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REPORT OF THE STAP EXPERT GROUP WORKSHOP ON EMERGING TECHNOLOGIES IN INTERNATIONAL WATERS AND THEIR APPLICATION TO GEF PROJECTS

[PREPARED BY THE SCIENTIFIC AND TECHNICAL ADVISORY PANEL (STAP)]

Report of The STAP Expert Group Workshop On Emerging Technologies In International Waters And Their Application To GEF Projects

Philippines
February 24-26, 1998

Prepared by
The Scientific and Technical Advisory Panel (STAP)
Of the Global Environment Facility (GEF)

STAP Secretariat

United Nations Environment Programme

TABLE OF CONTENTS

PREFACE

It is pleasure to present the report *of the STAP Expert Group Workshop on Emerging Technologies in International Waters and Their Application to GEF Projects* held in Philippines from 24-26 February, 1998. The workshop was convened by the Scientific and Technical Advisory Panel (STAP) of the Global Environment Facility (GEF), the objective of which was to promote a dialogue between scientists from developed and developing countries on highlights of emerging technologies already operational in some countries and the modalities of incorporating these into GEF projects were appropriate.

As a substantive input into the Workshop STAP prepared a background document. "*Emerging Technologies and Methods for Monitoring and Analysis of International Waters*". This provided not only an overview of emerging technologies but also their successful application in specific international waters bodies such as the Black Sea, Caspian Sea and Baltic Sea. It is anticipated that concrete action will be taken by the Implementing Agencies to integrate some of these technologies into existing and planned international waters project.

This Workshop report was prepared by the STAP Working Group on International Waters. The lead author for this report was Prof. Helen Yap.

Pier Vellinga
Chairman of STAP

June, 1998

EXECUTIVE SUMMARY

The Scientific and Technical Advisory Panel (STAP) of the Global Environment Facility (GEF), after an evaluation of the present portfolio in International Waters, was of the opinion that the projects, operational programs and operational strategy would benefit from a more effective use of advances in science and technology. STAP was guided in its thinking by the recognition of a "paradigm shift" from the simple gathering of data through direct observations, to the need to evaluate the response of a system to management interventions through monitoring and modelling, based on an ADEQUATE UNDERSTANDING of the dynamics of natural systems.

As a means of conveying its recommendations in an appropriate manner to the GEF, STAP convened an expert workshop, the objective of which was to promote a dialogue between scientists from developed and developing country institutions on certain highlights of emerging technologies already operational in some countries, and the modalities for incorporation of these into GEF-type projects, given conditions prevailing in developing countries. The focus of the workshop was on information technology, including chemical analysis of sediments, remote sensing of water body systems using radar, airborne instruments and acoustic measurements from ships, and the integration of data into numerical simulation models to enable understanding and prediction.

Environmental problems in developing countries are exacerbated by high rates of population growth, and include habitat destruction, over-exploitation of living resources, pollution and freshwater scarcity. A suggestion for an effective strategy was to incorporate elements of science and technology into the most critical phases of GEF project development, viz., conduct of a Transboundary Diagnostic Analysis (TDA), and development of a Strategic Action Program (SAP). It was emphasised, however, that the scientific community in a country or region should be actively involved in all stages of a project cycle, from conceptualization, to project design, execution, monitoring and possible revision. Furthermore, the entire GEF community, down to managers at the country level, would benefit from the introduction of a "culture of science, information and technology" which would be fostered through continual education and training. It was also recommended that each GEF project be guided by an in-house science and technology specialist (or "Project Engineer") who could advise on the use of appropriate technologies suited to project objectives, and which would realise better efficiency and cost-savings. Technology transfer could be effected through collaboration between developed and developing country institutions (the former with experience in the operationalisation of new technologies), or through regional networks of co-operating institutions. In order for science and technology to be effectively incorporated into GEF projects in developing countries, a correct political and management climate must be fostered, in particular to ensure sustainability after the lifetime of a GEF intervention. Vital elements of this would include capacity building at the local level, building up or strengthening of the proper institutional setting, and guiding policy and public opinion, particularly towards the long-term commitment of resources to support activities catalysed by the GEF. GEF mechanisms to facilitate the introduction of emerging science and technologies into developing countries could include pilot projects and targeted research projects.

INTRODUCTION

1. In 1996, the Scientific and Technical Advisory Panel (STAP) of the Global Environment Facility (GEF) prepared a thematic paper on International Waters. This document identified a number of key issues, one of which was the emergence of new technologies and methods which are improving the quality and reducing the cost of water management projects in some industrialised countries. One of the main conclusions of the STAP thematic paper was the need to introduce such new technologies and methods, representing current best practices into GEF International Waters projects.

2. Recent times have witnessed rapid advances in the sciences related to the oceans and other international water bodies with respect to instrumentation, sampling and experimental techniques, data quality control, numerical simulation, as well as the application of scientific results for management purposes. Managers of international water bodies can benefit greatly from the development of new methods and tools for the gathering and processing of information in support of their efforts. To date, GEF projects in international waters have focused largely on the identification of regional environmental problems, and remedial measures involving policy, institutions and economic structures that would be relevant in addressing such problems. The effectiveness of GEF projects can be enhanced by the improved quality of information and cost saving in monitoring.

3. STAP was of the view that one of the most effective ways of facilitating the transfer of emerging technologies in international waters is through convening of an Expert Group workshop. With the proposed workshop, it was hoped to demonstrate direct applications of science ranging from the scoping of environmental problems, to the determination of underlying dynamics and mechanisms, to prediction of the behaviour of water bodies and their living resources in response to varying kinds and degrees of environmental perturbation.

4. The objective of the workshop was to establish a dialogue among scientists at the forefront of the development of such methods, scientists from developing countries who could make the most effective use of them in their own projects, and GEF International Waters project staff. In addition to opening effective communication channels, the workshop would lay the ground for the establishment of co-operative networks of scientists in developed and developing countries for efficient transfer of new technologies.

5. The workshop was held on February 24-26, 1998 at the Marine Science Institute, Velasquez Street, University of the Philippines, Diliman, Quezon City, the Philippines. The list of participants is given in Annex II.

6. The workshop was structured in five distinctive phases, namely (see also Annex I):

   (i) An official session which was addressed by key representatives of the University of the Philippines, the Government of the Philippines, and of STAP.

   (ii) A thematic segment during which a number of presentations were made on: (i) generic methods in gathering and processing of information in support of management of water bodies, (ii) examples of applications of emerging technologies in international water bodies.

   (iii) Presentation and discussion of case studies based on current GEF project experience in International Waters highlighting the needs for science and technology and the ways these

could be applied for more effective project implementation and realisation of project objectives.

(iv) Working Group sessions in which working groups discussed the potential for utilising new technologies, the barriers that exist and means to overcome those barriers.

Subsequently, the Working Groups examined how and which new methods and technologies could be transferred to developing countries and adopted in GEF projects to realise a more effective strategy to achieve GEF goals.

The outputs of the Working Groups included the formulation of recommendations to that effect and the drafting of concepts for projects that incorporate new methods and tools.

THE INTERNATIONAL WATERS FOCAL AREA AND THE NEED FOR SCIENCE AND TECHNOLOGY

7. The International Waters (IW) focal area of the Global Environment Facility is guided by an Operational Strategy and 3 operational programs (OP's), viz., No. 8: "Waterbody-based operational program;" No. 9: "Integrated land and water multiple focal area operational program;" and No. 10: "Contaminant-based operational program." The operational programs specify important outputs of GEF projects which include, among others: a comprehensive transboundary environmental analysis identifying priority multi-country concerns; and a strategic action program consisting of expected baseline and additional actions needed to resolve such concerns. The specific roles of science and technology are implied throughout the operational strategy and programs, but not articulated in a prominent and coherent fashion.

8. The existing IW portfolio covering fiscal years 1992-1998 (including pilot phase projects) consists of 10 projects under OP#8, 4 projects under OP#9, and 6 projects under OP#10, with a total cost of US$192.4 Million. These are roughly categorised under freshwater basins, marine ecosystems, land degradation, small island developing states, ship-related pollutants, global contaminants, multiple focal area and technical support. In addition, there are a number of proposed projects in the "Pipeline" (covering fiscal years 1999-2000).

9. STAP recommends that science should serve as a fundamental basis for the design and conceptualisation of projects. Currently, data generation is most commonly achieved by direct observation. In order to better address International Waters issues, alternative approaches should be considered for the acquisition of data and their integration to allow for prediction, scenario development and evaluation of the effects of interventions. The role of science and technology could thus be described as being applied in: describing the status and dynamics of a system; quantifying rates of change and building scenarios; and monitoring and evaluation of the effects of management intervention.

10. To obtain necessary data and develop appropriate models, new skills and tools are needed. Among others, these include hydrodynamic-ecological modelling, dose-response relationships (applied in a system-wide context), and environmental cost-benefit-analyses. Technologies that enhance spatial and temporal resolution of interactions between natural and anthropogenic factors, and analytical tools to describe and quantify these, are critically needed. Science could also be used to formulate a set of simple indicators for each project to enable the evaluation of the effectiveness of GEF interventions.

ISSUES ADDRESSED AT THE WORKSHOP

11. Consideration was given to how future projects could be improved by incorporating new developments in science and technology. Some discussion was focused on how benefits of science and technology could best be assimilated, given existing capacity and infrastructure, in the developing countries. Another issue that was addressed was the existing barriers and barrier removal options on utilising new technologies.

12. Outputs of the Workshop were envisioned to be:

    (i) recommendations to the GEF on how to incorporate the new methods and tools to improve the quality of GEF projects;

    (ii) recommendations on the modalities for technology transfer, taking into consideration the existing capacity and infrastructure in Third World countries; and

    (iii) concepts for projects that incorporate new methods and tools, taking into consideration needs of the GIWA (Global International Waters Assessment).

13. Project proposals were supposed to explore ways and means to facilitate the further identification of promising technologies, the adaptation of such technologies to the needs of developing countries, and the development of pilot studies for testing these technologies as regards their applicability in developing country situations.

NEEDS AND DEMANDS OF DEVELOPING COUNTRIES

14. Freshwater, coastal and marine ecosystems are under greater stress than before as a result of population and economic growth. Thus, the sustainable use of aquatic resources is compromised. The situation is more serious among developing nations because of higher population growth rates (about 3% per annum, on average), and inadequately planned but rapid economic development. Human health, food security and employment opportunities are threatened in many developing countries.

15. The lack of freshwater has become a common and serious problem, especially on islands and in heavily populated regions. Inadequate planning and management of freshwater resources is identified as the major reason.

16. In freshwater and coastal systems, environmental degradation is more serious than in the open ocean. Major problems include eutrophication, industrial pollution, habitat destruction, erosion and sedimentation. In some parts of the open ocean, oil spills and over-exploitation (as in excessive by catch associated with pelagic driftnet fishing) are probably key issues. Transfers of exotic species into new habitats are an emerging concern.

17. In the developed nations of the world, the free flow of information, public awareness, the advance in information technology and the recognition of the subsequent economic benefits are the driving forces for the rapid development and use of environment-related technologies. In developing countries, socio-economic concerns have so far outweighed concerns for the environment; the realization is not widespread that the two are very closely inter-linked (i.e., a healthy environment can help support

carefully planned economic development which could potentially improve the standard of living on an equitable basis). The response to environmental problems in the Third World is often reactive rather than proactive. Scientists can play a positive role in initiating concerns for the environment through information pertaining to economic loss brought about by environmental degradation, and how science and technology could prevent or alleviate this.

18. Barriers to the application of emerging technologies in developing nations include security issues (such as relating to air-borne remote sensing), lack of basic local infrastructure (including hardware, software and trained personnel), poor knowledge and perception of the nature and benefits of new technologies, and various administrative limitations (policy, institutions, legislation, etc.).

THE ROLE OF THE GLOBAL ENVIRONMENT FACILITY (GEF)

19. The Global Environment Facility was put in place as a mechanism to finance efforts of developing countries to realise an improvement in environmental quality that would have global benefit. Resources of the GEF could be mobilised to harness the best that science has to offer in terms of understanding the nature and dynamics underlying particular environmental problems, putting these problems in their proper context, and identifying the most appropriate technological means to solve them. The GEF also offers potential means to overcome, reduce or eliminate barriers to incorporating the best that science and technology can provide to help developing countries realise environmental management objectives.

APPROPRIATE SCIENCE AND TECHNOLOGY

20. The focus of the workshop was on information technology. Certain new methods concern the routine monitoring and analysis of lake, river, estuarine or marine waters. The need for them has arisen in part from the results of the inter-comparison of measurements by leading laboratories of the world which have revealed the need for much higher quality control in, for example, chemical analysis. Other benefits have come from the introduction of new observing technology, especially that involving the remote sensing of the water system by radars situated on the coast or mounted on offshore platforms, by optical imaging from aircraft or from space, and by acoustic measurements from ships. The advent of gigaflops computers (capable of thousands of calculations per microsecond) has made it possible to integrate detailed models of the water system. The resulting simulations open the way to mathematical assimilation of observations into models, the first step towards forecasting which is one of the needs of environmental management. Once data assimilation becomes established practice, the observing system can be optimised to achieve the required information at minimum cost.

21. It was felt that the stages of GEF project development into which information technology would be most effectively incorporated were the Transboundary Diagnostic Analysis (TDA), and the development of the Strategic Action Program (SAP). GEF project development starts with obtaining a fundamental understanding of the nature of environmental problems in the geographic area of interest, as they are embedded in the complexities of natural ecosystem dynamics, including the influences of human populations. Recognition must also be made of the interconnections of various processes, both natural and anthropogenic, and their variations over different scales of space and time. Science and technology, thus, must play a critical role here, and this is initially captured in the conduct of a TDA. The TDA involves monitoring, modelling and assessment, and the setting of priorities for action on the basis of knowledge obtained.

22. The SAP is the next logical stage during which GEF interventions are designed to solve the problems

identified from the TDA. Thus, targets are set, activities planned, and the proper institutional arrangements put in place. However, it is recognised that gaps and uncertainties will continue to arise because of the dynamic nature of the environment. Hence, there will be a need for a permanent system of monitoring and evaluation.

23. As a concrete step towards the effective incorporation of science and technology into the GEF process, a matrix was developed wherein emerging technologies were mapped onto the various elements of the TDA and the SAP (Annex III).

24. It is recognised, however, that there exist specific criteria for the selection of technology that would be appropriate for use in a particular developing country under particular conditions. In selecting appropriate technology, the following would have to be considered: AVAILABILITY, APPLICABILITY and ADAPTABILITY. Furthermore, experience has shown that there is no such thing as a generic approach to problem-solving. Each problem arises in a specific context, and the optimum choice and combination of technologies will vary from project to project.

REQUIREMENTS FOR THE INTEGRATION OF SCIENCE AND TECHNOLOGY INTO GEF PROJECTS

25. The most critical consideration when incorporating appropriate elements of science and technology into GEF projects is that there is a correct POLITICAL AND MANAGEMENT CLIMATE to ensure SUSTAINABILITY of practices even beyond the lifetime of a GEF intervention. Thus, once a decision has been made concerning the inclusion of science and technology at appropriate stages of a GEF project in order to enhance its effectiveness, the next step in implementation would be to overcome, minimise or eliminate barriers to sustainability of implementation.

26. For a GEF project to be fully incorporated into the mainstream environmental agenda of a country, there must be a political mandate to do so. This is usually realised through executive decree, or through legislation, integrating the GEF activities into national priorities, and committing resources over the long-term for the purpose. A strong motivation for political action is PUBLIC PERCEPTION AND PRESSURE. Thus, there is a role for environmental education of the population at large.

27. In the actual implementation of the various elements of a project, different institutions are involved, and it is critical that the appropriate institutions are mobilised and strengthened, and that effective links are established among them. Often, there is a need for CAPACITY BUILDING, especially at the LOCAL LEVEL. In many developing countries, there is also a requirement for building up or strengthening local infrastructure, and the acquisition of certain hardware. But for infrastructure and equipment to be properly maintained, these must be placed in the correct institutional setting and looked after by capable personnel whose funding does not depend on the GEF on the long-term, but on local support.

28. Barriers to the effective use of science and technology include the lack of overarching frameworks or "master plans" at the country level (e.g., integrated coastal management; integrated river basin management); pervasive sectoral approaches to problem-solving; inadequate stakeholder involvement; and the failure to adequately mobilise the potential of multidisciplinary co-operation.

CONSIDERATIONS FOR TECHNOLOGY TRANSFER

29. The need for certain kinds of technologies in particular GEF projects must be evaluated carefully, especially in the context of the developing country or region (i.e., group of countries) concerned. Unique conditions pertain to particular countries or regions.

30. The decision of what types of technology are appropriate will have to be made within a broad context, defined, firstly, by the OBJECTIVE(S) of a GEF project or intervention. Clearly, this would relate to improvement of the environmental quality of a water body and the associated natural system. Once objectives are articulated, they would help define the STRATEGY, dictated by the particular local conditions where a project is being implemented, by which to approach the solution of specific environmental and human-related problems. The STRATEGY would include elements such as the proper kind of data acquisition, data processing, data interpretation and data presentation. Also, considerations would come in such as accuracy and precision required of the data; and selectivity, sensitivity, reliability, ruggedness and price of equipment.

31. The main challenge for the GEF (and the network of scientists advising it) is the adoption of appropriate technologies, and making them applicable and operational in developing countries in relation to project objectives. Information technology pertaining to data acquisition and management, data assimilation and visualisation will serve towards gaining better understanding of natural systems and the environmental issues attending them. Information gaps and uncertainties will be addressed, such as those concerning sources and sinks of pollutants in impacted areas, resolution of spatial and temporal variability, and the intensity of impacts and the underlying processes that control them.

32. Benefits of the proper application of appropriate technologies would include improvement of project efficiency and cost-effectiveness. Over-all, it is expected that the scientific and management capacity of developing nations in addressing their environmental needs would be strengthened.

33. There are a variety of mechanisms by which transfer of technology could be effected. One modality that has proven successful in the past is the development of partnerships or collaborative linkages between institutions in developed and developing countries. In some situations, a regional network of institutes, representing "south-south" collaboration, rather than a "north-south" flow of information, may be more suitable. As mentioned already in this document, there is no single prescription that would apply, and the approach should differ with each country or region concerned.

34. Institutions of higher learning and research institutes in developing countries are generally good vehicles for the application of emerging technologies, their modification and extension. However, information technology would be effectively applied and sustained only within institutional settings where environmental management frameworks are already in place.

TYPES OF POSSIBLE GEF PROJECTS AND INTERVENTIONS

35. The overriding goal of the GEF International Waters portfolio is the improvement of aquatic systems world-wide to ensure sustainable access to the resources and services they provide. Thus, GEF projects are, by nature, oriented towards effective interventions, which should be based on sound science. In this regard, the GEF should be able to enhance capacities in the areas of integrated assessment of problems and potential interventions. This will necessarily involve a range of disciplines, the various sectors, and relevant stakeholders.

36. Specifically, PILOT PROJECTS could be established to test and verify the applicability, efficiency, and cost-effectiveness of emerging information technologies with respect to selected problem areas in developing countries. New projects could be implemented for the purpose, or this could be done in the context of existing GEF projects as "TARGETED RESEARCH." An important component of such efforts would be considerations on capacity building at the local level.

37. When designing targeted research projects, problems addressed should be typical developing country problems that are presently under-funded. It would be ideal if topics appropriate or relevant to entire regions are identified. Targeted research should focus on the improvement of the use of science and technology in GEF-type projects, and be less directed towards "breakthrough" research. In order to be of value to the GEF, results should be available within 2-3 years.

RECOMMENDATIONS

1. STAP sees the need to develop a "culture of science, information and technology" within the entire GEF community (and not only with respect to the International Waters focal area) in order to enhance the usefulness of science and technology for effective intervention to improve environmental quality globally.

2. The development of a pervasive "science and technology culture" would require continual education and training (particularly on emerging technologies) at all levels, from the project implementing entity, down to CAPACITY BUILDING at the local level.

3. The GEF operational strategy and operational programs will need to be continually reviewed, revised and updated to incorporate the best that science and technology have to offer in a continuously evolving arena. STAP could play a more active role in this regard.

4. In order to ensure a solid scientific foundation for GEF projects, and to sustain project objectives, national and regional scientists must be active participants throughout an entire project cycle (i.e., from formulation, to execution, evaluation, then possible revision).

5. In relation to the preceding, the scientific and technical capabilities of the GEF operational focal points should be strengthened. One modality to achieve this could be the creation of a scientific and technical advisory system (based on a network of local and regional scientists) that helps in identifying and designing projects, and evaluating the appropriateness of the scientific and technological interventions proposed.

6. In addition, each and every GEF project would benefit from the guidance of a science and technology specialist (or "Project Engineer"), the position of which should be built into the national (or regional) implementation mechanism. The functions of this individual(s) would include recommendation of appropriate technologies to meet with the objectives and strategies embodied in a project, and for which sustainability could be assured after a project's lifetime, given local conditions of a particular country or region.

7. The imperative of QUALITY ASSURANCE should be built into each and every project, to assure that results generated are credible and acceptable internationally. The practice followed by many laboratories in developed countries is to seek accreditation to a relatively rigorous international scheme.

Developing country institutions should gradually work towards this.

8. Mechanisms for technology transfer should be actively explored, such as collaboration with institutes experienced in the operational use of new technologies, or the establishment of regional networks of co-operating institutions.

9. The PDF B is a possible form of GEF intervention to facilitate the introduction of new technologies into existing projects, or into new ones.

10. Additional dimensions of science and technology should be explored. Examples include habitat remedition or restoration, multiple focal area concerns, and linkages between the natural and social sciences. Specialised workshops could be one way to realise this.

11. The potential of the private sector to: 1) facilitate the introduction of new technologies into GEF projects; 2) to augment GEF resources in the implementation of projects; and 3) to better ensure sustainability of project activities beyond the lifetime of a particular GEF intervention should be utilised.

ANNEX I

STAP EXPERT GROUP WORKSHOP ON EMERGING TECHNOLOGIES IN INTERNATIONAL WATERS AND THEIR APPLICATION TO GEF PROJECTS

PROGRAMME

DAY 1: TUESDAY, 24 FEBRUARY 1998

SESSION 1:	Opening Session: Chaired by Prof. H.T. Yap (Joint Workshop Co-ordinator and Vice-Chair, STAP)
09:00 a.m.	Welcome by Prof. E.D. Gomez, Director, Marine Science Institute
	Statement by Dr. Claro Llaguno, Chancellor, University of the Philippines (Diliman)
	Statement by Prof. Pier Vellinga, STAP Chairman
	Keynote Address: Hon. Delfin Ganapin, Under-Secretary, Department of Environment and Natural Resources
09:45-10:15 a.m.	COFFEE
SESSION 2:	Overview and Background: Chaired by Prof. Pier Vellinga (STAP Chairman)
10:15a.m.-12:30 p.m.	Background and Purpose of the Workshop: Prof. John Woods (Joint Workshop Co-ordinator)
	Overview of the GEF International Waters Portfolio: Dr. Alfred Duda, Team Leader, Operations, GEF Secretariat
	Information and Data Needs for Coastal, Ocean and Freshwater Management: Implementing Agencies
	(Dr. John C. Pernetta, United Nations Environment Programme)
12:30-14:00 p.m.	LUNCH
14:00-15:00 p.m.	Emerging Technologies in Chemical Analysis for International Waters: Dr. J. M. Bewers, Bedford Institute of Oceanography, Canada
	Discussion
15:00-16:00 p.m.	Emerging Technologies in Coastal Monitoring and Prediction: Dr. David Palmer, Environment Agency, United Kingdom

	Discussion
16:00-16:30 p.m.	COFFEE
16:30-17:30 p.m.	Quality Modelling of Tropical Estuaries: Dr. Eric Wolanski, Australian Institute of Marine Science, Australia
	Discussion
17:30-18:30 p.m.	Airborne Remote Sensing Systems: Dr. Arnold G. Dekker, Institute for Environmental Studies, Vrije Universiteit, Amsterdam, the Netherlands
	Discussion
18:30 p.m.	Reception hosted by the Chancellor of the University of the Philippines, Diliman

DAY 2: WEDNESDAY, 25 FEBRUARY 1998

SESSION 3:	Application of Emerging Technologies (Chaired by Prof. John Woods, Joint Workshop Co-ordinator)
09:00-10:00 a.m.	Application of Emerging Technologies in the Black and Caspian Seas: Dr. David Aubrey, Woods Hole Oceanographic Institution, Massachusetts, U.S.A.
	Discussion
10:00-11:00 a.m.	Application of Emerging Technologies in the Baltic Sea: Dr. Hans Dahlin, Swedish Meteorological and Hydrological Institute, Sweden Discussion
11:00-11:15 a.m.	COFFEE
11:15a.m.-12:15 p.m.	Application of Emerging Technologies in the North Sea: Dr. David Prandle, Proudman Oceanographic Laboratory, Bidston Observatory, England (Presented by Prof. John Woods, Imperial College of Science, Technology and Medicine, London, U.K.)
	Discussion
12:15-13:15 p.m.	The Application of Casi to Coastal Zone Management in the Turks and Caicos Islands in the Caribbean: Herbert Ripley, Hyperspectral Data International Inc., Dartmouth, N.S., Canada
13:15-15:00 p.m.	LUNCH
SESSION 4:	Working Group Sessions

15:00-15:20 p.m.	Considerations for Working Group Sessions: Prof. Helen T. Yap
15:20-18:30 p.m.	Working Groups commence work. Three working groups will be convened, each focusing on how emerging technologies mentioned could be integrated into future GEF projects; the modalities for facilitating the transfer and application of these technologies in developing countries; and the types of future GEF projects that could be formulated with a greater emphasis on science and technology, particularly emerging technologies.
19:30 p.m.	Reception hosted by the United Nations Environment Programme (Mario's Restaurant, Quezon City)

DAY 3: THURSDAY 26 FEBRUARY 1998

08:00-10:00 a.m.	Working Group sessions continue
10:00-10:15 a.m.	COFFEE
10:15a.m.-13:00 p.m.	Continuation of Working Group sessions and preparation of reports
13:00-14:30 p.m.	LUNCH
SESSION 5:	Presentation of Working Group reports (Chaired by Prof. Helen T. Yap and Prof. J. Woods)
14:30-16:30 p.m.	Working Group presentations
16:30-17:30 p.m.	Consideration of final Workshop report
17:30 p.m.	Closing Statement

ANNEX II

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