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THE SIREN

news from UNEP's Regional Seas Programme

Averting Disaster In Africa

The devastation of the West and Central African environment by desertification and deforestation is forcing its peoples to turn hopeful eyes towards the sea as a source of bodily and economic sustenance in the coming decades. But the sea faces severe threats as well.

"We in western Africa are sandwiched between two evils," says a senior official from the region. "To our east, the desert is eating up our agricultural lands at an unprecedented rate, while further south forests are being destroyed to fulfill short-term needs. To the west, our coastal waters are being polluted by oil from offshore tankers, wastes from the shore and sediments which pour in from eroded inland areas. When we look to the sea as an alternative source of food, we find that foreign ships are taking 90 per cent of the annual catch. And between the desert and the sea, people are crowding coastal areas beyond their capacity, causing unemployment, social unrest and destruction of the basic infrastructure of our urban centres. This pattern is being repeated all over western Africa."

Three and a half years ago the countries of West and Central Africa

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a sea-change

by Arvid Pardo

Arvid Pardo was the 1983 winner of the Third World Prize. He has served as Malta's Permanent Representative to the United Nations, Ambassador to the U.S. and U.S.S.R., and High Commissioner to Canada. He was involved for some time in the negotiations on the Law of the Sea Convention, and is currently professor of international relations at the University of Southern California.

The following was excerpted from an article which appeared in South magazine (May, 1984) following Dr. Pardo's acceptance of the Third World Prize.

Uses of ocean space have changed, intensified and diversified over the past 30 years, but we are on the eve of even more dramatic changes that will have far-reaching political and economic consequences.

This is certainly not the occasion to analyse once again the philosophical content of the common heritage principle or to comment upon the long, complicated, and sometimes bitter negotiations on the Law of the Sea that were finally concluded with the signature in December 1982 of an historic convention.

The new convention has transformed the Law of the Sea. Important innovations range from the introduction into international law of the concepts of the exclusive economic zone, archipelagic waters and transit passage through straits used for international navigation, to the redefinition of the legal continental shelf and the explicit recognition of scientific research, and the construction of artificial islands, as freedoms of the high seas.

Four points, however, may deserve special mention.

This is the first time in history that the international community, "conscious that the problems of ocean space are closely interrelated and need to be considered as a whole," has attempted a comprehen-

sive approach to the uses of the seas and to the problems of ocean space. Second, the scope of international law has been significantly enlarged through the assertion in the convention of a duty of international co-operation in development and transfer of marine science and technology and through elaboration of the concept of a comprehensive environmental law of the sea based on the obligation of all states to protect and preserve the marine environment. Third, the 1982 Jamaica convention contains in Part XV and related annexes remarkably balanced, flexible and comprehensive provisions for settlement of disputes. If these are effectively implemented, they could constitute a most constructive development in international law. Finally, international acknowledgement that the seabed and its mineral resources enjoy a special legal status as a common heritage of mankind could mark a revolution not merely in the law of the sea, but also in international relations, by changing the structural relationship between rich and poor countries and the traditional concepts of economic aid.

The new convention does not clearly delimit national jurisdiction in the marine environment. Furthermore, the political, economic and technological forces propelling coastal states toward eventual partition of the oceans have not lost their strength merely because of the existence of the convention. It is possible, therefore, that by the end of this century much of what remains of the high seas -- apart from remote or unexploitable areas -- will be claimed by coastal states. We may then have a situation approximating that of five centuries ago when, following the papal grant in the Bull Inter caetera, Spain and Portugal, by the Treaty of Tordesillas in 1494, divided between themselves all seats and lands not already claimed by Christian kings.

Yet I am certain that in due course a reaction will set in under the stimulus of scientific and technological advance. This, in a sense, is ironic. Scientific and technological advances were probably the the decisive factors in setting in motion present expansionary trends in coastal state jurisdiction. But, as ocean space becomes integrated in man's living environment, as commercial navigation and other uses of the sea become subject to conflicting national regulations, as living resources of the seas under different national regimes come under increasing pressures, as military uses of the seas become all-pervasive, as powerful technologies are not only used but misused, as marine pollution spreads, states will gradually discover through bitter experience that full, beneficial use of the marine environment for national purposes presupposes new forms of close international co-operation at least

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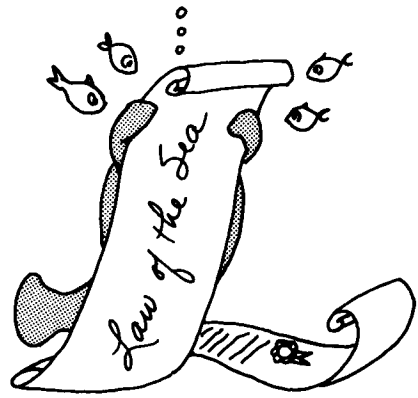
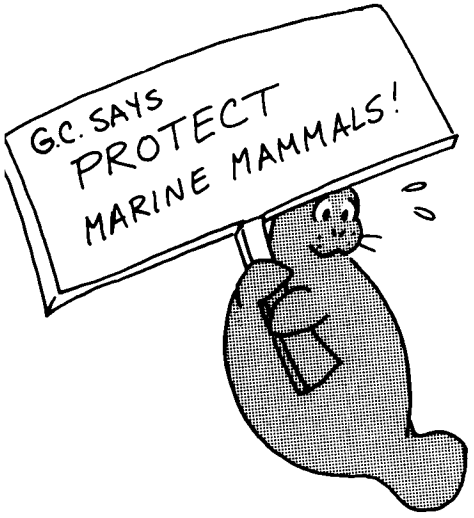


UNEP Governing Council

In their statements to the 12th Governing Council of UNEP (Nairobi, 16-29 May 1984), sixteen speakers referred specifically to the problems of the oceans. They repeatedly stressed the need to continue support to GESAMP, to increase funds for regional seas programmes, to activate the action plan for marine mammals, and to continue the worldwide watch over marine pollution.

The Council decided that:

- the possibility of a regional approach to the protection of marine mammals should be investigated;
- studies on environmental impact of the disposal of radioactive wastes on the seabed as well as in the area of sea-bed mining should continue;



- regional seas conventions and protocols should be adopted and ratified by states concerned;
- contributions to the regional seas trust funds should be paid regularly;
- the Executive Director of UNEP is urged "to apply his discretionary authority to increase funds for the high-priority regional seas programme, and to provide adequate financial support to this programme so that ongoing activities may be sustained and the preparatory activities for a new South Asian Seas Action Plan may be completed."

Dissatisfaction was expressed with how funds had been allocated since the Council's eleventh session. The delegates felt that guidance had not been heeded, as certain elements of the programme designated by the Council as high priority had been cut back.

The situation arose because of UNEP's difficulty in reconciling the difference between funding of various activities according to fixed percentages of the total budget and priorities as indicated by the Council.

Some delegations expressed concern about the planned transfer of the Regional Seas Programme from Geneva to Nairobi, and called for caution in order not to disrupt the work of a programme which was considered one of UNEP's successes. One delegation called for a cost/benefit analysis of such a transfer before it took place. The Secretariat of UNEP replied that there had been reasons in the past, when concentration was on the Mediterranean Action Plan, to have the Regional Seas Programme in Geneva, but now that the Programme had expanded world-wide it was an appropriate moment to transfer the Programme to Nairobi.

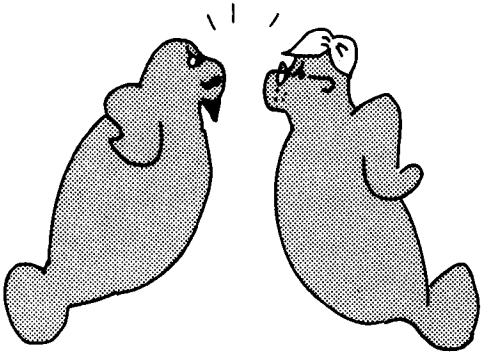
GESAMP XIV

The annual session of GESAMP* (Vienna, 18-30 March 1984) was a stormy but constructive one. The 21 experts gathered from all parts of the world, under the chairmanship of Dr. Alistair McIntyre, had an impressive agenda to cope with.

The report on the harmful effects of cadmium, lead and tin, as well as the report on the interchange of pollutants between the atmosphere and the oceans, did not meet with unanimous approval, and the experts insisted on seeing a revised version before they would agree to their publication.

The proposed guidelines for evaluating threshold values for fish tainting fared much better. The review of the atmospheric transport of pollutants into the Mediterranean was not ready for discussion and the experts reiterated their hope to see it at the next meeting in a year's time. The report on the effects of thermal discharges in the marine environment stimulated a lively discussion and was approved with minor changes on the spot. The question of how to analyse and quantify the land-sea boundary flux of pollutants was debated at length and a report on this subject is expected by the next meeting.

Passions were ignited when the waste assimilative capacity of oceans and the critical pathway analysis



were advocated in environmental impact studies. After lengthy discussion it was accepted as obvious that each ecosystem has a finite capacity to assimilate pollutants, but the feasibility of their quantitative assessment was questioned. However, the reservations against the unrestrained use of critical pathway analysis remained strong. With this caveat the experts recommended that for the next session specific guidelines be prepared for the assessment of the impact of potentially harmful substances released from land-based coastal sources into the marine environment, and that the use of the guidelines be demonstrated by an actual case study.

Another hot agenda item was a proposal to launch an inquiry into the scientific justification for integrated global ocean monitoring related to marine pollution, which had been referred to GESAMP by a meeting held in Tallin in late 1983 on the same subject. After pro and con arguments were heard, it was agreed that GESAMP should look into the matter.

* The IMO/FAO/UNESCO/WMO/WHO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Pollution. More information on GESAMP and GESAMP publications is available from The Siren. Just write and ask for it.

mediterranean

Fifteen Mediterranean Governments and the European Community, at their annual meeting on the protection of the Mediterranean, declined to consider the adoption of common criteria for safe water for swimming and for growing shellfish.

The disappointing action came after nine years of scientific research and monitoring and dozens of meetings.

The Governments had heard a pre-conference warning of Dr. Mostafa K. Tolba, Executive Director of UNEP:

"At this meeting you have one more opportunity for action. I urge you to consider seriously adopting environmental quality criteria for mercury in Mediterranean seafood and for the microbiological quality of your bathing beaches, shellfish and shellfish - growing areas. These criteria are based on the data collected and analysed by your own experts and supported by the technical know-how of WHO and FAO.

"If action is not taken, the Mediterranean peoples may doubt how seriously committed you are to safeguarding the future of the Mediterranean Sea.

"Adopting treaties, holding meetings, publishing studies and recommendations do not constitute the kind of action expected from us. Action is national legislation and its strict application."

Several positive decisions, however, were taken.

One called for a two - year, US$175,000 programme to study the problem caused by the appearance of jellyfish along bathing beaches, especially in the Eastern and Central Mediterranean.

UNEP had proposed trying to create a standardized methodology for observation and data reporting, making use of jellyfish observations by fishermen, coast guards and crews and passengers of pleasure boats. The approved programme will also include looking into factors that affect the population dynamics of jellyfish, studying jellyfish poisoning and identifying measures for prevention and cure.

In another decision the representatives of the Mediterranean States authorized the expenditure of US$183,000 this year and US$200,000 next year by the recently - created

centre for specially-protected areas in Tunis. The purpose of this centre is to help Mediterranean countries preserve and improve their living marine resources through the establishment of marine parks and protected zones.

It was also agreed that the Mediterranean Trust Fund, into which 17 Mediterranean countries and the European Community are putting US$3.5 million in 1984 and again in 1985, will be extended through 1987.

Assessing the work of the meeting, which ended Friday 13 April, Aldo Manos, the Co-ordinator of the Mediterranean Action Plan's headquarters in Athens, declared :

"I was disappointed at the failure of the Mediterranean Governments to adopt common environmental quality criteria for bathing water and shellfish at this meeting. Usually, UNEP is accused by Governments of moving too slowly. This time our pace was apparently too fast for them. So, the decision was put off until September of 1985 in Genoa. This is two full tourist seasons away!"

caribbean

Experts from 17 island States and Territories of the Wider Caribbean met in St. Lucia from 7 to 11 May 1984 to consider and adopt a sub-regional Oil Spill Contingency Plan for the islands.

The meeting was held under the auspices of the International Maritime Organization (IMO), the Organization of American States (OAS) and UNEP.

Approval of the Plan culminated five years of preparatory work started by the OAS in 1979. Regional oil spill contingency planning has been one of the highest priorities within the Caribbean Action Plan since its adoption on 8 April 1981 at Montego Bay, Jamaica.

The Oil Spill Protocol to the Cartagena Convention, which provides for the development of sub-regional plans, provides the legal framework for the Plan.

The substantive aspects of the plan deal with policy and responsibility; response operations including requests for assistance; joint response operations and the use of dispersants; reporting and communications; and administration and logistics. As with the oil spill protocol, an annex makes provision for applying certain aspects of the Plan to incidents involving other hazardous substances.

The final development of the sub-regional plan was financed from several sources, including the Caribbean Trust Fund, IMO, OAS, the U.S. Agency for International Development (USAID) and the Swedish International Development Agency (SIDA).

It is expected that in the future similar sub-regional plans will be adopted for the Central American and South American parts of the Wider Caribbean Region. The Third Meeting of the Monitoring Committee allocated US$44,000 for preparatory work for the South American sub-region.

south-east pacific

Two documents have been prepared with support from UNEP by the Permanent Commission for the South Pacific (CPPS), in collaboration with IOC and within the framework of the South-East Pacific Action Plan:

- Programme for research, monitoring and control of marine pollution by petroleum hydrocarbons in the South-East Pacific and their effect on marine communities and ecosystems;
- Programme for co-ordinated research and monitoring of marine pollution in the South-East Pacific region (CONPACSE - Phase I).

The first document has received the full endorsement of those countries participating in the Action Plan (Colombia, Chile, Ecuador, Panama and Peru).

The second document is being circulated for comments to Action Plan focal points before the programme document is finalized.

The South-East Pacific countries have identified the national institutions which will participate in CONPACSE. These institutions are presently analyzing the description of the programme in order to determine which aspects of Phase I they will undertake (pollutants to be measured, sites and frequency of sampling, processing of information, etc.).

The Third Intergovernmental Regional Meeting on the Environment in Latin America and the Caribbean (Lima, 11 April 1984) adopted a resolution which calls for continued and increased support of participating countries and UNEP towards the vigorous implementation of the South-East Pacific Action Plan.

south pacific

Two reports have been issued to assist the next round of negotiations on the Convention for the protection and development of the natural resources and environment of the South Pacific (Noumea, 18-28 September 1984).

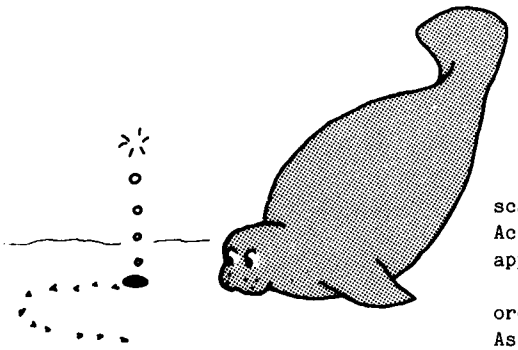
The more than 200 pages of the first report deal in great detail with the problems of radioactivity in the South Pacific. The main conclusions of the report are that:

- the exposure to artificial sources of ionizing radiation, mainly the radionuclides formed during previous atmospheric nuclear weapons tests is on the average two to three times lower in the South Pacific region than for the world as a whole;
- the dumping of radioactive wastes in the region, if carried out in limits set by IAEA, should pose extremely limited risk to human health or environmental safety.

Nevertheless, the report clearly warns that the dumping of radioactive wastes in the ocean should not be adopted as a procedure to be preferred over land-based disposal, and expressed concern about the possible long-term effects if the nuclear weapons testing programme and the accumulation of radionuclides underground are to continue in the future.

The second report summarizes the facts about hazardous waste storage and disposal in the South Pacific.

Both reports are available in the UNEP Regional Seas Reports and Studies Series (Nos. 40 and 48, respectively.



kuwait action plan region

The pollution monitoring programme in the Kuwait Action Plan Region has been extended through the end of 1985. At its third meeting, the Council of the Regional Organization for the Protection of the Marine Environment (Kuwait, 24 - 25 April 1984) also recommended the convening of workshops on oceanographic methodology and pollution sampling and analysis, the holding of a symposium on the marine environment of the KAP Region, and continuation of intercalibration exercises among participating institutions.

To initiate the development of a protocol concerning pollution from land-based sources, the Council approved plans for a meeting of legal and technical experts to be held before the end of 1984. In a related activity, an in-depth study on control of land-based sources of pollution will be carried out.

Other projects envisaged for the near future will deal with pollution by mercury and by chlorinated hydrocarbons.

east asian seas

The first two years of full-scale work on the East Asian Seas Action Plan have earned enthusiastic approval.

At its third meeting, the Co-ordinating Body of the Seas of East Asia (COBSEA) reviewed activities of the past biennium and marked progress made on projects concerning levels and effects of pollution, assessment of coral reef cover and management, marine meteorology and oceanography, oil pollution, hazardous waste dumping and data exchange.

And in one important decision, several participating Governments of the region pledged to raise their contributions to the East Asian Seas Trust Fund by 10 per cent, contingent on a matching increase by the UNEP Environment Fund. Allocations for the five projects were then adjusted to take into account recent developments.

The Interim Co-ordinator of COBSEA, Herman Haeruman, noted that the last year has been especially busy, including four workshops and significant progress on projects involving assessment of non-oil pollution and development of national mechanisms for data exchange.

The meeting, which was held in the Genting Highlands, Malaysia, on 5-6 April, also initiated efforts to bring a sixth Government into COBSEA and the East Asian Seas Action Plan: Brunei Darussalam has recently joined the United Nations and the Association of South East Asian Nations.

DATE	PLACE	TITLE	ORGANIZERS
17-21 September	Zagreb	Consultation meeting on biological monitoring of methylmercury in Mediterranean populations	WHO/FAO/ UNEP
18-28 September	Noumea	Third meeting of experts on a convention for the protection and development of the natural resources and environment of the South Pacific region	SPC/SPEC/ ESCAP/UNEP
11-13 October	Lucerne	VII UNEP/IOC/ICSEM Workshop on pollution of the Mediterranean	ICSEM/IOC/ UNEP
29 October- 3 November	Nairobi	Second meeting of experts on a draft convention and protocols for the East African Region	UNEP
5 - 9 November	Rovinj	Workshop on toxicity and bio-accumulation of selected sub-stances in marine organisms	FAO/UNEP
26-30 November	Suva	Training course for oil spill control and development of sub-regional contingency plans	IMO/SPREP
10-14 December	Athens	Third meeting of the Working Group for scientific and technical co-operation for MED POL	UNEP
11-14 December	Havana	Second workshop on environmental management of bay ecosystems in the Caribbean region	UNESCO/Govt. of Cuba/ UNEP

"El Niño" causa estragos nunca vistos en la población de iguanas marinas

por

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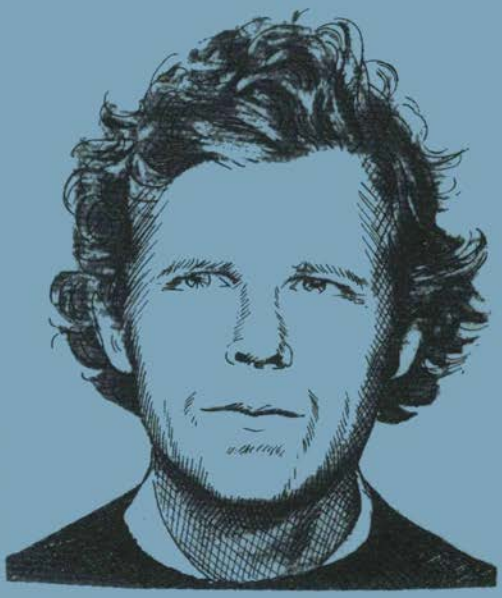
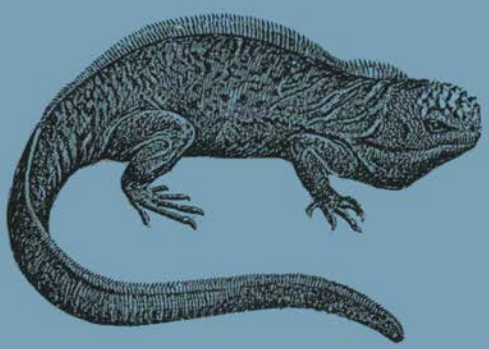


Además de las catastróficas y muy generalizadas inundaciones en tierra firme, en el Ecuador y el Perú, y del desmoronamiento completo de la industria peruana de pesca de la anchoa, la envergadura excepcional este año de la Oscilación Meridional llamada "El Niño" ha acarreado cambios considerables en la fauna y la flora de las Galápagos, y en las propias islas. El fenómeno de El Niño se produce a intervalos de dos a diez años en el Océano Pacífico tropical, y se caracteriza por una temperatura anómalamente alta de la la temperatura de superficie en alta mar, fuertes precipitaciones y unos vientos alisios insólitamente débiles. El intervalo medio entre fenómenos particularmente "fuertes" con una temperatura de superficie del mar de más de 3°C por encima de la media es de 12,3 años, habiendo ocurrido el último en 1972-1973. Pero El Niño de 1982-1983 es el más grave conocido: en las Galápagos, la temperatura de superficie mensual media llegó a ser 4,3°C más alta que la normal en junio de 1983, los vientos alisios brillaron prácticamente por su ausencia y en Puerto Ayora, en Santa Cruz, cuyas precipitaciones anuales medias (1965-1981) son de 374 milímetros, cayeron más de 3 500 milímetros de lluvia

durante ocho meses, a partir de diciembre de 1982. Otros efectos muy acusados de El Niño han sido un nivel extraordinariamente alto del agua en alta mar, fuertes marejadas y mar gruesa. La vegetación terrestre es ahora tan espesa que hace falta un machete para poder subir a los riscos, y el alto nivel del mar y la intensa acción de las olas han causado una erosión general, que ha destruido, por ejemplo, la mayor parte de la larga playa negra de la costa sudoriental de Marchena.

Los animales terrestres han prosperado, por supuesto; algunas parejas de pinzones y de sinsontes de Daphne y Tower han criado más de cinco pollos, cuyas crías han anidado ya a su vez. No se puede decir lo mismo de la vida marina y de las iguanas y los pájaros marinos que de ella dependen. La mayor temperatura del mar y la menor salinidad han traído consigo la desaparición de muchos organismos marinos y la dislocación de cadenas alimentarias enteras. Las colonias de patos bobos de patas azules están hoy desiertas, y no se ve ni un solo paájaro en las laderas de anidamiento de Roca Vicente o en el suelo del cráter de Daphne. Los albatros ondulados de Española han intentado nidificar, pero son muy pocos los que han regresado este año, y los huevos de muchos de ellos han sido barridos por la crecida de las aguas.



Han quedado también afectadas las iguanas marinas -una de las treinta especies de iguaninas (subfamilia Iguaninae, de la familia Iguanidae de grandes lagartos)-, que no viven más que en las Galápagos y que son justamente célebres por su gran capacidad de adoptación a un régimen de alimentación basado en las algas de la aguas frías de la corriente de Humboldt.

Este año, unas condiciones excepcionales han acarreado la desparición de una mayoría de algas, como Ulva, Spermothamnium, Centroceras y Gelidium, de las que se alimentan normalmente la iguanas, y las zonas intermareales y submareales han sido colonizadas por varias especies nuevas, con consecuencias calamitosas para las iguanas. La modificación de la flora algal, combinada con fuertes marejadas y un nivel del mar extremadamente alto, que restringen el acceso a las zonas de alimentación, han ido unidas a una mortalidad en masa de las iguanas marinas en toda las islas, si bien hay diferencias entre ellas en lo tocante a las tasas de mortalidad, globales y por edades.

Sobre las iguanas marinas ha versado un estudio de tres años de duración, iniciado en 1981, relativo a la dinámica de la población y la organización social. Están, pues, bien documentados los efectos de El Niño sobre esa especie. Casi todos los animales tienen un peso inferior al normal y, en ciertas poblaciones de Fernandina, la mortalidad ha sido

casi de un 50%. Allí donde hay pocas posibilidades de alimentación intermareal pero oportunidades de alimentación submareal por buceo, la mortalidad de los adultos ha sido pequeña y la juvenil, en cambio muy grande. Por otre parte, en Santa Fe, isla en la cual la alimentación es esencialmente intermareal, tanto los animales jóvenes como los adultos han muerto en gran número (aproximadamente un 40%) y en los doce mese últimos se ha producido, por término medio, una pérdida de peso del 30% entre los adultos supervivientes. La mayoría de los animales jóvenes no han perdido peso pero, en comparación con el aumento anual normal (un 35%), este año los animales de tres a cinco años pesa un 8% más, aproximadamente. Las crías suelen doblar de peso en su primer año (un incremento medio del 110%), pero el aumento medio de peso de las crías de 1982 fue tan sólo de un 65% al cabo de un año.

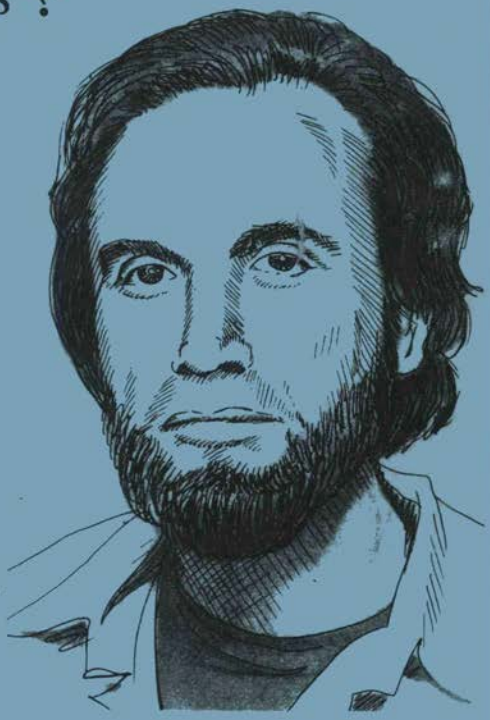
Al efectuar la autopsia de animales muertos, se han encontrado estómagos casi vacíos o que contenían los restos, en gran parte sin digerir, de las nuevas especies de algas, junto con elementos de carroña, como trozos de cangrejos, leones marinos e iguanas, así como tierra y piedras. Las nuevas especies de algas parecen difíciles de digerir; su aspecto exterior no había cambiado prácticamente después de haber pasado por el aparato digestivo, y las heces, normalmente líquidas y amorfas, eran secas y fibrosas, resultando perfectamente identificables los restos de comida. Solamente el análisis de ejemplares de algas, del contenido del estómago y los intestinos y de las heces permitirá determinar si ello se debe a unas toxinas que hayan atacado a las propias iguanas o a microorganismos de la tripa. Se están examinando detalladamente ejemplares fijos de iguanas que

murieron en tales circunstancias, para dar con la causa exacta de su muerte. Algunos animales tienen una carga particularmente grande de un parásito -el trematodo Iguanacola navicularis- en la tripa, pero no parece probable que se trate de la causa primaria de la muerte. Se han recogido huesos de animales muertos en diez islas diferentes, con la esperanza de que, como ha se ha logrado en el caso de reptiles templados, se pueda precisar su edad a partir de anillos anuales, visibles en secciones descalcificadas y manchadas. Si los resultados son positivos, ello revestirá evidentemente una enorme importancia para el estudio de la dinámica de la población: los trabajos preliminares indican que las iguanas marinas pueden vivir treinta años, por lo menos.

El Niño ha provocado grandes estragos, pero ha brindado una oportunidad excepcional de estudiar una calamidad natural y sus efectos sobre las poblaciones. La envergadura de El Niño de 1982-1983 no tiene paralelo desde hace cien años, como mínimo, y en sus últimas manifestaciones no se han conocido casos de mortalidad en masa de iguanas marinas, a pesar de la presencia de los biólogos que trabajan en las islas. En agosto de 1983 empezaron a ser normales de nuevo las condiciones en las Galápagos. La composición de la flora algal marina cambió lentamente y, aun no habiendo vuelto todavía a ser normal, proporciona ya buenos pastos a las iguanas marinas. A fines de noviembre de 1983, había deaparecido casi por completo la invasión de Giffordia y de Enteromorpha. La mortalidad de las iguanas se redujo espectacularmente en agosto, y los animales empezaron a recuperar peso, si bien a principios de noviembre estaban aún por debajo de su peso antes de El Niño (un 10% menos, por término medio).

El Niño repercutió gravemente en la temporada de cría de 1983-1984. Los machos empezaron a defender su territorio en la época normal, pero las hembras les rechazaban, y no se observaron acoplamientos durante una temporada territorial que duró dos meses más de lo normal. Se vio únicamente a diez hembras anidando en Santa Fe, donde nidifican normalmente 1 800 al año, y no hubo ninguna o muy pocas en las demás islas, en las cuales las iguanas suelen anidar muy pronto. En las islas en las que las iguanas hacen normalmente sus nidos más tarde había, en cambio, una actividad casi normal al respecto a fines de marzo. Probablemente las hembras se habían recuperado para entonces lo suficiente como para dedicar sus energías a producir huevos y a nidificar. Se reanudará el estudio sobre las iguanas marinas en la próxima temporada de cría, en noviembre, para ver cuáles son los animales que se acoplan y anidan, en relación con la edad y el historial de cría.

L'assainissement d'Abidjan et la sauvegarde de sa lagune : quelles alternatives ?



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ingénieur agronome

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ABIDJAN ET SA LAGUNE

La côte occidentale d'Afrique est particulièrement bien pourvue en lagunes, notamment de la Côte d'Ivoire au Nigéria. La lagune Ebrié, avec une superficie de 532 km^2 est la plus étendue d'entre elles[2]. Au début du siècle, ses rivages n'étaient guère peuplés que par quelques villages de pêcheurs ébriés. En 1904, un des plateaux qui la surplombent, au lieu dit Abidjan, était choisi comme tête de ligne de la voie ferrée devant joindre l'Océan au fleuve Niger. Dès lors, le devenir de la lagune était lié à l'essor d'Abidjan. A partir de 1931, les maisons de commerce s'y installèrent, suivant la construction du wharf de Port-Bouet sur l'Océan. En 1934, le gouverneur de la Côte d'Ivoire s'y établissait.

[1] Institut français de recherche scientifique pour le développement en coopération (ORSTOM), 24, rue Bayard, 75008 Paris, France

[2] Voir la carte en page 16.

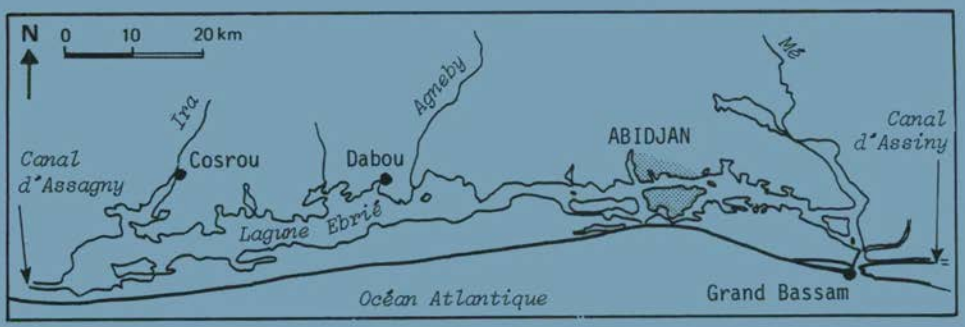
En 1950, le cordon lagunaire était percé, et les premiers quais du port d'Abidjan construits sur les rives de la lagune. De 22 000 habitants en 1939, l'agglomération passait à 128 000 en 1955, 650 000 en 1973 et plus de 2 millions aujourd'hui. Une telle croissance n'a pas été, bien entendu, sans poser de problèmes aux urbanistes et aux responsables de la santé publique.

LES PLANS D'ASSAINISSEMENT DE LA VILLE

Avant 1968, le problème posé par l'assainissement d'Abidjan ne fut guère évoqué. A cette date, les Ministères de la Santé et des Travaux Publics présentèrent une requête à l'ONU dans le cadre du Programme des Nations Unies pour le développement (PNUD). A la suite de graves épidémies, le PNUD chargea l'OMS de faire des études sur le sujet, et, en 1975, le schéma directeur initial d'Abidjan était mis au point.

Plusieurs fois remanié pour tenir compte de la démographie galopante et des difficultés financières, ce schéma propose une solution qui a fait ses preuves depuis le 19e siècle dans les pays industrialisés : le cocktail eau-fèces, son transport par égout et son traitement centralisé avant rejet au large de la côte océanique.

En 1980, on estimait que 80% de la population, soit 1,3 million d'habitants, n'étaient pas encore raccordés aux égouts. Parmi ceux-là, très peu bénéficiaient d'un assainissement individuel. Selon les prévisions les plus optimistes, 40% de la population ne devraient pas encore être desservis en 1990 : ce qui représentera alors 1,7 million d'habitants. Donc, malgré les efforts financiers consentis d'ici là, la population non correctement assainie va augmenter. On est loin des objectifs de la Décennie internationale de l'eau des Nations Unies, qui sont, d'ici à 1990, d'apporter l'eau potable à tous les pauvres du monde, et d'évacuer dans de bonnes conditions d'hygiène les eaux usées par leur activité domestique.



LA DETERIORATION DE LA QUALITE DES EAUX LAGUNAIRES

Non moins grave, on constate que ce taux d'assainissement déjà faible n'est atteint qu'au prix d'une détérioration de la lagune Ebrié. En effet, compte tenu des difficultés économiques que traverse la Côte d'Ivoire depuis quelques années, il est difficile de mener de front deux opérations jugées classiquement concurrentes : l'assainissement des populations et la sauvegarde du milieu naturel.

Il a donc été donné priorité aux raccordements aux réseaux déjà existants par rapport au traitement des eaux usées. Il n'est d'ailleurs plus guère question à Abidjan de leur évacuation au large des côtes océaniques, et, aux dernières nouvelles, l'emplacement prévu de la station centrale d'épuration a été loti en dur ! Dès lors, les effluents arrivent de plus en plus volumineux en deux points particulièrement mal choisis pour la sauvegarde de l'écosystème lagunaire. Ceux de la rive nord parviennent dans le chenal central qui commande l'accès à toute la lagune orientale, faisant barrage aux larves et jeunes poissons qui, en provenance de l'Océan, y transitent pour aller s'engraisser en amont. C'est donc le potentiel halieutique de la lagune orientale et aussi d'une partie de l'Océan qui est en danger. Cette pollution croissante n'est probablement pas sans relation avec les rendements décroissants de la pêche lagunaire, passée de 10 000 tonnes en 1975 à 5 000 tonnes au début des années 80.

Deuxième point de rejet : les effluents de l'île de Petit-Bassam aboutissent en baie de Biétri. Cette baie de 600 ha, aux eaux naturellement peu renouvelées, est déjà fort dégradée. La demande biochimique y atteint dix fois celle des eaux naturelles. En saison d'étiage, ses eaux profondes sont totalement désoxygénées. Eu égard à son taux de contamination bactérienne, la baie est impropre à toute utilisation.

Cet aspect de la dégradation lagunaire est particulièrement inquiétant. Elle risque d'atteindre les 40 000 personnes qui tirent leur revenu de la pêche lagunaire et de ses activités annexes. N'oublions pas non plus que la lagune, tant qu'elle n'est pas trop dégradée, donne à la capitale ivoirienne un cachet exceptionnel qui la fait surnommer la Venise africaine. Elle est le cadre de vie et de loisirs des Abidjanais, et stimule un tourisme gros pourvoyeur de devises.

L'INADAPTATION DES SOLUTIONS CLASSIQUES

Compte tenu de leur coût élevé, l'assainissement du plus grand nombre des Abidjanais et la sauvegarde de la lagune sont-ils incompatibles ? Un ingénieur des travaux publics du Ministère français de l'environnement et moi-même avons tenté de répondre par la négative. Notre étude (Colcanap et Dufour, 1981)[3] commence par critiquer le système d'assainissement centralisé par voie d'eau adopté par tous les experts qui se sont succédés à Abidjan. Certes, il faut reconnaître que ce système présente l'avantage d'être propre, confortable et peu astreignant pour l'utilisateur. Il présente par contre des inconvénients qui rendent sa généralisation impossible dans les quartiers défavorisés d'Abidjan, ceux-là mêmes qui regroupent la majeure partie de la population.

Ce système coûte cher, de 1 200 à 6 000 francs français par habitant selon le niveau de traitement et les difficultés techniques de réalisation. Ce coût doit être rapproché du revenu de l'Abidjanais des quartiers pauvres, qui ne dépasse guère 200 F par mois, et des investissements de fonction locale prévus pour l'assainissement de 50 F par habitant et par an.

Le système de toilette à chasse d'eau consomme de 20 à 80 litres d'eau potable par habitant et par jour pour évacuer une quantité dérisoire de fèces (200 grammes) et d'urines (1 litre). La généralisation du procédé conduirait, pour son seul fonctionnement, à une consommation de 200 000 m^3 par jour en 1990, soit deux fois la fois la consommation domestique totale actuelle (tous usages confondus). Un tel gaspillage est difficilement acceptable, compte tenu des ressources en eau potable limitées de la ville, qui se manifestent déjà aujourd'hui par la recherche de nouvelles sources d'approvisionnement et par l'augmentation du coût du mètre cube produit.

Un tel système produit des eaux usées en grande quantité. Si la purification parfaite de ces eaux est techniquement possible, comme elle est onéreuse, elle est dans la pratique toujours incomplète. Les polluants qui subsistent, rejetés dans le milieu lagunaire, le déséquilibrent. Le rapport en question montre que même dans le cas illusoire d'un traitement secondaire performant des effluents des habitants raccordés, la charge en matière organique du milieu récepteur devrait doubler d'ici à 1990.

Un tel système est antiécologique. Dans la nature, la matière parcourt un circuit fermé. Les déchets humains suivent aussi un cycle fermé dans les civilisations traditionnelles : du sol aux aliments, aux excréments et à nouveau au sol. Le parcours imposé par le système

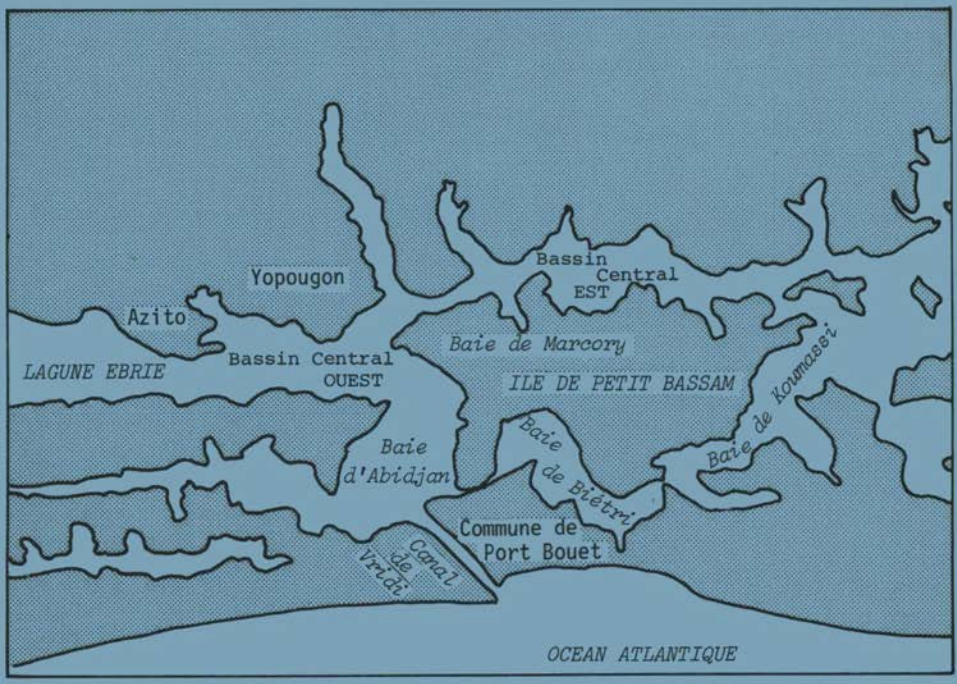
[3] Colcanap, M. et P. Dufour. L'assainissement de la ville d'Abidjan; expertise et propositions alternatives. Paris, Ministère de l'environnement et ORSTOM, 1981. 299 p.

d'assainissement moderne brise le cycle naturel : on passe du sol aux aliments, aux excréments, à l'égout et au milieu aquatique. Les sols s'appauvrissent et, en contrepartie, les milieux aquatiques sont artificiellement enrichis, pollués et déséquilibrés.

L'installation d'un réseau complet d'égout pour une grande ville nécessite de nombreuses années, pendant lesquelles les problèmes d'assainissement demeurent ou s'amplifient.

Un système de ce type nécessite des études approfondies. Il faut faire appel à des techniciens étrangers, ou formés à l'étranger, qui n'ont pas toujours une conscience très claire des réalités locales. La mise en oeuvre nécessite un équipement lourd qui doit généralement être importé. L'entretien et le fonctionnement d'un système aussi sophistiqué demande un personnel de haute technicité, rare actuellement dans les pays en voie de développement.

La région d'Abidjan



DES PROPOSITIONS ALTERNATIVES

Face à l'inadaptation de cette solution traditionnelle, nous avons proposé de revoir l'ensemble du schéma directeur d'assainissement d'Abidjan.

Le principe de nos suggestions consiste à diminuer l'importance des populations raccordables à un système d'assainissement de type collectif, de traiter ses eaux résiduaires par un lagunage contrôlé, et d'assainir la population restante par des installations individuelles et semi-collectives sans eaux résiduaires ou à eaux résiduaires épurées sur place.

Le ralentissement, voire l'arrêt de l'extension du réseau primaire d'égout permettrait de dégager des crédits destinés à rentabiliser les égouts existants, pour l'instant surdimensionnés, en augmentant la couverture des réseaux secondaires et les taux de branchement.

Parmi les différentes solutions examinées pour le traitement des eaux résiduaires, l'une a retenu l'attention des auteurs de l'étude : le lagunage contrôlé.

L'épuration par lagunage est un procédé extensif d'autant plus efficace que la température est élevée. Autant dire un procédé idéal sous les tropiques. Ses avantages sont bien connus : simplicité et économie de fonctionnement, efficacité de désinfection et de réduction des pollutions dissoutes, adaptabilité aux variations de charge. Ses défauts le sont aussi : investissement et emprise au sol élevés.

L'originalité de l'étude précité consiste à minimiser ces inconvénients en proposant d'appliquer le procédé dans une baie naturelle de la lagune Ebrié : la baie de Koumassi. Dans ce cas, les charges initiales principales du procédé seraient supprimées : pas d'achat du foncier, pas de terrassement. Bien entendu, il serait nécessaire de procéder à des aménagements. Une digue devrait être construite isolant la baie du reste de la lagune. Un système de vanne-écluse devrait y interdire la pénétration des eaux saumâtres naturelles. Un cloisonnement du bassin serait aussi nécessaire pour améliorer la circulation et les performances épuratoires.

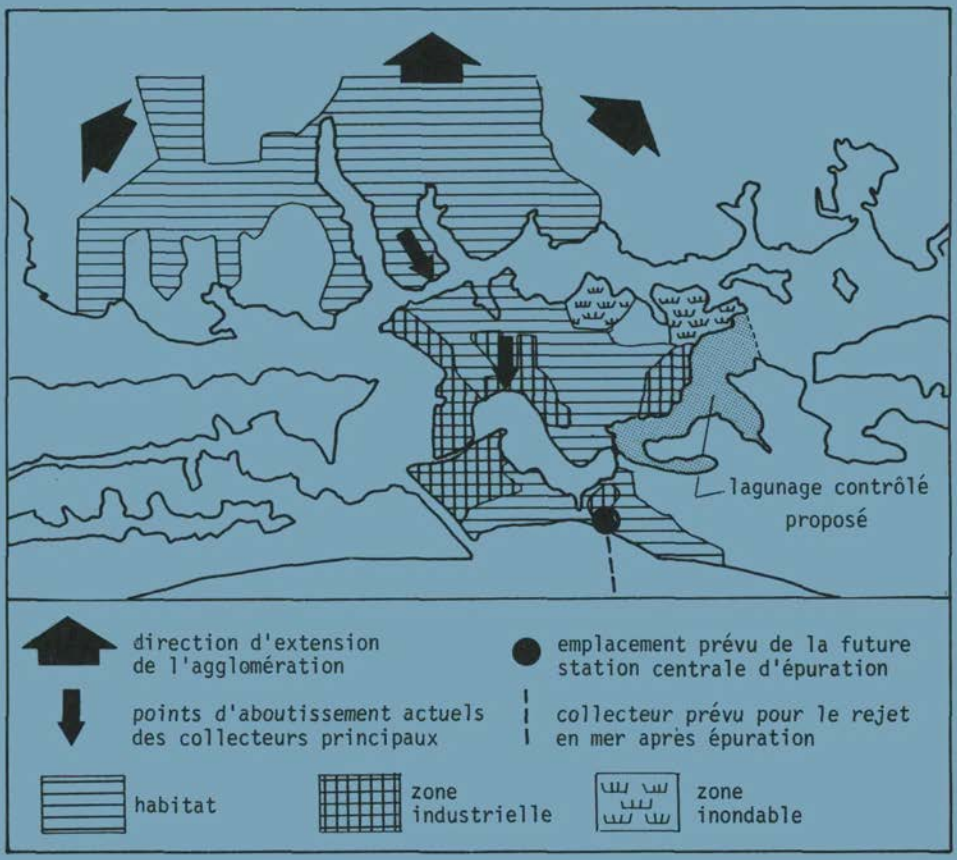
L'adoption de cette solution originale permettrait en outre de développer l'aquaculture, c'est-à-dire l'élevage d'alevins et de poissons dans les eaux usées qui ont subi l'épuration. En Chine, en Thaïlande, en Inde, en Israël, en Pologne, en Allemagne fédérale, aux Etats-Unis, on élève déjà avec succès des poissons dans des eaux ayant subi un tel traitement. Les productions vont de 500 kilograms par hectare et par an à Munich en Allemagne à 6 tonnes par hectare en Israël, et même 10 tonnes à Calcutta aux Indes.

Une telle aquaculture permettrait de couvrir une partie des frais

d'entretien du lagunage amont tout en incitant à son bon fonctionnement.

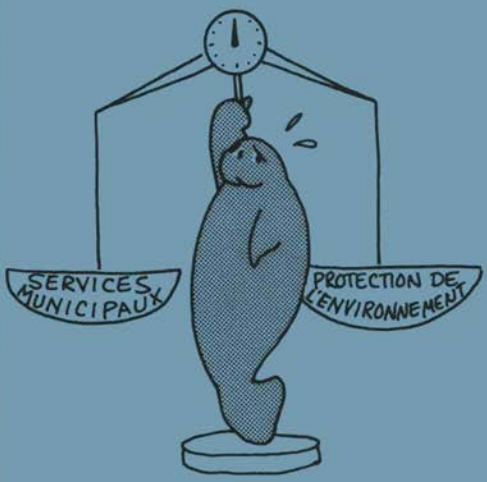
Une première évaluation du procédé montre qu'il pourrait épurer l'ensemble des eaux usées de la ville en 1990. Les trois bilans examinés (eau, matière organique et germes pathogènes) ont révélé qu'il y aurait une amélioration nette de la qualité des eaux du reste de la lagune par rapport à la situation actuelle.

Bien entendu, une telle réalisation n'ayant, de par sa taille et ses caractéristiques, pas d'équivalent au monde, doit faire l'objet d'une étude plus approfondie dont le coût serait néanmoins sans commune mesure avec les économies escomptées de l'application du procédé à Abidjan. Cette proposition n'a hélas toujours pas été retenue, des intérêts fonciers ayant été invoqués.



DES TECHNIQUES SIMPLES POUR L'ASSAINISSEMENT DES PLUS PAUVRES

Le traitement des eaux usées par lagunage contrôlé ne vaut que pour la population raccordable à un réseau d'égout centralisé. Or chacun s'accorde à reconnaître aujourd'hui que près de 2 millions d'Abidjanais n'auront pas atteint en 1990 les standards économiques et culturels permettant d'en bénéficier. Il faut donc répondre à ce défi intolérable en proposant des solutions alternatives qui, tout en procurant un niveau de service acceptable tant sur le plan sanitaire et social que sur celui de l'environnement, soit accessible au plus grand nombre. Ces solutions existent, qu'il s'agisse d'installations individuelles ou semi-collectives. Elles fonctionnent avec succès sous d'autres cieux. Elles sont performantes puisque agréées par les services sanitaires de pays où les exigences de confort et de sécurité sont pourtant élevées : Suède, Canada, Etats-Unis. Elles ne coûtent pas cher ; à l'extrémité basse de la gamme, la toilette à baril autoconstruite de Le Chappelier coûte moins de 500 F et quelques heures de travail. Elles ne produisent pas d'effluent (toilette sèche), ou des effluents épurés sur place (toilette à méthanisation, toilette à fosse septique) ou des effluents peu volumineux (W.-C. à faible flux d'eau) qui peuvent être stockés puis vidangés (fosse étanche) ou épurés par le sol lorsque ses caractéristiques conviennent (plateaux ou puits filtrants).



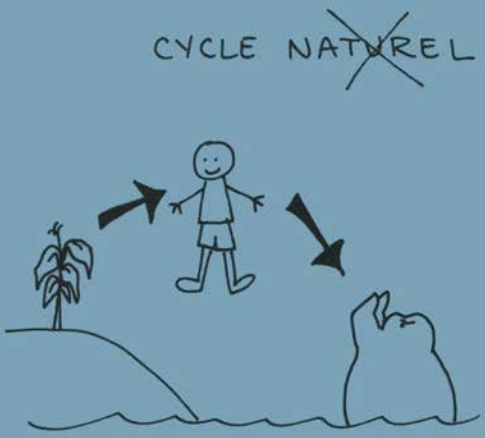
LE SYSTEME PORT-BOUET

Des réalisations de ce type ont été lancées l'an dernier à Port-Bouet, une des communes du Grand Abidjan. Port-Bouet n'était, il y a quelques années, qu'un immense bidonville. Des opérations massives de "nettoyage" et de constructions sociales ont modifié sa physionomie. Cependant, entre les immeubles "tours et barres", s'étendent toujours de vastes secteurs insalubres en pleine expansion spontanée. Il s'agit d'un conglomérat de baraques en tôle et en bois où s'entasse une population pauvre. L'assainissement individuel y est quasi inexistant, et les rares équipements publics sont sursaturés.

Sans attendre une décision venue d'en haut, sans capitaux, sans préfinancement et autres formules bancaires, la mairie de Port-Bouet a décidé d'améliorer le sort des plus démunis de ses administrés. Elle est aidée en cela par le Secrétariat d'Etat à l'environnement français, qui lui a délégué l'Agence de coopération et d'aménagement pour coordonner les travaux.

Des fosses étanches vidangeables, des toilettes sèches, des W.-C. à faible flux d'eau et épandage souterrain, des cuves à biogaz ont été contruites à Port-Bouet pour des coûts incroyablement faibles. Là où une société d'étude fournissait un devis de 260 000 F pour 13 W.-C., un bloc de 10 sanitaires a été construit pour 40 000 F.

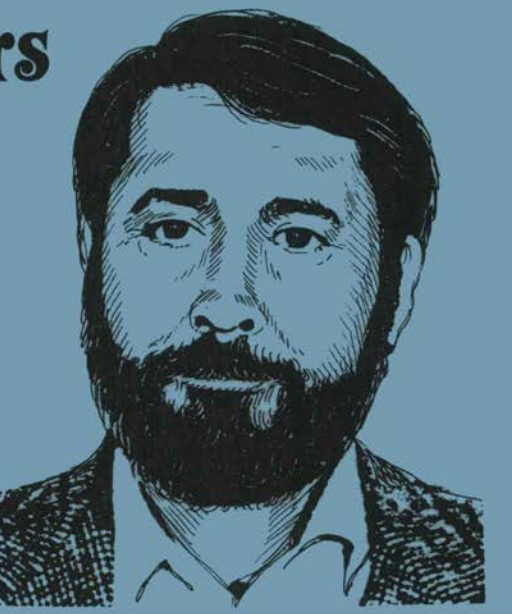
Comment une telle économie a-t-elle été possible ? En évitant les débats d'experts, en s'engageant après un minimum d'études dans différents types de réalisations jugés ensuite sur pièces à l'usage, en utilisant des matériaux peu onéreux, en appelant la collaboration des services municipaux, des artisans locaux et de la population. Car une des originalités du projet consiste, selon Gérard Gasselin -- un de ses concepteurs --, à responsabiliser la population en la faisant participer à la fois à la réalisation et à la gestion des équipements. Et ça a marché ! Ils sont venus par dizaines, les exclus du développement, mettre bénévolement leur main-d'oeuvre au service de leur communauté.



Animé par le Centre pilote des jeunes, la mobilisation générale n'a certes pas été chose simple. Il a fallu que les gens comprennent qu'ils ne devaient pas compter sur l'Etat providence, mais d'abord sur leur propre énergie. Bref, il a fallu leur faire admettre la nécessité de l'autodéveloppement. Certes, tous n'en sont pas encore convaincus, mais la voie est ouverte. Souhaitons qu'elle soit suivie par les municipalités et les habitants des autres quartiers démunis de l'agglomération.

Souhaitons aussi que, de leur côté, les pouvoirs publics adoptent des solutions collectives, peut-être moins prestigieuses, mais tout aussi performantes et nettement plus démocratiques. Alors, on pourra citer Abidjan comme étant la grande métropole du Tiers Monde ayant su maîtriser son développement en le mettant au service du plus grand nombre, tout en sauvegardant son environnement naturel.

Jellyfish Jitters



by Antonio Cruzado

Senior Marine Scientist
Co-ordinating Unit for the
Mediterranean Action Plan
UNEP, Athens

Athens News (24 May 1984): "The institute of oceanography and fishing Research (IOKAE) has announced that this year owing to a mild winter and an increase in phytoplankton and zooplankton in the Aegean we are in for a deluge of jellyfish in the Aegean and other Greek seas. Various measures to curtail the numbers of summer pests have proved ineffective. The four types of jellyfish that we can expect to meet are: Pelagia noctiluca (the most dangerous), Aurelia aurita, Rhizostoma pulmo and Cotylorhiza tuberculata."[1]

This article appeared in the English-language Greek daily newspaper, and whether it actually reflects IOKAE's views (probably it does not), it indicates how much society is sensitized to the appearance of jellyfish swarms in the major tourist areas of the Mediterranean Sea.

In the last ten years or so, reports like the one above have often been made from various areas of the Mediterranean. These reports are always made public with great reluctance because of fear that they might drive away some of the hundred-

[1] By the time this article went to press, jellyfish had not made their appearance in the entire Saronikos Gulf, which is one of the areas in the Aegean Sea where P. noctiluca has been seen most frequently.

million-or-so visitors who normally crowd the beaches of southern Europe.

But word gets out somehow, whether through articles in local newspapers, reports to scientific meetings, or, sometimes, announcements by courageous authorities hoping for international recognition and/or support for their efforts to solve the problem.

In any case, the reports invariably give great importance to the matter since it is considered a serious threat to one of the main sources of income for many Mediterranean countries: tourism.

Other impacts of jellyfish swarms, such as damage to fish stocks and clogging of fishing nets and power plant cooling water intakes, have indeed been reported, although they are not considered as serious. But resorts are shaken every time that visitors, especially from the wealthy regions in northern Europe, find themselves confronted with the prospect of either not going into the sea -- the greatest attraction of their holidays -- or risking being stung, sometimes rather severely, by the seemingly omnipresent jelly-like umbrellas.

There have been reports of mass desertion from some resorts by tourists determined to avoid contact with the stinging animals. In recent years, tour operators from northern Europe have asked national tourist agencies to confirm that no jellyfish swarms have been reported in an area before they will make group contracts with local hotels.

Yet, as with everything in life, there is also a positive side of the coin, and some enterprising person to turn it to his or her advantage. For example, Mediterranean ice-cream vendors have been known to profit by selling all sorts of anti-venom products (almost always ineffective or inadequate), ranging from ammonia to antihistamine sprays.

Sometimes monumental efforts have been made by the countries affected, using all the resources available at the national level: marine scientists have been asked to study the problem; coastguards and port authorities have been called on to report their observations; and task forces have been established in some cases to monitor and fight the sometimes frightening masses of jellyfish.

It was not until about two years ago that some of the Mediterranean Governments addressed themselves to the United Nations Environment Programme seeking help. First were the Maltese authorities who asked UNEP to look into the matter. Then the Greek delegation at the third meeting of Contracting Parties to the Barcelona Convention on the Protection of the Mediterranean Sea against Pollution officially requested that some action be initiated under UNEP's guidance in the framework of the long-term Programme for Pollution Monitoring and Research in the Mediterranean Sea (MED POL - PHASE II).

The response of all the other Mediterranean countries was immediate and warm, since practically everyone in the region had been confronted at one time or another with the jellyfish phenomenon.

Yet the knowledge that marine scientists have of the biology and behaviour of this somewhat enigmatic group of organisms is scanty and dispersed. Only a small number of researchers have concerned themselves to the point of carrying out detailed studies.

In fact, the term "jellyfish" is too broad to be useful in defining the organisms which are actually creating the trouble (Scyphomedusae). It applies only to the dominant, sexual, free-swimming life stage of a number of species of gelatinous coelenterates with a well-developed umbrella margin bearing tentacles and sensory organs. These are the most conspicuous planktonic forms which can occur in large swarms extending over large areas.

One of these species, Pelagia noctiluca, is a particular nuisance

due to its stinging properties. Its tentacles, oral arms and exumbrella are heavily equipped with wart-like growths, which are actually collections of hundreds of nematocysts with urticant substances used to paralyse prey animals.

Mediterranean species of Scyphomedusae are relatively few. Approximately 12 species are recorded, and are common mostly in offshore areas.

The occurrence of jellyfish swarms in the Mediterranean Sea is not abnormal. Reports of both offshore and coastal swarming of jellyfish are relatively frequent. Swarms of Pelagia noctiluca have been recorded in the Adriatic as well as in the Atlantic and Pacific oceans since 1800. Coastal swarms of Rhizostoma pulmo are quite common along the shores of the eastern Mediterranean during the summer months, and Aurelia aurita is known to form coastal swarms, especially in April and May, in several Mediterranean regions.

Persistent summer coastal swarms of Pelagia noctiluca were first observed in the southern Adriatic in 1976, and since then they have extended to the northern regions, including the Gulf of Trieste. Coast-swarming was also observed in the central Mediterranean, including the waters around Sicily and Malta, and along most of the shores of eastern Greece and some of the Greek islands.

Swarming of Pelagia noctiluca has also been observed in some areas of the northwestern Mediterranean Sea and has been reported all along the French Côte d'Azur up to the Ligurian shores, and in some areas of the Balearic Islands. In these regions swarming is supposed to happen when current reversals may bring offshore "Atlantic" water near the coasts. In fact, the Atlantic current flowing along the shores of North Africa has been suggested as a mechanism for "seeding" the Mediterranean waters with Pelagia noctiluca, though evidence is missing and the ecological characteristics of the Mediterranean Sea, and even of some of its sub-basins, are such that swarming can be produced by local populations.

Of these occurrences, perhaps only those of Pelagia noctiluca are of concern, since its sting is particularly severe. Yet many marine organisms live in close contact with Pelagia, some of them eating or being eaten by their apparently harmless neighbour.

A jellyfish is made up of about 98 per cent water, and can consume impressive amounts of organic particulate matter, including zooplanktonic organisms and fish larvae. Thus, its growth rate must be extremely large when food is available, as is the case in eutrophic areas. It can swim steadily against currents and, by migrating vertically, takes advantage of favourable currents to move around in large areas during its two-to-three-year life span. However, it can also be trapped by convergent wind - generated currents in calm inshore areas -- which often attract human visitors as well.

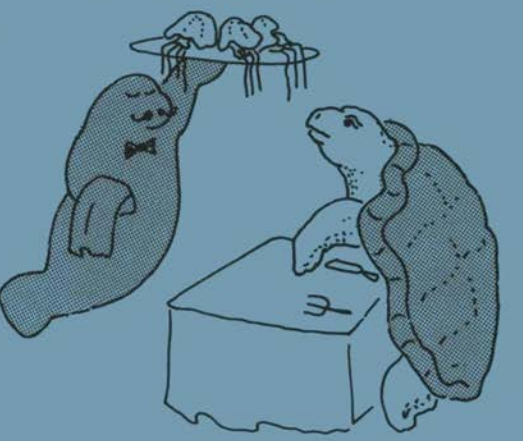
Jellyfish predators have been identified through observations of the stomach contents of various marine organisms. For example, the saddle bream (Oblada melanura) and sea turtles are well-known for feeding on jellyfish. That other fish may also feed on them when they are present in large numbers is revealed by the fact that the fish are sometimes found to contain jellyfish pigments.

Some scientists have advanced the theory that a decrease in the number of such predators might be a major cause of the increase in jellyfish numbers. However, no firm evidence of any decrease in predator populations has been provided in the Mediterranean.

Following the request of the third meeting of the Contracting Parties to the Barcelona Convention, held in Dubrovnik in 1983, UNEP organized a Workshop on Jellyfish Blooms in the Mediterranean (Athens, October 1983). Although not many scientists had shown an interest in studying these organisms, the workshop had a large attendance -- more than sixty scientists, and nearly as many journalists. As the researchers exchanged results of their studies, they became excited at the challenge to eliminate or at least reduce the numbers of jellyfish which appear every year, along with the tourists, at the onset of the warm surface temperatures.

The conclusions of the workshop were anything but "conclusive". Only the following could be said with any confidence:

- Large swarms of jellyfish are a natural phenomenon not uncommon to the Mediterranean shores.
- Swarming may be enhanced by changing climate, as well as by the eutrophication of coastal waters stimulated by the discharge of pollution -- a common practice in most of the areas affected.
- Meteorological and hydrodynamic conditions are of great importance in their accumulation in some areas.
- Though jellyfish stings do not constitute a severe public health problem, they may produce more than a simple rash in sensitive bathers. In some individuals, the effects may be serious.
- Although other effects, for example on fisheries or sea-water cooled power stations, have been reported, tourism is by far the activity most affected owing to psychological factors.
- All remedial measures that have been proposed and/or tested in other regions (e.g. the Chesapeake Bay, USA) have proven inadequate.



Thus the workshop could not provide a clear explanation for the swarming of Pelagia and similar organisms. Even less was it able to propose measures to be taken by Mediterranean Governments in order to alleviate the fears of the public and the tourist industry.

However, it did accomplish something: the numerous reports of jellyfish swarms from many areas of the sea greatly relieved the psychological pressure on those countries which feared that the problem was theirs alone. No longer need they be afraid to discuss the problem openly and frankly.

The entire Mediterranean community has now become aware of the problem and is making an effort to investigate the causes of the swarming. As a result, the second meeting of the Working Group for Scientific and Technical Co-operation (the forum in which all scientific matters related to the Mediterranean Action Plan are reviewed) agreed, at UNEP's request, to ask all national co-ordinators for MED POL to monitor closely any swarm that may appear in their coastal waters, in conjunction with routine pollution monitoring carried out by national institutions as part of the MED POL programme.

In addition, an operational document containing guidelines for submission of research proposals on the subject was, after approval by the last meeting of Contracting Parties in April of 1984, circulated among scientists working in the field. The activities planned cover the following aspects:

- Monitoring of the occurrence of jellyfish swarms in the areas selected by all means available, including fishermen, coastguards, ferry boats, health inspectors, police, etc.

- Systematic sampling of phytoplankton, zooplankton, and ichthyoplankton carried out at stations in which swarms of jellyfish have been reported -- areas likely to be breeding grounds or where hydrographic conditions may possibly originate the swarms.

- Study of meteorological and hydrodynamic features of the areas selected and analysis of historical data whenever available. In particular, local wind and surface currents should be measured frequently by use of current meters, floats and/or drift cards.

- Analysis of correlations between swarming and physical, biological or other enviromental conditions; including behavioural testing in the laboratory and in the field. In particular, jellyfish feeding habits and reproductive cycle, vertical and horizontal migration patterns and influence of environmental conditions on the swarming process should be

studied.

- Development of models for selected areas which include hydrodynamic and ecological processes. Harmonization between field work and model development should be kept in mind at all stages of the project's implementation.

- Preliminary assessment and quantification of the possible damage that the swarms may do to the fisheries (catches, stocks and quality of fish products)

- Preparation of guidelines on curative treatment, prevention of stings and beach management and informative leaflets, etc. Research on the properties of jellyfish venom and its remedies should be promoted.

These activities, based on the work of national research institutes and a number of the United Nations specialized agencies co-operating in the MED POL programme (FAO, WHO, UNESCO, IOC, WMO, IAEA), are to be carried out in selected areas where the appearance of jellyfish swarms has been of some concern during recent years. In particular, the Adriatic, the Aegean and the central Mediterranean were initially selected as areas for intensive monitoring and research studies. It is however assumed that the whole Mediterranean will be monitored by more than 139 institutions participating in the MED POL programme.

More than 25 specific project proposals involving jellyfish were submitted to the UNEP secretariat. A detailed analysis of them was made, and after discussion with the scientists involved, national programmes were prepared for Greece, Italy, Malta and Yugoslavia covering the Adriatic, the Aegean and the Ionian seas. Other projects in the north-western Mediterranean have also been established in France, Italy and Spain.

The last meeting of Contracting Parties adopted the jellyfish programme which includes more than US$ 180,000 as assistance provided by UNEP from the Mediterranean Trust Fund (to which Mediterranean Governments contribute more than US$ 3 million each year for the implementation of the Mediterranean Action Plan). This assistance is provided in cash or equipment, ship-time, fellowships for training, meetings, etc. UNEP has also published a specialized bibliography, proceedings of the Athens Workshop and guidelines and reference methods for monitoring of jellyfish.

Even with UNEP's assistance, all the activities planned represent a large effort from the institutions involved. The programme is now approaching its first full year of results, and although at this point it is too early to make many predictions, I will confidently make one:

By the end of the two-year programme, very few organisms will be known as well as Pelagia noctiluca, and its image shall no longer bring terror to the hearts of the bathers, the hotel operators and the Governments of the Mediterranean coastal States; instead it may well be seen as the symbol of Mediterranean scientific co-operation.

TOWARDS A NEW ORDER OF THE SEA

by

Lamine Mohammed Fadika

Lamine Fadika is Minister for Marine Affairs of the Ivory Coast and Chairman of the Steering Committee for the Marine Environment of Western and Central Africa. Statesman, scientist and man of letters, he is one of the youngest high-ranking officers and ministers in Africa at the present time, and has been increasingly active on the regional and global scene. Mr. Fadika has kindly agreed to share with The Siren some of his thoughts concerning the "new order of the sea" as it relates to shipping, international trade, the law of the sea and the environment within the context of the North/South dialogue.

The Siren: For a number of years now you have been advocating a "new order of the sea". Could you tell us why?

H.E. Mr. Fadika: To quote the words of President Houphouët-Boigny of the Ivory coast, the new order of the sea is "a decisive element of the new international economic order which the developing countries have been calling for so wholeheartedly." There has always been a close link between economic and social expansion and the sea in various countries at particular times. The growth of the Phoenician and Carthaginian civilizations, the Hellenic renaissance, Roman expansion, the Arab ascendency and, closer to our times, the great adventure of the European powers, are all intense moments of history which clearly show that the sea is, in the life of nations, a decisive factor in national independence, genuine cultural fulfillment and lasting economic and social well - being, within the framework of what has been referred to as the "freedom of the seas".

This independence, however, has all too often implied the subjugation of other peoples when it should, on the contrary, have occurred in a context of harmonious interdependence. Far from being reserved exclusively for the priveleged few, this state of well-being should be concretely accessible to as many countries as possible, and the same "freedom", instead of being merely "freedom in the North and servitude in the South", as Blaise Pascal would have said, should become concretely universal.

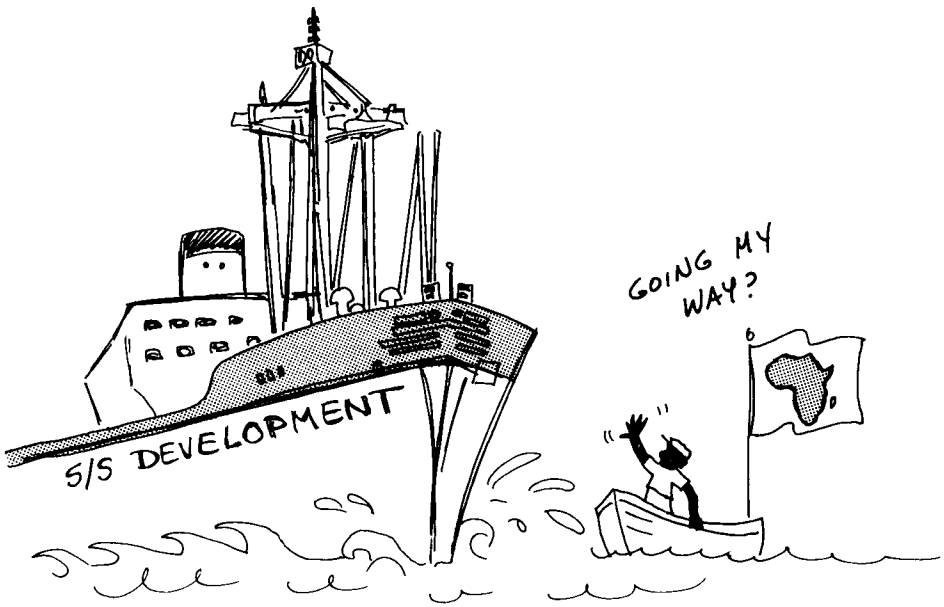
Q: How is this possible?

A: There has to be a complete redistribution of the shipping map of the world, so as to give all nations, especially in the Third World, the chance to take an active part in the world transport of cargo -- of which they are in fact the main supplier. For many years, the developed nations have monopolized shipping and the profits it produces.

This situation is detrimental to the development of Third World countries, which use the sea for some 90 per cent of their trade, and this imbalance must be remedied if the younger nations are to play a significant part in world shipping.

The effects of the economic, monetary and energy crisis which the international community is now undergoing have not been altogether negative for national economies, international trade and world commerce. One of the more positive consequences has undoubtedly been the emergence and consolidation of the concept of a new international order of the sea.

Q: What do you mean by that?



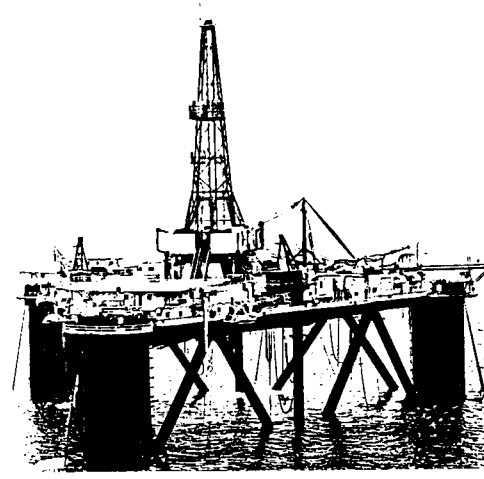
A: Essentially, it is a new philosophy, a new understanding of the expression "freedom of the seas" which gives it a more positive content and makes it truly universal and accessible to all nations. It covers all the legitimate aspirations and major objectives of developing countries aimed at achieving both a qualitative and quantitative improvement in their shipping. It is also a catalogue of concrete, fair and effective measures which the developing countries can take to restructure the basic organisation of their shipping services, as part of a more "self-centred" development effort; that is, one based essentially on the notion of self-help.

This is not to say that the developing countries intend to resort to protectionism as a means of securing the growth of their shipping, which the overwhelming importance of sea trade in their economy has made necessary. We remain resolutely in favour of liberalism, particularly where all shipping matters are concerned.

Nevertheless, we cannot help observing that world shipping markets are not always as transparent and accessible to all as they might at first appear. In other words, the free competition to which we aspire is not always open to young nations, to the newcomers on the world shipping scene like ourselves.

Q: On what facts would you base this opinion?

A: The proportion of world tonnage carried by national fleets, especially those of African countries, is extremely low compared with the flow of goods generated by their foreign trade.



In 1975, while 61 per cent of exported cargo came from developing countries, only 6.3 per cent of the world tonnage was actually theirs, the share of African countries amounting to 0.6 per cent. In 1979, 36 African countries fully controlled 4.6 million GRT (gross register tons), and five of these countries -- Algeria, Egypt, Libya, Morocco and Nigeria -- whose national fleets all exceed 300,000 GRT, alone accounted for 74 per cent of the African share.

This situation is particularly detrimental to young nations.

Q: Why is that?

A: Because they have to cover very great distances both to sell the greater part of their product and to acquire most of their capital and consumer goods. This means:

- high and continually rising freight charges;
- higher investment and production costs;
- relatively less effective industrial and commercial export

strategies at a time of rising pro-protectionism in the developed countries;

- and finally, an accumulation of negative effects on their balance of payments at a time when the world crisis is already diminishing the financial capacity of developing countries and adding considerably to their indebtedness.

Q: In what way can the new international order of the sea help the young nations?

A: It can only do so if international markets are sufficiently reorganised to ensure the long-term development and profitability of our national fleets. It is absolutely essential that we should find a way of making these fleets competitive with those of the developed countries.

In that respect, if one looks at the operating costs of shipping -- especially the main items, such as capital, fuel and labour costs -- it is the latter which turn out to be critical, while the other factors remain the same from one flag to another for fleets operating under similar conditions.

Thus, the key factor which nowadays decisively determines the competitiveness of fleets is labour, particularly as regards its cost and productivity. Especially for the traditional shipping companies, this is one of the decisive considerations governing the choice of ships, as well as the choice of operating and management systems from both the administrative and the commercial point of view.

In the developed countries, labour costs are very high and penalize the competitiveness of shipping companies, causing them in some cases to suspend operations or even forcing them into liquidation. This is why these countries now prefer high-technology ships requiring small crews compared with conventional cargoes. It is also why they are increasingly transferring their fleets to the developing countries, where they can recruit cheap ancillary labour.

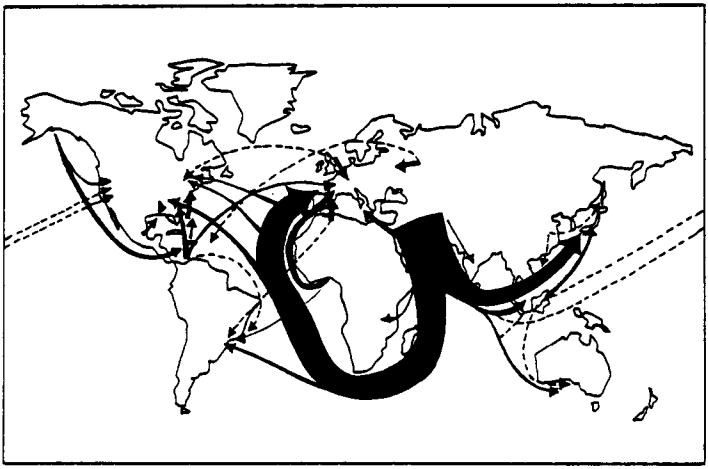
Q: How does this situation affect the shipping policies of developing countries?

A: A serious problem faced by the fleets of the developing countries is finding qualified national personnel who will work for competitive wages and are able to cope with all aspects of shipping techniques and technologies. The obvious answer is to provide permanent training and retraining for national specialists who are competent, effective and highly productive at all levels. This is the object of the new Regional Academy of the Sciences and Techniques of the Sea, recently set up in Abidjan, which will be taking in students from the French-speaking countries of West Africa.

Q: Are you optimistic regarding the chances of the new order of the sea being generally accepted?

A: I am, because two important supports already exist. One is the UNCTAD code for Liner Conferences, which came into effect in October 1983, and the other is the new Law of the Sea, for which a Convention has just been signed under United Nations auspices by a large majority of

Main oil transport routes by sea in 1980.



countries in the world.

The signing of the latter agreement was an event of capital importance, of universal and even historical significance, as it covers everything to do with the sea and the environment and all their interrelations, while extending and completing the Stockholm Conference on the Environment of June 1972.

The Convention introduces an entirely new system in international relations. Henceforth on the high seas the rule of law will replace the law of force. It has been the first major international negotiation which has involved and mobilized the whole world, including all its different political and legal systems, coastal countries and inland countries, capitalist states and socialist states, kingdoms and republics. They all met around the negociating table.

It has also been a unique achievement in international law, since the balanced and positive results it has produced represent a series of judicious compromises between the legitimate interests of the North and those of the South, between the legitimate concerns of the major ore consumers and those of the producer countries, and between the status attributed to maritime areas under national jurisdiction and that connected with the international sea and sea-bed areas.

Q: How is the role of the sea likely to evolve in the years ahead?

A: We have reached a stage at present between the end of a unidimensional sea and the beginning of a multidimensional sea, which is bound to be a central factor in future strategies for survival and for international development and to leave a powerful mark on the civilization of the future.

In other words, the economic role of the sea will no longer be

as an essential medium for carriers operating the transfer of cargo flows worldwide and the exchange of goods between nations and continents. It covers more and more substantially the vast sectors of human nutrition, minerals and energy, at a time when these requirements can no longer be met from land resources alone, in view of the prodigious population explosion in the world and especially the frenzied rate of economic growth, lately somewhat tempered -- though for how long? -- by the crisis.

According to the experts, by the year 2000, offshore oil -- which already accounts for 30 per cent of world production -- is likely to exceed the 50 per cent level. Apart from that, with the increasing "sahelization" of tropical areas, the biological resources of the sea and coastal areas are going to play a prime role in food strategies. A further factor is the primary importance of ocean masses in the major balances which govern world ecosystems (for instance, the water cycle) and by which life on earth is conditioned.

Q: Does that mean that we should all completely change our attitudes towards the sea?

A: The sea is no longer a marginal phenomenon; it is no longer the preserve of specialists. It has undoubtedly become one of the major concerns of the end of this century and the decades to come. It will be a prime factor in international development policies and strategies, both in the north and in the south, especially as there are more and more signs of an emerging "new sea-oriented civilization".

Thanks to the Convention on the Law of the Sea, it may be hoped that the sea of conflict will be replaced by the sea of peace and fraternity, and that the supposedly free sea -- that is, the sea which has been confiscated by the great powers -- will gradually be replaced by a sea whose bed and subsoil will be shared according to well-defined rules in areas adjacent to the coastline, and whose areas beyond the limits of national jurisdiction will now constitute the common heritage of mankind -- a <u>res omnium</u> to be exploited and controlled by all, on a basis of egalitarianism and solidarity.

In the words of President Houphouët-Boigny, "the sea is one of those historic opportunities offered to mankind to restore a global and lasting balance in our world, which is already so mutilated by injustices and disparities of all kinds. The new order of the sea can and must contribute decisively to the happiness of man, of all men and of the whole man in peace, mutual understanding and mutual respect for legitimate mutual interests."

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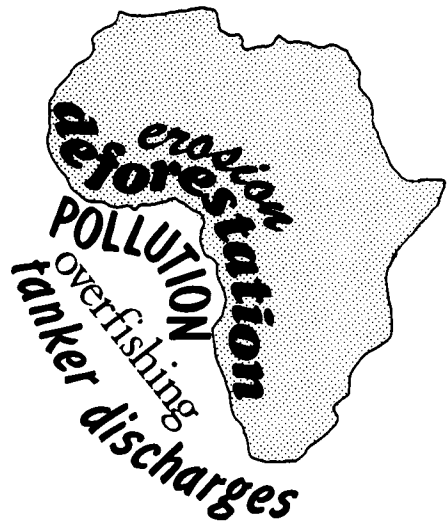
joined hands in an effort to head off the disaster foreseen in the accelerating destruction of their environment by desertification, pollution and other factors. The Action Plan for the Protection and Development of the Marine Environment and Coastal Areas, adopted in Abidjan in March of 1981, was reviewed at two recent meetings held in Lagos, Nigeria. The Third Meeting of the Steering Committee for the Marine Environment of West and Central Africa (30 April-1 May) and the Extraordinary Intergovernmental Review Meeting of the Action Plan for the West and Central African Region (2-4 May) marked the progress made on three major projects and evaluated the status of the regional Convention and Trust Fund.

The meetings found that the spirit and resolutions of the Abidjan Conference had been honoured, and the Steering Committee's guidelines followed satisfactorily. They had before them a report on the three priority projects selected for implementation:

Institution and co-ordination of national contingency plans. Drafts of national contingency plans for both marine and industrial pollution emergencies have been developed for Benin, Congo, Guinea, Liberia, Sierra Leone and Ivory Coast. Progress in practical implementation of these plans will be reviewed at a meeting of national experts to be organized by the International Maritime Organization (IMO) and UNEP in 1985. A training workshop in contingency planning for marine pollution emergencies associated with industrial installations was organized by the United Nations Industrial Development Organization (UNIDO) and UNEP in Dakar, Senegal, from 20 to 24 February 1984.

Monitoring of pollution in the marine environment of the West and Central African region. The Food and Agriculture Organization of the United Nations (FAO) has concluded agreements on marine pollution research and monitoring with institutions in Gambia, Ghana, Ivory Coast, and Sierra Leone; further negotiations are under way with centres in Benin, Cameroon, Ivory Coast, Senegal and Gambia. Training of scientists and lab technicians will take place at several locations, and missions to the region have already identified needs for equipment and instrumentation. When all centres are ready, they will analyse organochlorines and petroleum hydrocarbons in fish, and



metals in a variety of organisms.

The Intergovernmental Oceanographic Commission (IOC) of UNESCO has consulted with national institutions and experts on oil slick and beach tar observations, oil pollution measurements and training in statistical treatment of data.

Control of coastal erosion in West and Central Africa. Ten western African States have expressed their wish to participate in the project, and proposed coastal sites for field studies and long-range surveys. Two sites will be selected, for English- and French-speaking countries. They will be used to obtain information on coastal processes which can be used as a basis for coastal protection measures, and in the training of scientists, engineers and technicians.

Although the participants in the Lagos meetings were generally satisfied with the progress made on the projects, they were less happy with the status of ratifications of the Abidjan Convention and related protocol. To date, only five countries (Ivory Coast, Guinea, Senegal, Togo and Cameroon) have ratified; a sixth is required for entry into force.

Some dissatisfaction was also expressed over insufficient contributions to the Trust Fund, which has resulted in delays in programme implementation.

On the whole, the meetings revealed that the spirit of Abidjan is alive and well, along with the commitment of the West and Central African States to face up to their common problems.

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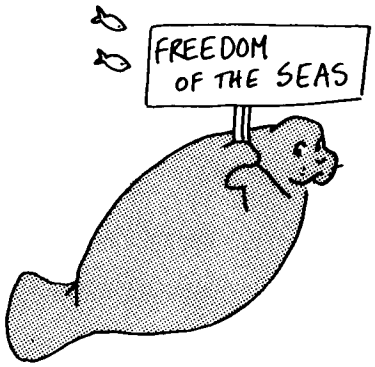
at the regional and in some cases at the global level. When this realisation becomes widespread, the tide of excessive nationalism will begin to recede. I do not think, however, that we shall see again, in the foreseeable future, a rebirth of the principle of freedom of the high seas on the 19th century model. For this principle is inappropriate, as Grotius himself would have recognised, where ocean space can be physically controlled and occupied. When the tide of nationalism turns, therefore, the international community will have to recognise a new basic principle of international law replacing the freedom of the high seas so as to permit secure, flexible and equitable accommodation of marine uses and of national and international interests in the marine environment. At that time an expanded concept of ocean space as a common heritage of mankind could become indispensable. Reciprocally, the concept of sovereignty could require redefinition in a functional sense.

Whatever the future may bring, one thing is certain. The problems of ocean space -- like other aspects of the contemporary problematique of peace and economic development -- cannot be dealt with successfully through protection of national interests alone. International co-operation is required at a level transcending that already occurring within the United Nations system. Such co-operation, desirable for general reasons of world order, should become a high priority for countries lacking the financial resources and technological capabilities of the major powers. For only



though far-reaching international co-operation, sensitive to ideological diversities, are the national advantages of the strong made to serve the needs of the international community as a whole.

A new order in ocean space is inevitable. The new order, like traditional law of the sea, will favour only a handful of states, unless poor countries make a co-ordinated effort in the preparatory commission of the Seabed Authority and in other fora to ensure that the concept of common heritage of mankind is implemented responsibly and meaningfully in the difficult years ahead, not only with respect to manganese nodules in the international seabed area, but also with regard to science and technology and to uses and resources in areas beyond the limits of present national jurisdiction.

If this is done, I have no doubt that the present convention on the Law of the Sea will be remembered as marking the beginning of the long process that will eventually lead to a more equitable world order and to a better use of the marine environment in the interest of and for the benefit of all.

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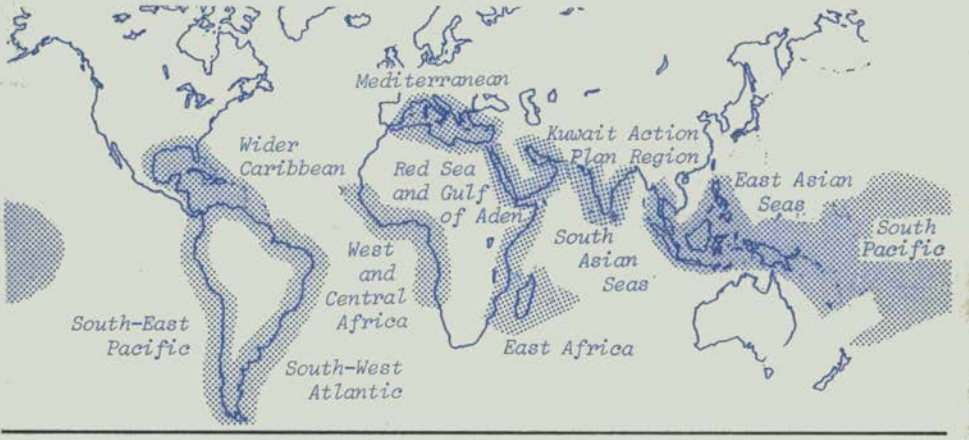
the regional seas



The Siren is issued four times a year in English, French and Spanish by the Regional Seas Programme Activity Centre of the United Nations Environment Programme (UNEP).

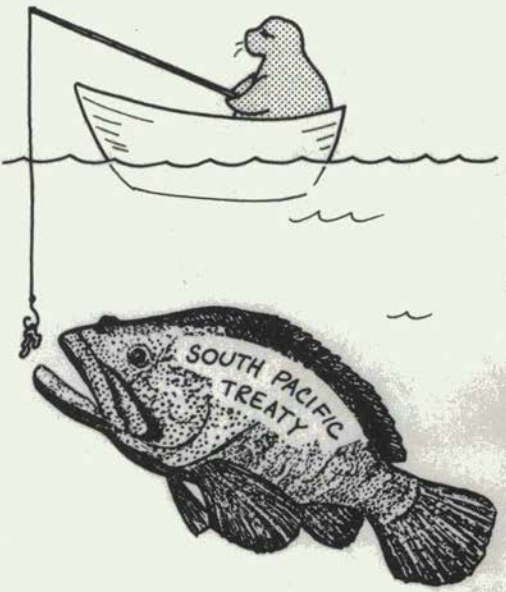
If you wish to receive The Siren regularly, or would like to propose an article on a subject of current interest and controversy related to marine science and environmental protection, please address: Nikki Meith, Editor, The Siren, United Nations Environment Programme, Palais des Nations, 1211 Geneva 10, Switzerland.

Number 26 December 1984

THE SIREN

news from UNEP's Regional Seas Programme

Bringing home a big one



Considerable progress has been made in negotiations for an international treaty to protect the environment of the South Pacific region.

In late September, legal and scientific experts from the Pacific islands and neighbouring governments came together to negotiate a convention for the protection and development of the natural resources and environment of the South Pacific Region. This was the third time in 18 months that such a meeting had been held on the convention and its two related protocols.

The meeting was organized by the South Pacific Regional Environment Programme (SPREP), and held at the Noumea headquarters of the South Pacific Commission (SPC).

The importance of these negotiations was recognised by all present and reflected in the opening statement by Mr. Francis Bugotu, the Secretary-General of SPC. He observed that the meeting was intended "...to finalise the wording of the most significant legal regional agreement that South Pacific governments have yet developed to enhance and maintain the quality of our shared environment. In my memory, there have been no other issues which have so galvanised our island communities into a collective response and

continued on page 39...

The end of whaling?

by

Sir Peter Scott

Chairman
World Wildlife Fund
International Council

I have attended most of the annual meetings of the International Whaling Commission for the past 19 years. This period has seen the desperate rear-guard action of the steadily decreasing number of whaling nations, and the gradual ascendency of the non-whaling nations.

The passing of the "moratorium" vote in 1982, by an overwhelming majority (25 to 7), was a dramatic and important step but it certainly did not signal the end of the struggle to bring all whaling to a halt. The IWC can make all the decisions it likes -- provided the necessary 3/4 majority can be mustered -- but it has no sanctions to apply against members who do not comply with its decisions. All members have to do is to file an objection within 90 days to any ruling or catch limit they do not agree with and they are then not bound by it. However, out of the nine whaling nations remaining at that time, one (Spain) voted in favour of the moratorium, four (Chile, Korea, Brazil and Iceland) did not file objections to it, one (Peru) filed an objection in 1982 but then withdrew it in 1983, which leaves a hard core of three die-hards -- Norway, USSR and Japan, whose objections to the moratorium are still in force.

Some conservationists argued that the 1982 moratorium vote (that all commercial whaling should cease after 1985 for at least five years) was bad tactics because it was unenforceable and that we should have concentrated on more easily enforceable low catch limits. But, so far, it looks as though the moratorium policy may have been the best way to bring whaling to a halt. Both in 1983 and at the IWC meeting in Buenos Aires in June of this year, the

conservationists succeeded in cutting many of the catch limits very severely, so that we really are in a period of phase-out, which was the intention behind the three years' delay in introducing the moratorium. The Norwegians' quota of Minke whales, for example, was cut from 1,690 to 635 last year and they did not file an objection. This year the catch limits for Southern Hemisphere Minkes, taken mainly by the USSR and Japan, was cut by 37% from 6,655 to 4,224. It remains to be seen whether they will object to this reduction. (Although the IWC does not itself have any sanctions, the U.S.A. and perhaps others are likely to impose fisheries sanctions on any nations not complying with IWC decisions).

Both these drastic cuts in catch limits were the result of much lower scientific assessments of the stock levels. Again and again in the past few years it has been shown that the assumptions the whale scientists were making in their estimates of populations have led to wildly over-optimistic conclusions, and that the "facts" used were no more than very crude guesses, which would not give any early warning even when whale numbers were about to fall steeply. This year, for example, the majority of the IWC Scientific Committee agreed that population estimates of Southern Hemisphere Minkes based both on mark-recapture data and on sightings data relied on false assumptions and were much too high. They agreed on a population figure 40% lower than their 1983 figure. This was in spite of the fact that up to 1982 the Scientific Committee believed these stocks to have been increasing because more krill were thought to be available to the Minkes since the larger whales species were depleted by the whalers. This apparently plausible theory continued to be cited although it has been shown that there is not valid evidence for such a supposition. It was based on apparent increases in breeding rates which have now been shown to be unreal.

In other words, most of the work of the Scientific Committee year after year continued to reveal how ignorant we are about the dynamics of whale populations and how poorly we are able to assess their numbers and to prevent further depletion of their stocks. This ignorance is the rational justification for a complete moratorium on killing whales. The

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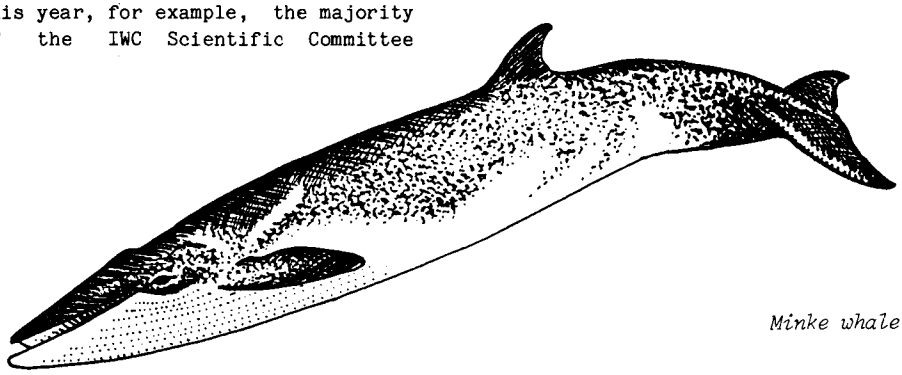

Minke whale

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trouble is that the remaining whaling nations have considerable capital invested in the whaling ships and factories. Economically it is in their interest to hunt the whales to extinction before writing the capital off, although they continue to pay lip-service to the idea of "sustainable" catches.

For the time being there are probably many thousands of Minke whales left -- although we do not know just how many thousand -- but since the IWC's earlier "management procedures" failed to prevent the Blue, Humpback, Fin, Sei, Sperm and Bryde's whales from coming, in varying degree, close to commercial extinction, how can we assume that the present management procedures can prevent the same fate befalling the Minke?

global news

Brundtland Commission begins work

The newly-established World Commission on Environment and Development, chaired by former Norwegian Prime Minister Gro Harlem Brundtland, met for the first time from 1 to 3 October in Geneva.

The Commission began its work by deciding to adopt a new and radical approach for solving the world's critical environment and development problems. It will examine issues from the viewpoint of their root causes in macro-economic, trade, agriculture, energy and other policies of government.

In the past, problems such as desertification have been tackled after they have developed, rather than prevented. The Commission will work on the assumption that building a better, more prosperous and more secure world will be possible only if inspired by "policies and practices that serve both to sustain and to expand the ecological basis of development," in the words of Mrs Brundtland.

Recommendations of the Commission will be submitted to the United Nations General Assembly in 1987.

Reference Methods refreshed

From the beginning the Regional Seas Programme has been plagued by a recurring scientific problem -- that of comparability of data generated by the various marine pollution research and monitoring programmes carried out worldwide under its auspices. In order to overcome the difficulties caused by the variety of sampling and analytical methods used by individual scientists, the standardisation of these methods became necessary.

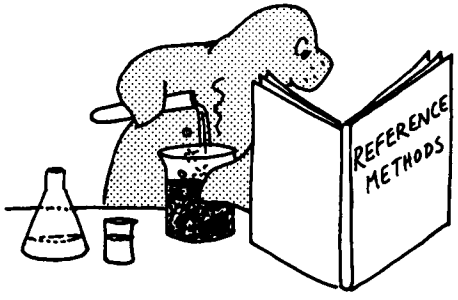
Therefore, UNEP, in co-operation with FAO, WHO, IOC, IAEA, WMO and other competent organizations, began formulating and testing methods to be recommended for general use in its scientific programmes.

Such "reference methods" must satisfy a number of requirements: they must fulfil high standards of chemical analysis, reproducibility and accuracy; they must be relatively simple and applicable by a large number of participants on a routine basis; and they must meet the legal requirements set forth in the various regional seas conventions.

Several methods and guidelines have been issued since 1980. However, in early 1984 their preparation was radically improved when the IAEA's International Laboratory for Marine Radioactivity (ILMR) became, on behalf of UNEP, the technical focal point for the preparation and testing of all methods to be recommended for use in the Regional Seas Programme. Assistance continues to be provided by all the agencies which participated in the earlier phase.

The high quality of the reference methods is further assured by the recent agreement between UNEP and IOC to co-sponsor the Group of Experts on Methods, Standards and Intercalibration (GEMSI), which will be used as their joint advisory body on all chemical reference methods. GEMSI is a subsidiary group of the Global Investigation of Pollution of the Marine Environment (GIPME), an IOC-sponsored programme. The sixth meeting of GEMSI (Woods Hole, 26-30 November 1984) was scheduled to discuss how best to fulfil its new role.

Close to 20 reference methods have been issued to date by UNEP in the series "Reference Methods for Marine Pollution Studies." They include guidelines for monitoring the quality of bathing and shellfish-growing waters; sampling and sample preparation for analysis of chemical pollutants; monitoring of coral reefs; and a large number of methods for determination of microbiological and chemical contaminants in sea water, marine organisms and sediments.



HELMEPA birthday

The Hellenic Marine Environment Protection Association (HELMEPA) was two years old in June.

In 1982 the Greek shipping community voluntarily committed itself to protecting the seas of the world from ship-generated pollution. "Safe Ships and Clean Seas" became the common goal of Greek shipowners, operators, masters, deck and engineer officers and seamen. Most of

HELMEPA's activities involve informing, advising and educating its members on international conventions and procedures associated with protection of the marine environment.

For his contribution to the founding of HELMEPA and to marine safety in general, George P. Livanos was awarded the 1983 Halert C. Shepheard Award for Achievement in Merchant Marine Safety. Mr. Livanos, who is president of Seres Shipping, Inc., was interviewed in The Siren No. 18, October 1982.

news from the regions

south pacific

The SPREP networks on (1) environment monitoring and research and (2) education, training and information are busy with implementation of their programmes adopted earlier this year in Port Moresby (see Siren No. 23).

A regional workshop on marine pollution was held in Suva in November. The workshop was organized in co-operation with IMO to discuss prevention, control and response to marine pollution emergencies through national contingency plans.

The directory of Pacific coral reef researchers has been published and the coral reef monitoring handbook has been reissued.

west and central africa

The Abidjan Convention for Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region and its Protocol concerning Co-operation in Combating Pollution in Cases of Emergency entered into force on 5 August, 60 days after ratification by six countries: Ivory Coast, Guinea, Cameroon, Senegal, Togo and Nigeria.

Progress continues to be made on the three WACAF projects (see Siren No. 17). With the assistance of the International Maritime Organization (IMO) a draft national contingency plan for marine pollution emergencies has been developed for the Ivory Coast and for the sub-region covering Nigeria, Cameroon, Gabon, Sao Tome and Principe (WACAF 1). Two additional research agreements with institutions in the Ivory Coast and Senegal have been concluded by FAO (WACAF 2). Twenty-one WACAF research centres are expected to become the core of the marine pollution research and monitoring programme in the region. A training workshop to study coastal erosion processes was organized by UNESCO in Togo in September/October (WACAF 3).

eastern africa

Legal experts from nine States have reached a consensus on a draft convention and two related protocols for Eastern Africa.

Meeting at UNEP headquarters in Nairobi (29 October - 3 November), they agreed on draft texts for a regional convention for the protection and management of the marine and coastal environment, a protocol on protected areas and wild fauna and flora, and a protocol on co-operation in combating marine pollution in cases of emergency.

The meeting also considered the institutional and financial arrangements that would be required to support the implementation of the regional programme, and recommended that governments establish a trust fund to cover its common costs. The meeting also recommended that UNEP be requested to assume responsibility for the secretariat functions of the action plan, the convention and the protocols.

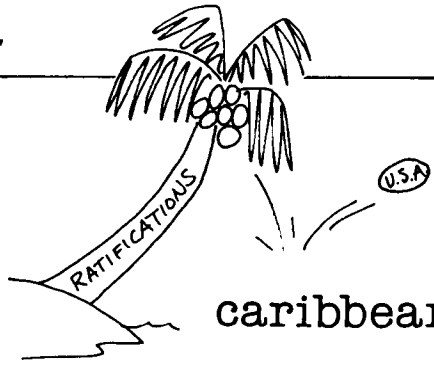
The legal documents and a regional action plan will be submitted for adoption to a Conference of Plenipotentiaries tentatively scheduled for June 1985. The Governments of the Seychelles and Somalia have offered to host the Conference.

red sea & gulf of aden

The past achievements of the Red Sea and Gulf of Aden environment programme (PERSGA) have been reviewed by ALECSO and UNEP, and preparations are being made to develop a long-term programme of co-operation, which would include UNEP's support to activities deemed appropriate within the framework of the Regional Seas Programme.

kuwait action plan region

As a result of the Third Meeting of the Council of the Regional Organization for the Protection of the Marine Environment (ROPME), several new posts were created in its Secretariat, some of which have now been filled. The posts are Deputy Executive Secretary, which is now occupied by Dr. Badrya Al-Awadi from Kuwait; Director for Administration and Finance, which is occupied by Mr. Taleb Kazem Al-Zubaidi of Iraq; and Co-ordinator for Regional and International Relations, which is occupied by Abdul Latif Al-Zaidan. Mr. Al-Zaidan is not new to the Secretariat, of course, since he has been responsible for overseeing its operations for the last three years. These new changes in ROPME mark its continued progress in taking on responsibility for the Kuwait Action Plan. The UNEP Regional Seas Programme looks forward to continued co-operation with ROPME and wishes success to all members of the Secretariat in their new positions.



caribbean

The United States of America has become the first country to ratify the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean, known as the Cartagena Convention, and the attached Protocol concerning Co-operation in Combating Oil Spills in the Wider Caribbean Region. President Reagan signed the necessary ratification instruments on 6 September 1984.

Six of the projects approved by the last meeting of the Caribbean Monitoring Committee (see Siren No. 24), involving the direct support of eight international, regional and national organizations, are advancing well. A meeting of experts in St. Lucia (May) adopted an oil spill contingency plan for the Caribbean island states and territories. Preparatory work on a similar plan for the South American sub-region is being undertaken by IMO. Trainees from Colombia, Mexico, Panama and Venezuela joined in September the training course based on the experience of the Havana Bay marine pollution project. Nine half-hour radio programmes have been prepared by the Caribbean Conservation Association (CCA) and played on most English-speaking Caribbean radio stations. A seminar for media personnel was held in Barbados in June. Preparation of three case studies and guidelines for environmentally - sound tourism development is under way.

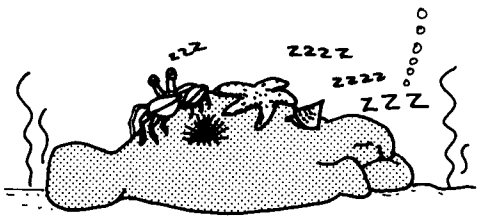
east asian seas

A workshop with participants from the East Asian Seas and SPREP regions was held in Manila (May) to discuss methodological problems related to monitoring of metallic pollutants in the marine environment, and to foster interregional co-operation on marine pollution studies. A complementary workshop is planned for mid-1985 in Port Moresby to discuss analytical methods relevant for monitoring of chlorinated hydrocarbons.

south asian seas

Work on country reports outlining environmental problems in South Asia is progressing rapidly and is expected to be completed by the end of the year. Consultancy assistance has been provided by UNEP through the South Asian Co-operative Environment Programme (SACEP) to those states of the region which requested help in preparing the reports.

When the country reports are ready, they will be consolidated into an overview of the region's environmental status and threats, and used as a basis for the drafting of a regional action plan.



mediterranean

Several meetings of Mediterranean scientists were held to review the application of reference methods used in the Mediterranean Pollution Monitoring and Research Programme (MED POL) (Rome and Athens, June 1984) and the problems of mercury in the Mediterranean (Siena, August; Zagreb, September).

A joint Blue Plan - Priority Actions Programme (PAP) seminar discussed the environmental impact of nautical tourism (Cannes, September). A programme complementary to the FAO/UNEP Mediterranean Regional Aquaculture project (MEDRAP) is being developed in the framework of PAP. With the assistance of IUCN a detailed workplan has been formulated for the Tunis Centre for specially protected areas.

Spain has ratified the land-based sources protocol (June) and the EEC approved the protocol on specially protected areas (June).

A. Cruzado completed his three year assignment as the senior marine scientist of the Mediterranean Co-ordinating Unit and returned to his research work in Barcelona. I. S. Dharat from Libya joined the Unit in September. P. Le Lourd has completed his assignment as Director of the Regional Oil Combating Centre in Malta. N. Voirin was appointed as the new Director.

DATE	PLACE	TITLE	ORGANIZERS
10-14 December	Athens	Third meeting of the Working Group for scientific and technical co-operation for MED POL	UNEP
10-14 December	Concepcion	Workshop on the assessment of the environmental impact of potentially harmful substances released from coastal sources into the marine environment - case study in Chile	ECLA/CCPS/ UNEP
11-14 December	Havana	Second workshop on environmental management of bay ecosystems in the Caribbean region	UNESCO/ Govt. of Cuba/UNEP
1985			
January/ February	Athens	Meeting of National Priority Actions Programme(PAP)/Blue Plan Focal Points	UNEP
February	West and Central African Region	Meeting of experts on contingency planning for marine pollution emergencies	IMO/UNEP
March	West and Central African Region	Workshop on coastal erosion control	UNESCO/ UN-DIESA/ UNEP
March	Caribbean region	Fourth Meeting of the Monitoring Committee and Third Intergovern-mental Meeting on the Action Plan for the Caribbean environment programme	UNEP
March	Caribbean Region	Third Intergovernmental Meeting on the Action Plan for the Caribbean environment programme	UNEP
18-22 March	Panama	Course on oil spill control in the South East Pacific Region	IMO/CPPS/ UNEP
25-27 March	Panama	Workshop of legal and technical experts on the contingency plan to combat oil spill pollution in the South East Pacific Region in cases of emergency	IMO/CPPS/ UNEP

the last gold rush

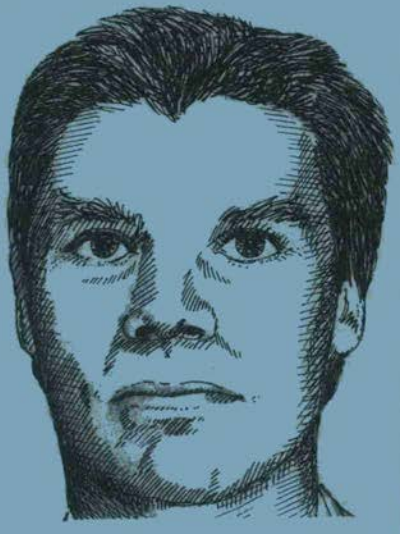
by

Michael Donoghue

Fisheries biologist

Scientific adviser to the
New Zealand Delegation to the
International Whaling Commission (IWC)

Member of IWC Scientific Committee



The outlook for the marine life of Antarctica is bleak. There has been little observable recovery in the decimated stocks of great whales. Major fisheries have collapsed from overfishing. Catches of krill have increased by almost 200 times in just six years. And negotiations to conclude a regime for mineral exploitation of the continent are proceeding apace.

Just how the Antarctic ecosystem has come to be in such a critical state, and why the Antarctic Treaty Nations have failed to provide adequate safeguards or effective management for the unique fauna of the Southern Oceans, is a disturbing story.

WHO OWNS ANTARCTICA?

A small group of nations, led by the world's major political and economic powers, has been trying since 1959 to retain tight control over the vast expanse of Antarctica. In recent years, however, both environmentalists and a number of Third World countries have become increasingly aware of Antarctica's unique features, and have challenged the right of a handful of countries to exploit the world's last undeveloped continent as they alone see fit.

The ownership of Antarctica and its wealth has been disputed for many years. Territorial claims were lodged early this century by Argentina, Australia, Chile, France, Norway, New Zealand and the United Kingdom, but these claims are not recognized by the nine other non-claimant states who are the remaining consultative parties to the Antarctic Treaty. These countries are: Belgium, Federal Republic of Germany, Japan, Poland, South Africa, USA, USSR, and two newcomers who have only recently become full partners to the Treaty, Brazil and India.

The original intention behind the Antarctic Treaty negotiations, which were completed in 1959, was to

consolidate the progress made in scientific research during the International Geophysical Year in 1957. Under the terms of the Treaty, the Antarctic Continent is to remain a place for scientific research, free from militarisation (it is one of the world's few nuclear-free zones), and commercialisation. In recent years, however, increasing pressure has been placed on the Treaty Nations to open up the Antarctic for mineral development. Under the chairmanship of New Zealand's Chris Beeby, the Consultative Partners have been meeting several times annually for the last three years in an attempt to negotiate a regime which will enable them to control the mineral exploitation of Antarctica, to the exclusion of the rest of the world.

A UNIQUE CONTINENT

The Antarctic Continent covers some 14 million square kilometres, or one tenth of the Earth's land surface (Fig.1). Some 98 per cent of it is covered by a permanent icecap averaging 2,000 metres in thickness and containing about 90 per cent of the world's store of fresh water. The huge area of ice greatly reduces the exchange of heat between the ocean and the atmosphere, and its reflectivity prevents all but a small proportion of the sun's radiant energy from being absorbed.

Although Antarctica has no native human inhabitants, about 900 people brave the six months of darkness and extreme cold to occupy the 34 scientific stations in winter.

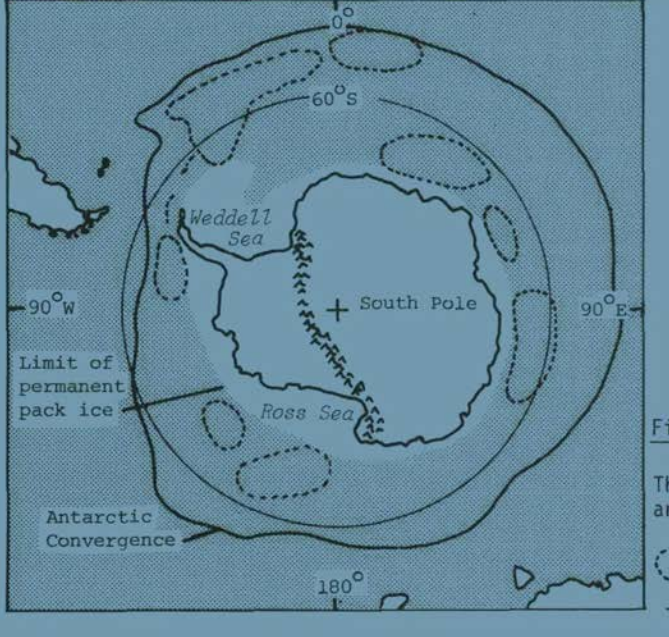


Figure 1.

The Antarctic Continent and Southern Ocean

major krill concentrations

This number increases to about 3,000 during the summer.

Terrestrial flora consist of microscopic soil fungi, mosses, primitive algae, at least 350 species of lichen, and two species of flowering plants. Terrestrial fauna are represented by about 150 species of mites, lice and midges.

THE MARINE ECOSYSTEM

The contrast between the paucity of terrestrial life on Antarctica and the abundance of marine life could hardly be greater. The key to the productivity of the Southern Ocean, defined as the seas surrounding the Antarctic Continent south of 60° S, is the long period of daylight during the polar summer which facilitates the rapid growth and reproduction of phytoplankton.

Antarctic waters contain abundant nutrients for phytoplankton growth because of the upwelling effect of the Antarctic Convergence. As cool surface waters spread out and away from the continent, they meet the warmer, less dense sub-Antarctic water. The region where these two bodies of water intermingle is one of great upwelling, as the colder waters slip to the bottom and bring to the surface nutrients which have accumulated in the bottom sediments during the passage of warmer waters from tropical latitudes. The water temperature in the upwelling areas changes by up to 4°C within less than 50 miles, so that the Antarctic Convergence is a major faunistic boundary.

The extent and reliability of the upwelling combine with an abundance of nutrients and (in summer) light to give the Antarctic Surface Water an extremely high potential for production: estimates of annual primary production range from 6,100 million tonnes to 38,000 million tonnes.

The dominant grazer of this phytoplankton is a small, shrimp-like crustacean, Euphausia superba, commonly known as krill. Perhaps the richest single source of protein in the sea, krill is the fundamental unit of Antarctica's marine living organisms. It provides food for other Antarctic animals including squid, many species of finfish, six species of seals, several species of great whales, and over 50 species of birds.

Krill sometimes congregate in massive "superswarms". A U.S. expedition in 1981 observed swarms of krill six miles wide, 12 miles long and 1300 feet thick.

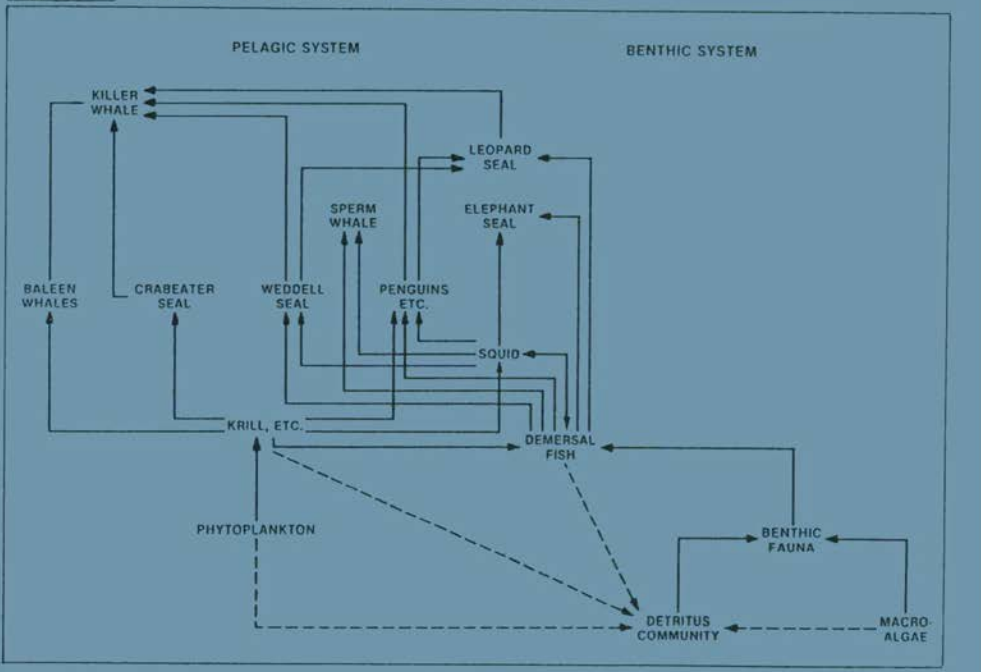
Most of the animals which feast on the krill are unique to the Antarctic (Fig. 2). Many of the whales, of course, are only summer visitors, but most of the 15-30 million seals and 100 million sea birds (90 per cent of which are penguins) are permanent inhabitants. The fish species all appear to be confined to the Southern Ocean.

The major feature of the Southern Ocean ecosystem is the direct dependence of so many of the primary consumers on krill as a food source. The food web for the ecosystem is thus exceptionally simple, in comparison with most marine food webs.

A HISTORY OF EXPLOITATION

Exploitation of the Antarctic ecosystem over the past century has caused the near extinction of two species of seals and several species of whales. The widespread Southern

Figure 2. Simplified Antarctic marine food web.



Fur Seal population was reduced from numbers in the millions to fewer than 100 individuals by the turn of this century. Elephant Seals also became exceedingly rare at this time.

Hunting for fur seals stopped when it ceased to be economically viable. Because little or no harvesting has taken place since 1900, fur seal populations have begun to recover, and the seals now number about one million around the island of South Georgia. Elephant seals have also recovered from the onslaught of the sealers, but unfortunately no such recovery has been noted in the stocks of great whales. The depletion of the great whales in the Antarctic represents a prime example of the dangers associated with inadequately regulated exploitation of renewable resources.

The era of modern whaling began in the Antarctic in 1904, but right whales in the Southern Hemisphere -- whose breeding area lies outside the Antarctic zone -- had been virtually exterminated in the 19th century. Before the modern era, whales were hunted from land-based stations in the South Atlantic. Humpback whales were the first target, but the main catch was blue and fin whales. Antarctic stocks of humpback whales were also exploited in their wintering grounds at lower latitudes.

In 1925, the first factory ship with a stern slipway was introduced, allowing industrial whaling far from land. By 1930, most catches were taken on the high seas, the blue whale being the main quarry. By the beginning of World War II, the stocks of blue whales had fallen signifi-

cantly. When they were finally protected by the International Whaling Commission (IWC) in 1964, a population origially thought to represent around 200,000 animals was estimated at no more than a few thousand. Latest estimates (1984) of the IWC Scientific Committee number this population at about 1,000.

After World War II, fin whales formed an increasing proportion of the catch and became the mainstay of the industry throughout the 1950s and 1960s. Catches often exceeded 25,000 fin whales per year. Eventually stocks became so reduced that they were no longer commercially significant, and sei whales became the industry's chief target. These were also quickly depleted, and today only a remnant of the open ocean whaling industry operates on the smallest of rorquals, the minke whale. Sperm whaling has been banned since 1975 in the Antarctic.

In spite of the enormous reduction in numbers of great whales in the Antarctic (Fig. 3), both Japan and the USSR have maintained their pelagic whaling fleets and have consistently opposed attempts by the IWC to reduce Antarctic quotas for minke whales. Both have lodged objections to the moratorium on commercial whaling, due to come into effect during the 1985/86 Antarctic season. Theoretically, therefore, neither nation will be bound by the moratorium decision, and either (or both) may continue Antarctic whaling after next season. The Soviet Union has also lodged an objection to the reduction in minke whale quotas for the Antarctic season 1984/85, which was voted by the IWC meeting in Buenos Aires this June. The Russian pelagic whaling fleet will thus be hunting in Antarctica this year with no restriction on the catch of minke whales.

The reluctance of the USSR and Japan to call a halt to their whaling activities in Antarctic waters underlines the difficulty of compelling nations to abide by international conventions if it does not suit their purpose to do so. The international treaty which supposedly regulates the stocks of fish, squid and krill in Antarctic waters provides a classic case of a well-worded and carefully-drafted treaty which appears to be totally toothless in its application.

CCAMLR AND THE DECLINE IN ANTARCTIC FISH STOCKS

The Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR) was widely acknowledged as a major negotiating success when it was drafted in 1978, because

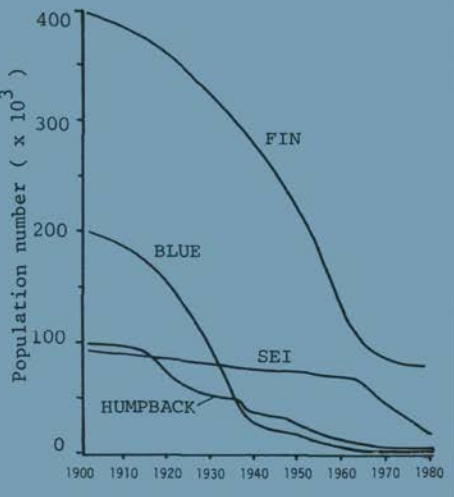


Figure 3. Population trend curves for the major whales in the Antarctic from 1900 to 1980.

it was the first international treaty to adopt an ecosystem approach to marine resource management, rather than the usual species-by-species approach.

The stocks of Antarctic finfish were in a perilous state by 1978 (see Fig. 4). This followed a decade of intensive fishing spearheaded by the Soviet Union, which launched its fishery effort with a massive catch of 430,000 tonnes of Antarctic cod (Notothenia rossii) in 1969/70. Since then, at least three different stocks (N. rossii; Scaled Notothenia, N. squamifrons; and Antarctic Icefish, Champsocephalus gunnari) have been so heavily overfished that in some areas, such as the previously rich grounds around South Georgia, less than 10 per cent of the original stock remains. Of the three species mentioned, N. rossii is the most seriously threatened.

Between 1969 and 1981 over 2.3 million tonnes of finfish were caught in the South Georgia area, of which N. rossii made up 21 per cent. In 1969, this fish contributed 98 per cent of the total catch including krill, but by 1981 this had dropped to 0.4 per cent. In the 1979/80 season, commercial fleets caught 45,382 tonnes of N. rossii, which was equivalent to about 88 per cent of the estimated standing stock for the previous year. Predictably, there was a sharp decline in the reported catch the following year, to only 1,504 tonnes.

However, as the stocks of Antarctic cod declined, the fishing fleets turned their attention to the other species. From 1972 on, the Soviet fleet was joined by fishing vessels from three other Eastern European countries.

The introduction of the CCAMLR accord, following several years of negotiation by the Treaty Nations, provided an opportunity for the introduction of the strong regulatory measures necessary to arrest the dramatic decline in Antarctic fish stocks during the 1970s. The key passage is Article II of the convention, which states that:

> "...the harvesting of marine living resources should be conducted in such a manner that (i) exploited stocks should not decrease to levels below those which ensure stable recruitment; (ii) depleted stocks should be restored to levels close to those which ensure the greatest net annual recruitment; (iii) the ecological relationship between harvested, dependent and related populations of Antarctic marine species should be maintained; and (iv) changes in the marine ecosystem which are not potentially reversible over two or three decades are prevented or minimised."

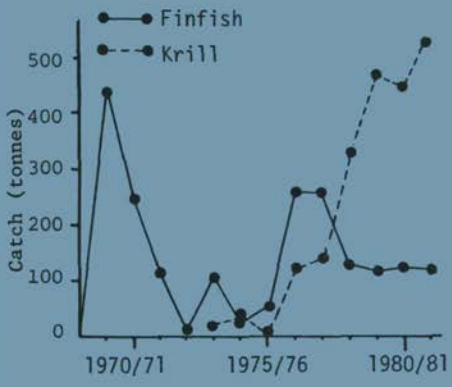


Figure 4. Total finfish and krill catches in the Southern Ocean from 1968/69 to 1981/82.

Regrettably, however, there has since 1978 been no real attempt by the Commission to invoke the spirit and intentions of Article II. It was hoped that at CCAMLR's third meeting in Hobart this September, the Treaty Nations would finally live up to their obligations and agree on appropriate measures to conserve and rebuild Antarctic fish stocks. Numerous control measures were available for consideration, ranging from a five- or ten-year moratorium on all fishing to the introduction of mesh size controls for trawl nets, closed areas, closed seasons and quotas.

Astonishingly, six years after the basic negotiating text was agreed and after three meetings of the Scientific Committee and the CCAMLR Commission, these basic regulatory measures have yet to be introduced in the Southern Ocean.

Part of the Commission's failure to act in accordance with Article II of the Convention stems from the consensus voting system adopted by the Treaty Nations in CCAMLR. This system proves decidedly ineffectual when faced with total intransigence on the part of one or two members. It is perhaps not surprising that the negotiations for a minerals regime seem to be favouring a majority vote system for decision making. At this year's meeting, the Treaty partners were not prepared to take on the Soviet Union with sufficient authority to force any significant concessions from the major fishing nation. Although a moratorium on finfishing in the Southern Ocean was called for, only two countries lent enthusiastic support and the move failed.

For the first time, however, there were a few encouraging signs. Limits were apparently agreed on mesh

size for trawl nets (legitimizing the commonly-used mesh sizes) and minimum sizes for fish, although this was not without its embarrassing moments -- the originally approved minimum sizes had to be hastily revised when it was realized that such regulations would have outlawed almost the entire Soviet Antarctic fish catch of 1982-1983. Also, a prohibition was agreed on fishing within 12 miles of South Georgia long after commercial stocks in the area had been wiped out.

However, the Commission merely "requested" fishing nations not to target N. rossii, and no quotas were set for any species. So the open access system, which proved so devastating to Antarctic fur seals and whales, will continue to prevail, and the spirit and intent of Article II cannot possibly be served.

Article II imposes clear obligations on the members of the

Commission when they decide on the management of the fish stocks of the Southern Ocean. All the present members were participants in the International Conference which drew up the Convention, they were all initial signatories, and they have all now ratified it. There can be no excuses for failing to understand the obligations imposed by the Convention.

GOING IN FOR THE KRILL

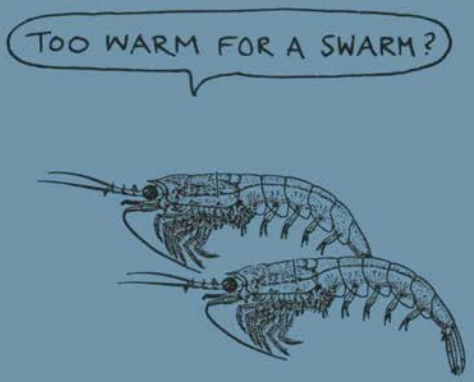
As finfish stocks have declined, the fishing nations have increasingly turned their attention to the development of a substantial fishery for krill. Catches of krill have risen spectacularly, from less than 3,000 tonnes in 1975/76 to over half a million tonnes in 1981/82. This huge increase in fishing effort has been a compensation to state and commercial fleets, following the collapse of the major finfish stocks (Fig. 4).

Wildly variable predictions have been made of the potential stocks of krill. Estimates have ranged from about 130 million tonnes (calculated to be the "surplus" of krill following the devastation earlier this century of stocks of some of their major predators, the baleen whales) to as high as 500 million tonnes (estimated by a Soviet scientist). By comparison, the total world fish catch is about 70 million tonnes.

Recently published information has thrown a great deal of doubt on these predictions. Previously, most scientists considered the life span of krill to be two to three years. A new technique of ageing, based on the accumulation of fluorescent pigments in their tissues, has resulted in a reliable estimate of their life span of up to seven years. This means that previous production estimates will have to be substantially reduced.

Krill may also prove to be more susceptible to changes in water temperature than had been supposed. A temperature in parts of the Antarctic this year which averaged one to two degrees Celsius warmer than usual may have been associated with the almost total absence of krill swarms in these areas. It may well be, therefore, that environmental conditions can cause huge changes in the abundance or distribution of krill on a scale far greater than previously believed.

The rapid growth in annual harvest of krill underlines the need for development of an effective management regime. Favourable economic conditions could quickly lead to a massive expansion of the krill fishery. Modern fishing methods are capable of destroying even the most productive fisheries. For example, the anchoveta fishery off Peru increased from zero to 13.9 million tonnes in under a decade. This



resulted in a reduction of the stock from 20 million tonnes to less than one million, and a population crash in the mid-1970s from which the fishery has never recovered.

CCAMLR's woeful record as a management body is drawing increasing criticism, following this year's Hobart meeting. The critics are not only the intergovernmental organizations, such as the International Union for Conservation of Nature and Natural Resources (IUCN) and FAO, and the non-governmental organisations, such as Greenpeace and the Antarctic and Southern Ocean Coalition. More threatening to the Antarctic Treaty System are the nations outside the system who are challenging it.

ANTARCTIC TREATY NATIONS vs THE REST OF THE WORLD

Membership of the Antarctic Treaty club is very exclusive, although membership is theoretically open to all nations -- provided that they can mount a serious scientific effort and maintain a permanent base on Antarctica. Most of the Treaty Nations have had a long-established tradition of Antarctic exploration and research, but Poland and the Federal Republic of Germany are more recent arrivals, whilst Brazil and India are complete newcomers. Much interest will be focused on the performance of the latter two in the continuing negotiations to establish a minerals regime.

The unseemly haste with which the Treaty partners seemed to be moving towards the conclusion of negotiations to establish a minerals regime was a major factor in the increasing awareness of Antarctica which has been shown by non-Treaty nations, especially within the United Nations General Assembly. There are two major areas of concern; one is the potentially devastating impact which a programme for the exploitation of minerals could have on the delicate Antarctic ecosystem.

Offshore oil exploitation is likely to be the first mineral development in the region, and this has given rise to fears about the possibility of oil spills. In the Antarctic climate, once oil was spilt, it could take decades to disperse, and if there were a blow-out, an uncapped well could flow for six months or more during the Antarctic winter.

Scientists are also fearful of a number of other possible hazards, including volcanic and seismic activity and the movement of sea ice and icebergs. There has never been a major oil spill in the Arctic and no adequate clean-up techniques for removing oil from the ice-pack have been developed.

The effects of oil spills on animals are still unknown, although a number of birds have already been killed in northern spills. Some scientists warn that a major oil spill in Antarctica could be lethal to entire seal populations and millions of birds.

Since krill move in vast swarms they would be vulnerable to a catastrophe of this type. Scientists have also expressed concern over the potential effects of oil on this major link in the food web of the Southern Ocean.

The second consideration is more political. Since the United Nations Conference on the Law of the Sea established the principle of the seabed in international waters as the "common heritage of mankind", a simi-

lar principle has been proposed for Antarctica. An outspoken leader of this movement has been Malaysia whose Prime Minister was a key speaker in the United Nations General Assembly debate on Antarctica a year ago.

Thus the Treaty Nations are being increasingly forced to recognise that other countries wish to have their say in the decisions affecting the future of Antarctica. The inclusion of India and Brazil will go some way to increasing the dialogue between parties to the Antarctic Treaty and the non-aligned nations, but there seems to be little likelihood of a compromise between the desire of the Treaty partners to maintain total control over Antarctica and its living and mineral resources, and the demands of the non-aligned countries that the continent should become part of the "common heritage of mankind".

Conservationists are hoping that such a diplomatic impasse may result in the reconsideration of an idea first proposed by New Zealand some ten years ago, and scornfully dismissed by the other Treaty Nations at that time.

Cartoon by Trevor Daley

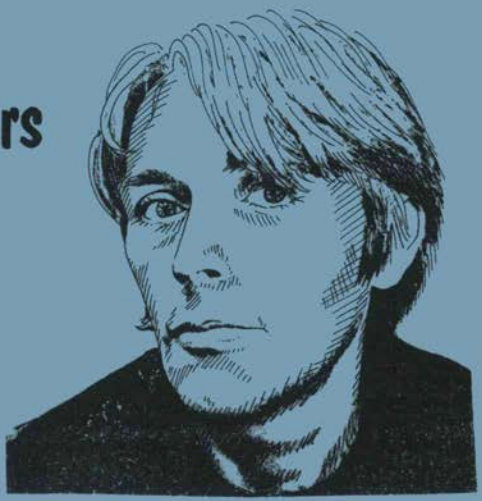
ANTARCTICA -- A WORLD PARK?

New Zealand's proposal called for the establishment of Antarctica as a World Park, free from any commercial or military applications. The idea was so firmly buried at that time that, as far as we can tell from the meagre information released to the media, it has never again been seriously considered during the regular negotiations of the Treaty partners.

However, the World Park concept has much to recommend it. It obviously provides the best opportunity for conservation of the continent and its unique fauna and flora, and eliminates the possibility of lasting damage to the terrestrial and marine ecosystems by mineral exploitation. Whilst these factors are unlikely to be major considerations in the eyes of many of the Treaty partners, others show more sympathy. Increasing concern over the potentially detrimental effects of mineral exploitation, mounting exasperation over CCAMLR's inability to initiate even the most fundamental conservation measures in the Southern Ocean, and an increasing vociferousness from the non-aligned nations in the United Nations (where Antarctica is predicted to become a major issue in 1985) are combining to bring greater pressure than ever on the Treaty Nations.

The next few years will clearly be crucial. If the signatories to the Antarctic Treaty are to fulfil their obligations to the rest of the world, they will have to move rapidly to protect the stocks of finfish and krill in the Southern Ocean, and provide real and lasting protection from mineral development to the unique Antarctic ecosystem.

Antarctique : les avions dénicheurs



par

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Greenpeace, La Fédération française des sociétés de protection de la nature (FFSPN), la Ligue pour la protection des oiseaux (LPO), les biologistes internationaux se battent pour qu'en terre Adélie, fraction de l'Antartique dont la France est gestionnaire, les avions ne remplacent les oiseaux.

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En 1982, l'Administration des Terres australes et antarctiques françaises (TAAF) écrivait : "La nidification des oiseaux et leur adaptation poussée à la vie pélagique les rendent plus vulnérables aux activités humaines. Les couveurs, même les manchots dans les grandes rookeries, sont facilement dérangés et peuvent déserter leurs nids. Les perturbations qui en découlent dans les colonies exposent oeufs et poussins à un accroissement de la prédation par les stercoraires. Les pétrels sont également sensibles à toute perturbation et on peut dire que toute visite dans une colonie est intempestive et constitue une cause de mortalité possible."

En terre Adélie, la presque totalité des oiseaux qui viennent se reproduire nichent sur l'archipel de Pointe-Géologie et se concentrent surtout sur les îles choisies pour la construction de la base aérienne française. De plus, sur les huit espèces présentes, quatre, le pétrel géant, le fulmar antarctique, le damier du Cap et le manchot empereur, ne nichent en terre Adélie que sur cet archipel.

DOMMAGES POUR LES OISEAUX

Les pétrels de Wilson sont environ 500 couples et leurs nids sont le plus souvent inaccessibles. Il sera impossible d'éviter qu'ils ne soient victimes des dynamitages dont le rayon de projection est de l'ordre de 200 mètres.

Les nids des pétrels des neiges et des damiers du Cap - environ 500 couples par espèce - sont plus aisément repérables, c'est pourquoi, dans une note interne des Expéditions polaires françaises (EPF), est évoquée la possibilité "de les mettre dans un grand carton et de les transférer". Il est improbable que les pétrels des neiges et les damiers du Cap, extradés de leurs lieux de reproduction, élisent domicile ailleurs. Les sites de nidification conformes sont en effet en nombre limité et ces oiseaux s'adaptent mal à toute modification de leur environnement.

Il y a quelque 50 couples de fulmars sur l'archipel de Pointe-Géologie. Selon un arrêté de l'administrateur des TAAF

lui-même, ils méritent une attention particulière et leurs territoires doivent, en tout temps, être strictement épargnés. Les fulmars ne sont pas directement menacés, mais la piste d'atterrissage couperait leur aire d'envol et dégraderait leur zone de dispersion. Ces 50 couples pourraient d'autre part être décimés par la route de raccordement entre la piste et l'île des Pétrels.

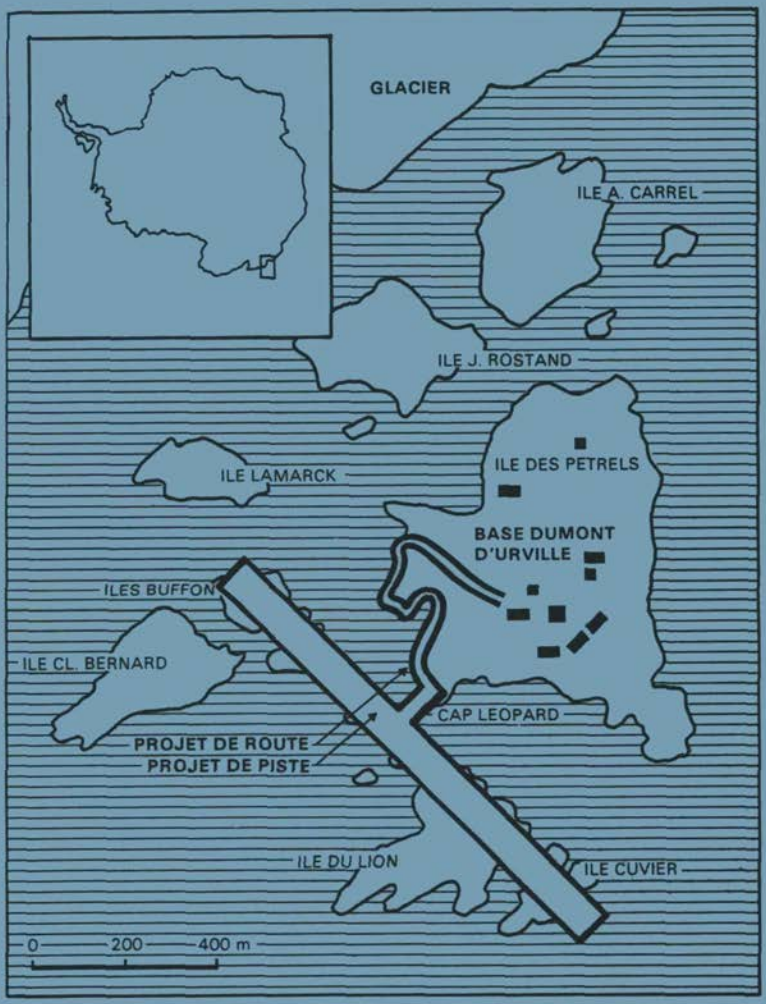
Les pétrels géants ne sont que 20 couples. Ils constituent le meilleur exemple de l'extrême sensibilité de l'avifaune antarctique à la présence et à l'activité humaines. En 1952, ils étaient 75 couples qui élevèrent 44 poussins. En 1961, il n'y avait plus que 25 couples qui élevèrent 16 poussins. En 1983, seuls un ou deux couples se sont reproduits. Les autres ont été chassés par la colonisation humaine. Ils ont essayé, sans succès, de s'implanter dans les îles voisines, à l'exception de l'île Jean-Rostand où cependant la colonie est beaucoup plus fragile que la colonie originelle de l'île des Pétrels. Les pétrels géants ne sont pas directement concernés pas la base aérienne, mais leurs couloirs d'envol seraient perpendiculaires à ceux des avions. On peut redouter leur réaction de fuite aux explosions pendant les travaux et au trafic aérien qui s'ensuivra.

Les stercoraires sont les seuls oiseaux antarctiques qui aient tiré profit de l'arrivée des hommes sur l'archipel. Leur population a triplé depuis 1952, mais ils restent cependant assez peu nombreux, environ 50 couples. Ils se nourrissent des déchets alimentaires de la base Dumont-d'Urville mais sont aussi les prédateurs d'oeufs et de poussins de manchots Adélie en particulier. Ils n'hésitent pas à attaquer les intrus, y compris l'homme, et même les hélicoptères. La construction de la base aérienne détruirait six territoires et un dortoir.

Les manchots Adélie sont au nombre de 16 000 dans l'archipel de Pointe-Géologie et 1 600 dans les îles menacées. On estime leur population à 25 000 individus dans le reste de la terre Adélie. Ils semblent moins menacés que les autres espèces, mais déjà un millier d'oeufs ont été détruits lors des nettoyages préliminaires aux dynamitages de cette année. Quoique curieux, ces oiseaux sont méfiants. Trois colonies, choisies comme colonies d'étude autour de Dumont-d'Urville, ont été désertées en cinq ans. Les Néo-Zélandais et les Américains ont dû, en 1964, strictement protéger la colonie de Cap Royds qui, par la suite, fut déclaré "site d'intérêt scientifique particulier". Les plus importantes colonies de l'archipel de Pointe-Géologie sont situées sur le parcours de la route de jonction entre la base aérienne et la base Dumont-d'Urville.

Les manchots empereurs, quant à eux, n'ont pas le vent en poupe. Leur colonie de Pointe-Géologie, la seule de terre Adélie, a régressé de 12 000 individus en 1952 à 6 500 en 1983. Ils semblent avoir été victimes de facteurs climatiques cumulés, banquise anormalement grande et moins bonne protection du vent après le recul du glacier de l'Astrolabe. Leur site préférentiel n'est pas directement condamné mais la voie d'accès moyenne sera barrée par la piste d'atterrissage. Les manchots empereurs ne sont pas d'un naturel agile sur terre et s'il leur arrive de faire du toboggan, ils ne s'y connaissent guère en escalade. Ils seront incapables de gravir la pente des remblais de six mètres de haut surmontés en outre d'une clôture destinée à empêcher les manchots Adélie d'occuper la piste. De plus, en mars, ils arrivent de la mer en processions, ayant reconstitué leurs réserves pour affronter le jeûne de plusieurs mois qu'ils devront subir pendant l'incubation et l'élevage de leurs poussins. On a observé que les manchots égarés par une erreur de navigation - ils semblent s'orienter d'après le soleil - ou par des mouvements d'icebergs, mettent plusieurs mois à sortir d'un cul-de-sac ou à retrouver la bonne route. Ils manquent ainsi les 'rendez-vous de l'espèce' et ne peuvent se reproduire. Une autre voie d'accès, mineure, sera aussi coupée par la route de jonction.

Tous ces oiseaux seront soit tués lors des dynamitages soit lentement anéantis par la construction de la base



La base aérienne condamnerait à plus ou moins long terme les nombreuses colonies d'oiseaux qui vivent sur l'archipel de Pointe-Géologie et qui sont très sensibles à la présence humaine.

La route de jonction entre la piste d'atterrissage et le coeur de la base Dumont-d'Urville décimerait, elle aussi, l'avifaune de l'île de Pétrels.

C'est pour faire atterrir des Transall à roues que la France veut construire une piste en dur. Pourtant, depuis 1957, des avions à skis atterrissent et décollent sur les 13 millions de kilomètres carrés du continent antarctique.

aérienne, puis son trafic. Prétendre que les oiseaux iront renicher dans les remblais de la piste est faire preuve de mauvaise foi, car ils nichent dans des sites particuliers et limités à une altitude au moins égale à dix mètres. Ceux qui tenteraient de le faire s'enfuiraient vite après le passage à deux mètres d'un Transall aux turbopropulseurs vrombissants. Dire que les explosions, le trafic aérien, les modifications topographiques auront un 'effet nul' sur la reproduction des oiseaux est un mensonge éhonté.

LE COMITE DES SAGES

Il se confirme que les sages sont une espèce en voie de disparition puisqu'il a été difficile d'en trouver huit qui acceptent de se pencher sur le sort de huit espèces d'oiseaux antarctiques. Elle est non seulement menacée, mais aussi condamnée au silence... Depuis deux mois et demi, rien n'a officiellement transpiré de ses conclusions. Le Secrétariat d'Etat aux DOM-TOM et l'Administration des TAAF, instigateurs plus ou moins contraints de ce comité, se montrent à cet égard d'un mutisme déterminé.

Cependant, le 26 mars dernier, quelques jours après les auditions du comité des sages, Greenpeace envoyait par télex le message qui suit au Premier Ministre, au Ministère des relations extérieures, au Ministère de l'industrie et de la recherche, au Secrétariat d'Etat aux DOM-TOM, au Secrétariat d'Etat à l'environnement, à l'Administration des TAAF et aux EPF :

"Antarctique : le comité des sages donne raison à Greenpeace, à la LPO et à la FFSPN.

"Selon les informations confidentielles recueillies par Greenpeace aujourd'hui, les premières conclusions du comité des sages chargé d'examiner le projet de base aérienne sur l'archipel de Pointe-Géologie en terre Adélie et réuni à Paris pendant quatre jours rejoignent celles des organisations de protection de la nature.

"En effet, le fond et la forme de l'étude d'impact réalisée par un responsable des EPF ont été jugés inacceptables par les huit éminents biologistes de différentes nationalités composant le comité.

"Le comité des sages réclame dans ses conclusions la mise en oeuvre d'une nouvelle étude d'impact contrôlée par des scientifiques actifs, pluridisciplinaires, et par un écologiste. Le comité des sages préconise que cette nouvelle étude soit faite dans un délai de six mois et dénonce par ailleurs l'absence d'étude de voies alternatives, qu'elles soient aériennes, maritimes ou mixtes.

"Le comité recommande aussi que les décrets d'application de la loi de 1976 sur la protection de la nature soient dès maintenant observés aussi bien dans les Terres australes et antarctiques françaises que dans les départements et territoires d'outre-mer.

"Le directeur de cabinet du Secrétaire d'Etat aux DOM-TOM a affirmé devant le comité des sages qu'à la veille de la reconduction ou de la renégociation du traité de l'Antarctique en 1989-1991, il était indispensable que la France jouisse d'une logistique 'en dur' soutenue par ses forces aéronavales.

"Les campagnes des organisations internationales, comme Greenpeace, et nationales, comme la FFSPN et la LPO, récoltent donc leurs premiers fruits, des fruits amers pour les promoteurs du projet qui voient leur étude maison dénoncée, et vont être contraints d'ouvrir leur dossier et d'élargir leurs champs de réflexion;

Manchot empereur

d'autre part, les DOM-TOM vont être obligés d'expliquer leurs conceptions stratégiques en Antarctique, qui, au moins jusqu'en 1991, restera démilitarisé.

"Un porte-parole de Greenpeace qui a lui aussi été entendu par le comité des sages a ainsi conclu son audition : 'Si la France renonce à son projet dévastateur aux conséquences écologiques et politiques incalculables, Greenpeace, au niveau international, soulignera le caractère positif et enthousiasmant de sa décision ; si, par contre, la France s'obstine autour de l'Île des Pétrels en terre Adélie, à remplacer les oiseaux antarctiques par des avions militaires, elle trouvera Greenpeace et ses adhérents sur tous les chemins qui mènent à l'Antarctique.'"

Ce message eut un effet de souffle ravageur. A ce jour, début juin, il constitue encore la seule référence écrite aux travaux des sages ; il dit la vérité dont on dit qu'elle serait encore plus 'crue".

L'un des responsables de l'Administration des TAAF, avant même la publication officielle du rapport du comité des sages, a mis en oeuvre une nouvelle étude d'impact qui serait soumise à l'approbation du Secrétariat d'Etat à l'environnement et ensuite consultable pendant quinze jours dans les bureaux des TAAF.

Une décision est requise, en juillet, du gouvernement. Il faut qu'elle soit positive, disent les promoteurs du projet en s'appuyant sur les sommes déjà dépensées, les travaux irréversiblement entamés et le concept de souveraineté. Tous ceux qui s'étonnent, élaborent des voies alternatives sont au mieux des gêneurs, au pire des fanatiques, en tout cas des "ignares".

Pourtant, Paul-Emile Victor écrivait dès 1979 que "l'île des Pétrels n'était pas extensible, qu'elle était trop exiguë, qu'il fallait le plus vite possible réinstaller une station sur le plateau antarctique". En créant, comme le suggère aujourd'hui en alternative le Ministre de l'industrie et de la recherche, une piste de neige compactée sur le plateau continental, le programme de recherches françaises en Antarctique se réorienterait sur le plateau, là où les recherches, selon les EPF, ont de l'avenir. Ainsi, les îles seraient laissées à la souveraineté des oiseaux et aux observations des biologistes qui pourraient étudier en toute tranquillité les moeurs des manchots ou des quelque 400 phoques de Weddell qui croisent, en été, autour de l'île des Pétrels.

Manchot Adélie

ANIMATIONS RECENTES

Le 23 juin 1984, les "manchots empereurs" - des militants de Greenpeace - escaladèrent la façade de l'immeuble des terres australes et antartiques françaises. Ils demandaient la publication officielle du rapport du comité des sages. Ces six "manchots empereurs" ont été, pour leur insolence, molestés par les forces de l'ordre.

Le 10 octobre 1984, cinq manchots empereurs ont apporté au siège des TAAF, vingt mille cartes postales et lettres de protestations envoyées par les adhérents des sociétés de protection de la nature pour qu'elles soient jointes au registre de la nouvelle étude d'impacte.

Le 21 octobre 1984, huit "manchots empereurs" occupaient, au Havre, le Polar Bjorn, cargot norvégien qui s'apprêtait à partir en terre Adélie avec du matériel spécifiquement destiné au chantier de la piste. Après 56 heures d'occupation, les "manchots" redescendaient de la nature, le Premier Ministre français ayant donné l'ordre de suspendre tous les travaux jusqu'à ce qu'une décision gouvernementale finale soit prise.

Le 24 octobre, sur un manifeste lancé par Greenpeace, la FFSPN et la LPO demandent que les solutions alternatives soient approfondies et que les oiseaux soient épargnés. Il est déjà signé par de très nombreuses personalités du monde politique, artistique et scientifique français ainsi que par trois membres du comité des sages.

Pour conclure, il faut rappeler que les biologistes, dans la nouvelle étude d'impacte, mettent en avant la fragilité de la colonie des manchots empereur et n'excluent pas le risque d'extinction que les avions leur ferait courir; il faut souligner que si la France sacrifie "ses" oiseaux en faisant sauter au su et au vu du monde entier le verrou de protection que constituent les mesures agréées sur la protection de la faune du Traité de l'Antartique, les autres pays signataires pourraient s'engouffrer dans la brèche et perdre ainsi tout sens de ces mesures. Ce serait la mort des seuls "aborigènes antarctiques" et une grande défaite pour l'écologie et la vie.

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¿Cuál es el futuro del Tratado de la Antártida?

por

Mairuth Sarsfield

Mairuth Sarsfield ha sido nombrada recientemente directora de la Canadian Broadcasting Corporation. Sarsfield trabajó anteriormente con el PNUMA en Nairobi y Nueva York en calidad de Oficial Principal de Información y Directora Adjunta de Información.

La Antártida, por mucho tiempo hábitat casi exclusivo de pingüinos y científicos, se ha convertido en un campo de batalla entre el Tercer Mundo y algunos de los principales países industrializados. En el centro de la controversia sobre el futuro del continente - actualmente en debate por la Asamblea General de las Naciones Unidas - existe la tentativa de algunos de los signatarios del Tratado de 1959 de establecer un régimen sobre los minerales, preocupados por los enormes e inexplotados recursos minerales de la Antártida, que amenazan con provocar una

invasión de tierras y desatar reacciones en cadena sin precedentes.

El Tratado de 1959 declara que la Antártida será utilizada con fines pacíficos y prohíbe su uso para propósitos militares, incluyendo pruebas nucleares. Así pues, es la única zona del mundo genuinamente libre de energía nuclear. Este tratado sobre medio ambiente contiene medidas para el control de armamentos, de acuerdo con las cuales se pueden efectuar inspecciones y comprobaciones en el lugar. La protección de los recursos vivos de dicha zona está cubierta por una convención jurídica ambiental que constituye un "hito". Sin embargo, los 28 Estados miembros del exclusivo Club de la Antártida, entre los que figuran China y la India, "temen", cada uno por razones diferentes, enmendar el Tratado de 1959 para permitir una participación más universal.

La descarga de desperdicios tóxicos se podría concebir a cambio del desarrollo de un producto comercializable que produjera utilidades al Fondo del "Patrimonio Común de la Humanidad". La explotación del "krill" (pequeños crustáceos) para satisfacer las necesidades mundiales de proteína, podría permitir también la exploración de mantos petrolíferos submarinos para satisfacer el insaciable apetito de productos petroquímicos. El derretimiento del hielo polar sobre el Mar de Weddell a consecuencia del desarrollo industrial no es tan poco probable como pareció al principio, ya que los científicos no se comprometen a garantizar que la fórmula para la eliminación de desperdicios sea infalible. En la Antártida existen cuestiones demasiado intricadas, no contestadas y quizá imposibles de contestar, además de la relativa a quién es el dueño de esa frontera congelada del mar.

Los ambientalistas mundiales convencieron a varios gobiernos de que mantengan una posición firme en relación con el tratado existente de protección del medio ambiente hasta que el Secretario General de las Naciones Unidas, en consulta con los Estados que efectúan investigaciones científicas en la Antártida, con los

organismos especializados de las Naciones Unidas y con los organismos no gubernamentales pertinentes, pueda llevar a cabo un estudio objetivo para el trigésimo noveno período de sesiones de la Asamblea General de las Naciones Unidas, en 1984. (El estudio acaba de culminar y se ha presentado ante el debate de la Asamblea General que actualmente se está llevando a cabo.)

En el trigésimo octavo período de sesiones, el Gobierno de Malasia se unió al de Antigua y Barbuda, para solicitar a la Asamblea General de las Naciones Unidas que discutiera el Tratado de la Antártida de 1959, que ha estado siendo renegociado en sesiones privadas por las naciones industrializadas necesitadas de recursos.

Siete naciones (Australia, Argentina, Chile, Francia, Nueva Zelandia, Noruega y el Reino Unido) reclaman porciones del continente de la Antártida, basádose en descubrimientos, ocupaciones, contigüidad geográfica o sobre actos administrativos. Sin embargo, nueve naciones (Bélgica, Brasil, los EUA, la India, Japón, Polonia, la República Federal de Alemania, Sudáfrica y la URSS) signatarias del Tratado, no reconocen estas demandas y una gran parte del continente aún sigue sin ser reclamado.

NUEVO TRATADO

Estos dieciséis países han empezado ahora a negociar un nuevo tratado que gobierne las exploraciones y la explotación de los recursos minerales de la Antártida. La región que ha de abarcarse incluye el continente, la plataforma continental y los mares adyacentes. Algunos gobiernos y compañías suponen que existen considerables reservas petroleras bajo la plataforma continental y están ansiosos de hacer exploraciones dentro de un nuevo régimen jurídico, tan pronto como sea posible.

Se han iniciado ya estudios geofísicos en busca de lugares para posible perforación de pozos de prueba. Parece haber también posibilidades para extracciones futuras de minerales en el mismo continente.

La Antártida tiene una gran importancia ambiental, climática y científica para el mundo. Los hombres de ciencia de diferentes ramas y de muchas naciones, dentro del marco del Tratado de la Antártida, afirman que están efectuando importantes estudios e investigaciones en materia de campos magnéticos, sistemas de estado del tiempo, distribución de los terremotos, efectos de las manchas solares, y la protección de las ballenas, las focas y los recursos de la vida marina, para fomentar la cooperación internacional y la conservación de los ecosistemas mundiales. La Antártida tiene también gran potencial económico en términos de recursos vivos y no vivos.

Las negociaciones tienen lugar a puerta cerrada. No se permite la participación de ningún otro país u organización. Ha habido reuniones en Wellington, Nueva Zelandia (junio de 1982 y enero de 1983), en Bonn, República Federal de Alemania (julio de 1983), en Washington, D.C. (enero de 1984), y en Tokio (junio de 1984), para discutir un proyecto de convención, que algunos gobiernos esperaban fuese adoptado en 1984. La reunión de Tokio reportó "buen progreso" en las negociaciones.

Como los países no alineados han sido en gran parte excluídos, en su séptima conferencia cumbre, efectuada en Nueva Delhi, los gobiernos de esos países decidieron que era necesario celebrar consultas internacionales para asegurarse de que las actividades efectuadas en la Antártida fueran para beneficio y en interés de toda la humanidad.

Sin embargo, como lo han señalado el PNUMA e importantes ONG, la explotación de los recursos vivos y no vivos podría causar perjuicio al frágil medio ambiente de la Antártida, así como a otros ecosistemas bastante alejados de ella.

La capacidad de la Antártida para resistir cualesquiera cambios producidos por los seres humanos es menor que la de la mayoría de los ecosistemas en otras partes, debido a las condiciones extremas y a la simplicidad de sus ecosistemas.

La Antártida afecta mucho al clima mundial. El casquete y los campos de hielo tienen un albedo o poder de reflexión elevado. Ello significa que sólo se absorbe una pequeña porción de la energía solar radiante que cae sobre la Antártida. Estas enormes extensiones de hielo reducen considerablemente el intercambio de calor entre la atmósfera y el océano. La gran fluctuación anual en la magnitud de los campos de hielo afecta también al clima mundial.

La contaminación industrial podría producir cambios tanto en el hielo marino como en el casquete de hielo que, a su vez, podría tener un efecto considerable tanto sobre la circulación atmosférica a gran escala como sobre la productividad biológica local.

A escala mundial, las actividades de perforación o de explotación minera podrían causar trastornos importantes que alterarían los patrones del clima y contaminarían los ecosistemas marinos a miles de millas de distancia.

Los equipos de perforaciones mar adentro tendrían que afrontar la gran profundidad de la plataforma continental, los icebergs, los campos de hielo y los poderosos vientos. Algunos posibles riesgos los constituyen su destrucción por el viento, los escapes no controlables

procedentes de las torres de perforación destruidas, y los enormes derrames causados por los buques cisterna dañados durante las violentas ventiscas y tormentas antárticas. Tales accidentes serían agravados por la tendencia del petróleo a extenderse rápidamente sobre el hielo y por las bajas temperaturas antárticas, que retrasarían la degradación física y biológica del petróleo. Los efectos locales de la contaminación por el petróleo podrían incluir la destrucción de las poblaciones de krill y de la capacidad aislante y de impermeabilidad de la piel de las focas y de las aves marinas meridionales, incluyendo a los pingüinos.

La explotación del krill mediante recolección debería ser cuidadosamente restringida y vigilada, hasta que se llegue a comprender mejor la relación que el krill tiene con la cadena alimenticia antártica y con el proceso biótico mundial.

La Antártida desempeña un papel importante en la circulación del agua a grandes profundidades, influyendo en las aguas muy al norte.

Un estudio antártico actualmente en marcha está observando las aguas del fondo de esa región, las capas inferiores de agua fría que se hunden a partir del hielo y que influyen considerablemente en el clima mundial. El Mar de Waddell es la principal fuente de calor de los océanos. La mayoría de las aguas del fondo antártico se forman allí y después viajan lentamente hacia el norte como corriente del Golfo cruzando el ecuador y penetrando en el Atlántico Norte. Este movimiento influye sobre los patrones del clima en el Caribe, en Europa, en la región escandinava y, hasta cierto punto, en la URSS, a muchos miles de millas de distancia.

Los países del Caribe temen que si cambiara la corriente del Golfo, de la cual dependen sus actividades turísticas,

su agricultura, su industria pesquera y su clima acogedor, se verían privados de una alternativa industrialmente productiva o de base amplia.

El posible "efecto de invernadero" debido a la combustión industrial de hidrocarburos de petróleo en la región al norte del Caribe, lo cual, según advertencia hecha por el Organismo Norteamericano de Protección del Medio Ambiente, cambiaría los patrones del clima, aumentando la precipitación pluvial y alternando los rendimientos agrícolas, es causa de preocupación entre las naciones del Caribe.

La acumulación de bióxido de carbono y el efecto subsecuente de invernadero, afectaría a la permanencia del casquete de hielo antártico y, en particular, la inestabilidad del hielo en la Antártida occidental. Si se fundiera el hielo, liberando el agua que lo constituye, el nivel de los mares mundiales se elevaría 60 metros, causando inundaciones y otros desastres naturales o antinaturales.

El Tratado original prohíbe específicamente la descarga, en la Antártida, de desechos radiactivos. Sin embargo, las reglas establecidas bajo cualesquiera tratados internacionales sobre la utilización de energía nuclear, incluyendo tanto las explosiones como la eliminación de desperdicios, deben ser aplicables en el desarrollo industrial de la Antártida. La descarga de tales desperdicios ha sido sugerida debido a su aislamiento geográfico y de actos humanos de sabotaje y desastres naturales. Los recipientes que pudieran abrirse paso a través del hielo, por fundirse éste, podrían contaminar la capa de agua que se encuentra entre el hielo y el lecho de rocas subyacente. Los contaminantes podrían entonces ser transportados al océano y hacia el norte por las aguas antárticas del fondo, llegando en algunos casos hasta el Hemisferio Norte.

En su declaración ante la Primera Comisión en relación con el tema del programa para la Antártida, Nueva Zelandia resumió el problema citando lo dicho por su Primer Ministro, Sir Robert Muldoon:

"La región de la Antártida marca un violento contraste con las áreas en el mundo que tienen problemas. Durante más de 20 años el Tratado de la Antártida ha tenido éxito al hacer de ella una zona de cooperación internacional y evitar que se convirtiera en objeto de disensión internacional. El Tratado está abierto a la participación de cualquier Estado miembro de las Naciones Unidas y se mantiene en vigor en forma indefinida. Constituye una contribución muy efectiva para lograr los objetivos de las Naciones Unidas. Suponemos que cualquier estudio efectuado por la Organización reconocerá plenamente este hecho y procurará reforzar el Tratado en vez de debilitarlo."

En representación del Club de la Antártida, Nueva Zelandia reafirmó el compromiso de que "interesa a toda la humanidad que la Antártida continúe con fines pacíficos y que no se convierta en escenario u objeto de discordia internacional". Al igual que el Tratado de la Antártida de 1959, e instrumentos posteriores, incluyendo la Convención sobre la Conservación de los Recursos Marinos Vivos de la Antártida, cualquier régimen en el campo de los minerales adoptado por las Partes Contratantes quedaría abierto a otros Estados. En 1981 las Partes Contratantes se comprometieron en tal sentido. Esa misma recomendación contiene dos compromisos importantes. Primero, la protección del medio ambiente particular de la Antártida y de sus ecosistemas sería de consideración básica. Segundo, al ocuparse de la cuestión de los recursos minerales en la Antártida las Partes Contratantes no perjudicarán los intereses de toda la humanidad.

Las preocupaciones presentadas ante las Naciones Unidas por ocho Estados (Antigua y Barbuda, Bangladesh, Malasia, Pakistán, Filipinas, Singapur, Sri Lanka y Tailandia) parecen haber fortalecido el sistema de inspección y equilibrio que ayuda a crear un mundo más responsable. Podemos esperar que el sistema será efectivo para prevenir todo abuso sobre las riquezas de la Antártida, nuestra última frontera.

PACIFIC RADIOACTIVITY: a scientist's view

with Michael P. Bacon

Michael P. Bacon joined the scientific staff of the Woods Hole Oceanographic Institution in 1977. His research interests lie in the field of environmental radioactivity, with emphasis on the application of radionuclides to problems in oceanography, geochemistry, and geochronology. His interest in the environmental problems of the Pacific dates from 1968 when for two years he was a Peace Corps Volunteer in Palau.

Since 1982 Dr. Bacon has served as Chairman of the Technical Group on Radioactivity in the South Pacific Region, convened by the South Pacific Regional Environment Programme (SPREP). The group's report on the sources, levels and effects of radionuclides in the South Pacific environment has recently been issued as "Radioactivity in the South Pacific," UNEP Regional Seas Reports and Studies No. 40.

The Siren: Why is the South Pacific such a hot spot of concern about radionuclide pollution, especially in light of its enormous area and scattered population?

Michael Bacon: Concern over radioactive contamination of the environment is not, of course, unique to the South Pacific Region. It exists worldwide. However, it is probably true that the concerns are more deeply felt in the South Pacific than in other places. One reason for this is the historical fact that Pacific Islanders have experienced directly some of the more serious detrimental effects of exposure to ionizing radiation.

During the period 1946-1958 the United States conducted more than 60 atmospheric nuclear explosions at its Pacific Proving Grounds in the Marshall Islands. Inhabitants of Bikini and Eniwetok were displaced to allow the test programs to be carried out on those atolls. Many of the detonations occurred at or near ground level, giving rise to heavy contamination with local fallout debris. Unusually high levels of radioactivity remain, especially on Bikini Island, and the Bikinians have not yet permanently resettled their atoll.

In addition, there was the 1954 incident of the Bravo test, a very high-yield (fifteen-megaton) surface

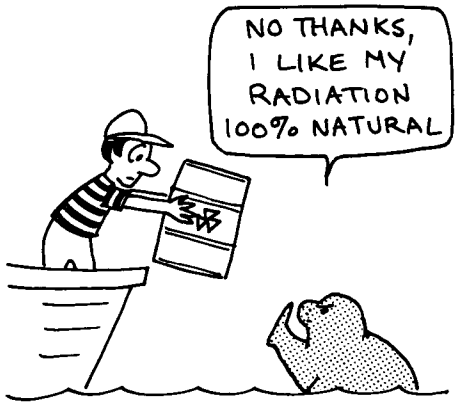
explosion. The trajectory of the fallout cloud from that test was incorrectly forecast, and large quantities of fallout fell on inhabited atolls in the Northern Marshalls. As a result, more than 200 Marshallese received variably severe exposures to ionizing radiations. The exposures produced skin burns and short-term sickness and also led to long-term effects that continue to be studied.

Q: What has been the response to these incidents?

A: These events have naturally led to fears which have a strong impact on people's thinking about the present issues. And I think these particular events are seen by many, in a broader context, as mere examples in a long history of foreign domination. There exists now a growing regional pride and a feeling of opposition to any proposal that appears to impose the will of outside powers, however small the impact might be.

Consider a hypothetical problem of the disposal of some particular kind of waste. You might do a perfectly objective analysis of benefits and risks and decide, from a global perspective, that the best solution is to dump it in the Pacific Ocean. The political problem, of course, is that the risk/benefit relationship changes as you go from a global to a regional to a national or local perspective. The Pacific people see little or no benefit to themselves from nuclear technology, so it always looks, in a relative sense, like a bad deal to them, no matter how small the absolute risk might be.

I suppose the answer to what will ultimately be tolerated in the



Region depends largely on how much the Pacific people view themselves as beneficiaries of worldwide technological development and as participants in the global community. Unfortunately, this has not been their history, which has been largely one of rude imposition by other nations.

Q: To what kinds of radiation are South Pacific peoples exposed, and what are the sources of these radiations?

A: Pacific peoples are exposed to the same kinds of ionizing radiation as other people on earth. The most important contributors are the natural sources, which include the cosmic rays that come from outer space and the natural radionuclides that occur on earth. It has been estimated by the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR, 1982)) that the average person living on earth receives an annual effective dose equivalent of 2,000 microsievert from natural sources of ionizing radiation. This is an average figure, and there is a large variation from place to place on earth, depending on

a number of environmental factors, and from person to person, depending on living habits.

The Technical Group estimated the average dose from natural sources of ionizing radiation received by a person living in the South Pacific Region. They arrived at a figure of approximately 1,000 microsievert per year--only half the world average. The lower-than-average exposures in the Region are the result of several factors: (1) the low concentrations of radioactive elements in the coral-based soils that occur in much of the Region; (2) the lower concentrations of radon (a naturally occuring radioactive gas) in air over the ocean compared with concentrations over the continents; and (3) the fact that most people in the Region live in well-ventilated houses and spend much of their time outdoors, thus avoiding exposure to the elevated levels of radon that often occur in indoor air.

Q: What are the sources of ionizing radiation associated with human technology?

A: Most important in this category are the X-ray machines and artificial radionuclides used for medical diagnosis. Average doses received by the world population from these sources amount to about 20 per cent of those received from natural sources, according to UNSCEAR. For the South Pacific region there is little pertinent data, but the Technical Group felt that a similar percentage (thus possibly amounting to about 200 microsievert) might be a reasonable assumption.

Next in importance are the artificial radionuclides that were dispersed in the environment during nuclear weapons testing in the atmosphere. The Technical Group concluded that exposure to these sources of ionizing radiation is on the average lower, perhaps two to three times lower, in the South Pacific region than it is for the world as a whole.

Q: Why is that?

A: For the simple reason that most of the population of the region lives in the Southern Hemisphere, whereas the greater part of the fallout from atmospheric testing was delivered in the Northern Hemisphere. In general, the contribution to total radiation exposure that is due to artificial fallout radionuclides is small and is much less than the variability that exists in exposure to natural sources of radiation. Doses due to other sources of ionizing radiation, such as radionuclides released to the environment as a result of nuclear power generating activities or the radionuclides contained in consumer products, are of an even lower order of magnitude.

Q: So this means that the average doses from <u>both</u> natural and artificial ionizing radiation in the South Pacific region are substantially lower than in most other parts of the world?

A: In general, yes. However, there are certain islands in the region where populations receive unusually high radiation doses. Niue Island is a documented example of an area of particularly high natural radioactivity, and there exist some data suggesting that part of Guam might also be such an area. And, of course, there are the unusually high levels of artificial radioactivity found on the atolls in the Marshall

Islands that were contaminated by local fallout from the U.S. tests.

Q: How much additional radioactivity is likely to be added to the Pacific environment by ocean dumping and testing of nuclear weapons?

A: One hopes that there will be very little additional input of radioactivity from nuclear weapons testing. In recent years only China has conducted occasional tests above ground. These have resulted in some inputs of radioactivity to the global environment, but the amounts are small in comparison to the amounts already delivered during the earlier periods of atmospheric testing by the U.S. and USSR.

As for disposal of radioactive waste in the Pacific Ocean, there is only one specific proposal that is being seriously considered at present. That is the Japanese proposal for low-level waste dumping at a site in the North Pacific. For a while the US Navy very seriously considered using a site in the Pacific Ocean off California for disposal of decommissioned, defueled nuclear submarines, but that proposal has just recently been abandoned, not for scientific reasons but because of objections by the public.

There is also the sub-seabed emplacement concept, which is being considered as an option for high-level radioactive waste management. Research programmes are underway in a number of countries to test the scientific and environmental feasibility of the concept, but it will be many years before any specific proposal might issue from this.

Q: How much radioactivity is involved in the Japanese proposal?

A: It calls for the dumping of no more than 100,000 curies per year, consisting almost entirely of beta/gamma emitters with half-lives of 30 years or less. Because of the short half-lives, even if this dumping were to continue indefinitely at the maximum rate, the effects would be cumulative for only about 150 years. At that time the annual loss by radioactive decay (to stable nuclides) of the radionuclides then already added to the Pacific Ocean would balance the new annual inputs by dumping, so the amount in the ocean would stay at a constant level. The amount of artificial radioactivity due to dumping that would have built up by that time would be of a similar magnitude to that presently existing in the Pacific Ocean as a result of past atmospheric nuclear weapons tests, which by then would largely have decayed away. And this amount is very small compared to the total amount of natural radioactivity present in the Pacific Ocean.

Q: So would you say that in fact not very much additional radioactivity would be added to the Pacific environment by testing and dumping?

A: That is right. But it can be misleading to make comparisons with just the total natural radioactivity, because different radionuclides behave in different ways in the ocean and have different biological effects.

A more meaningful quantity, from the standpoint of health and safety, is the additional radiation dose that might be received by people as a result of dumping. The Japanese scientists who wrote the safety assessment estimated a maximum dose of 0.1 microsievert per year to

individuals who might be most exposed. Average individual exposures would be considerably lower. Thus the additional dose due to dumping is more than 10,000 times smaller than the average dose in the South Pacific Region from natural radiation.

Q: Do you think that the dumping of radioactive waste in the Pacific could conceivably endanger the health of its people?

A: If you are referring specifically to the Japanese proposal for dumping of low-level waste, the answer is that I don't. The scientific basis for making such a judgement is given in reports published in 1978 by the International Atomic Energy Agency (IAEA). Their task was to set limits on the release rates of radionuclides on the sea floor so that a definition of high-level waste, not suitable for dumping, could be formulated as required by the London Dumping Convention. This involved making predictions of the maximum radiation doses that might conceivably be received by the most exposed individuals as a result of the releases, and limits are set so that the predicted doses do not exceed those set by international standard.

Predictions of this kind require understanding of the physical, chemical and biological processes that operate in the oceans. As in any field of human knowledge, our understanding of these processes is imperfect, so there are uncertainties in the predictions. In order to be safe, therefore, one takes a conservative approach based on pessimistic assumptions about what might happen in extreme circumstances, not on realistic assumptions about what would most likely happen under ordinary circumstances.

It is impossible to give an absolute guarantee of safety, of course. This cannot be done for any human endeavor, no matter what level of technological sophistication is involved, and in the end we always need to rely on our good judgement and common sense.

Q: Do you feel that the IAEA limits set for dumping are adequate?

A: The Technical Group spent a considerable amount of its time studying the IAEA documents and concluded that they adopted a very high level of conservatism, and that dumping carried out within the IAEA guidelines should pose extremely little risk to human health or environmental safety. (By the way, the Japanese proposal calls for dumping rates less than one per cent of the guideline, so you can see that the safety limit is not approached).

The IAEA limits and recommendations are based on the results of scientific research, which is a continuing process, so there will always be the need for review and revision in response to improved scientific knowledge. This is the way it should be, and I understand that the IAEA is now actively engaged in such a review.

The whole question of the ocean dumping of low-level waste is also undergoing a separate scientific review within the framework of the London Dumping Convention.

Q: Are there other considerations with regard to ocean dumping than those of safety?

A: Beyond the question of whether a particular dumping operation might be safe are the broader questions of whether ocean dumping is justified by the need for it, and whether it is the optimal procedure in comparison with other disposal alternatives, such as land disposal. These are more complex issues requiring a good deal more scientific examination. However, I think it is possible to give satisfactory answers to some of the specific safety concerns about ocean dumping, even though we cannot yet give solid answers to these more difficult questions.

Q: What is the Technical Group's assessment of the dangers associated with nuclear weapons testing?

A: The Technical Group found it difficult to judge the situation because of the high level of secrecy that surrounds military activities, especially programmes of weapons development. This is in sharp contrast to civilian activities, such as

radioactive waste disposal, which are subject to international surveillance, scientific review and public scrutiny.

The present procedure of testing underground avoids pollution of the atmosphere by radioactive debris. It is considered to be a safer procedure, with regard to human health, than the past procedure of testing in the atmosphere. Certainly this is true on the global scale and for the short term, because the radioactive material is contained within the underground cavity rather than being dispersed worldwide.

But you have to give some thought to the long-term effects that might arise locally in the vicinity of the underground testing site. In order to evaluate this intelligently, you need the same kind of information that one requires from those who might propose a waste disposal programme, because in essence that is what it is. You are creating waste and disposing of it at the same time.

In the case of Mururoa, for example, you need to know how much radioactivity is produced, which

nuclides, how much percolation of sea water through the rock of the atoll might occur, and how much radioactivity might be released to the ocean in a worst case situation. Military authorities are not generally required to publish such information, though I should note that a scientific mission was sent to Mururoa last year by the French Government to examine some of the safety questions. I understand that the report of that mission has been published, so there may now be some better information than that to which the Technical Group had access.

Q: In the absence of solid data, how did the Technical Group proceed on the question of nuclear testing?

A: We made some very speculative estimates of how much radioactivity might possibly be produced by the French undergound tests, just to get some appreciation of the magnitude of the problem. It was concluded that the amounts are unlikely to be large enough to be a cause for alarm, but that one should be concerned about the possible long-term effects, such as leakage of radionuclides into the ocean, especially if the testing programme and the accumulations of radionuclides underground are to continue into the future. Past environmental safety assessments and publication of results were judged to have been inadequate, and prompt publication of available data was urged.

One often hears it said that the debate over nuclear issues tends to be irrational and full of emotion, and there is some truth to that statement. In this particular instance, however, I think it is quite understandable because of the poor communication. We really are in ignorance, and that condition always arouses suspicion and activates the imagination.

Q: At a recent meeting in Port Moresby (August 1984), 18 Pacific and Asian countries unanimously called for a nuclear-free Pacific. The Prime Minister of Papua New Guinea was quoted saying, "...We must make it abundantly clear to all nuclear powers that we will not even consider the dumping of nuclear waste in the Pacific." In the light of the scientific findings, is this a defensible stand?

A: The Prime Minister may very well have sound political reasons for his statement, but his is an intellectually rigid stance that a scientist would not take. I believe that most scientists who have thought about the question would at least consider it a hypothesis worth testing that the oceans are a resource that can serve mankind, in part by serving as a receptacle for some of the wastes produced by human technology. The amounts that can be assimilated by the ocean may be close to zero for some kinds of waste or very large for others, but we will never know if we reject the opportunity out of hand.

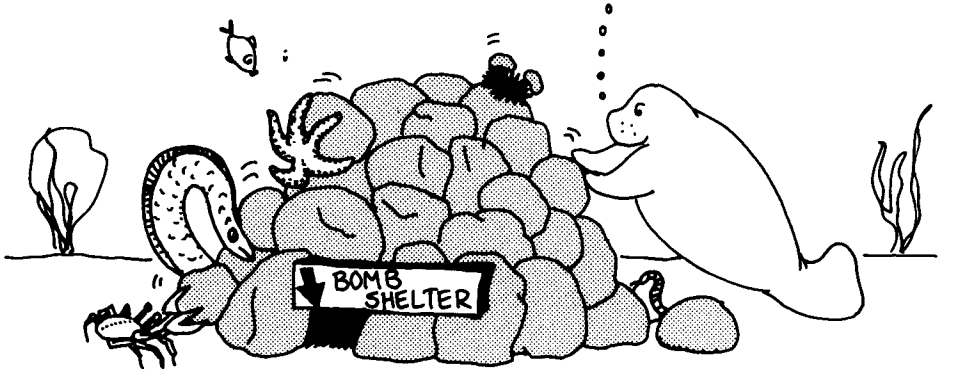
I think it is especially important for Pacific Islanders to maintain some flexibility on the general question of ocean dumping because of the very limited capacity of their available land areas to assimilate the increasingly varied wastes that are produced by their own societies.

Q: How would you summarize the Technical Group's overall evaluation of the nuclear issues in the South Pacific Region?

A: The general conclusion was that the present nuclear weapons testing by the French and the proposed low-level waste disposal by the Japanese involve only a small, quite possibly non-existent, risk to human health and the environment. It found little scientific basis for judging these activities to be unacceptable. Personally I feel very confident that this conclusion rests on the best scientific information presently available. However, this should in no way be taken to deny that important legal, political and moral principles may exist that dominate the evaluation of these issues.

I hope that our report will be a contribution to informed debate on these questions, and I think it is very important to clarify just what is at stake in these discussions so that you can achieve some ordering of priorities. If you are really concerned about radiation exposure, for example, then you should give your attention to the regulation of medical uses of ionizing radiation. That is where countries have the greatest possibility of control over the radiation doses received by their populations. If quality of life and environmental protection are truly your concern, then I would suggest that energies and resources might be better directed toward other existing threats to Pacific society and environment (such as soil erosion, local sources of pollution, and others discussed in the SPREP report on the Rarotonga conference), which I suspect are more serious than radioactive contamination of the ocean is ever likely to be.

But if, on the other hand, you believe that waste disposal in the oceans would be a serious violation of your rights, then that is the case that must be made. Or if you are morally outraged that inhuman weapons should be developed in the Region, then the arguments should be clearly expressed in those terms. Whatever your role in the debate might be, I think it is damaging to exaggerate or to misstate or misinterpret the scientific facts. In the long run, it can only weaken your argument, lower your credibility and limit your opportunities.



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which have caused such widespread and animated debate as those addressed in this convention before us. Of course, the two major issues are the continued testing of nuclear devices and the proposed dumping of radioactive materials within the region. These issues are interwoven in complex ways with our aspiration for genuine political independence and social well-being."

One important achievement of the meeting was reaching agreement on the text of the draft protocol for co-operation in combating pollution emergencies in the South Pacific Region. Substantial progress was also made on issues related to pollution of the region by ocean dumping. Within the provisions of the convention, an article was proposed in which the parties will "agree not to dump radioactive wastes in the convention area" in accordance with the provisions of an annex to the convention. Although the language of the annex was not specified, there was a consensus on a number of its most important elements, including the closely related issue of geographic coverage of the convention area.

Time did not permit full consideration of a provision on pollution caused by testing of nuclear devices, although a useful exchange of views took place.

The need was stressed for further informal contacts and consultations relating to the unresolved issues of the draft convention and its protocols before the next meeting of experts. Two ways of achieving this were recommended:

- the Chairman of the meeting should be asked to conduct consultations with selected states and territories in order to assist in achieving mutually acceptable positions on unresolved issues; and

- a regional seminar should be convened for those involved directly or indirectly in the negotiations of the convention in order to provide the participants with additional explanations and clarifications which may assist in further negotiations.

In considering dates for the fourth expert meeting, delegates emphasised the importance of the anticipated discussions within the South Pacific Forum on the adoption of an agreement for a nuclear-free Pacific. In this respect, Mr. Mahe Tupouniua, Director of the South Pacific Bureau for Economic Co-operation (SPEC) and Chairman of the SPREP Co-ordinating Group, expressed his view that the Forum had taken an important step forward by deciding to appoint a working group of officials to prepare a draft treaty establishing a nuclear free zone for consideration at the 1985 Forum meeting. Delegates also considered the meeting of the London Dumping Convention scheduled for September 1985 as being relevant to the timing of the fourth expert meeting. The latter is thus tentatively scheduled for some time between August and November of next year.

The third legal experts' meeting was chaired by Mr. Kilifoti Eteuati of Western Samoa and was attended by by participants from the States and Territories of American Samoa, Australia, Cook Islands, Federated States of Micronesia, Fiji, France, French Polynesia, Guam, Kiribati, Nauru, New Caledonia, New Zealand, Niue, Northern Mariana Islands, Solomon Islands, Tonga, United States of America, Vanuatu and Western Samoa.

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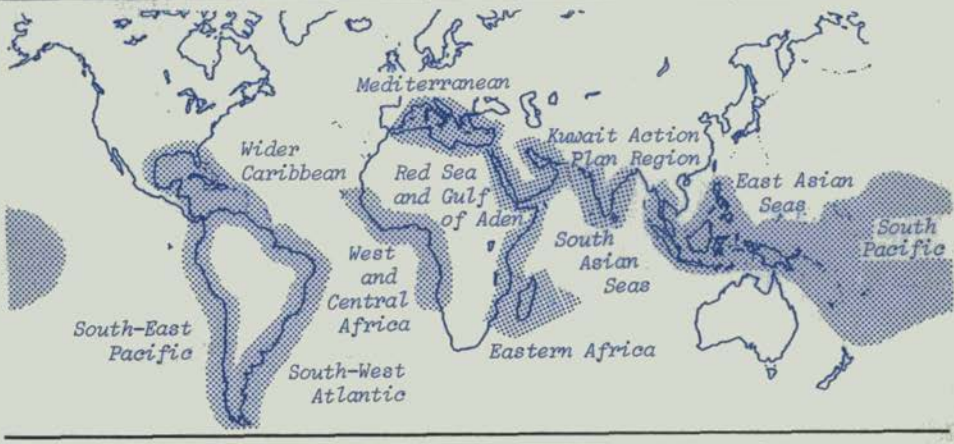
the regional seas



The Siren is issued four times a year in English, French and Spanish by the Regional Seas Programme Activity Centre of the United Nations Environment Programme (UNEP).

If you wish to receive The Siren regularly, or would like to propose an article on a subject of current interest and controversy related to marine science and environmental protection, please address: Nikki Meith, Editor, The Siren, United Nations Environment Programme, Palais des Nations, 1211 Geneva 10, Switzerland.

Number 27 March 1985

THE SIREN

news from UNEP's Regional Seas Programme

THE SIREN'S NEW FRIENDS

The Siren has been joined by her friends the whales, dolphins, fish, shrimp, clams -- and of course all manatees and dugongs!

This welcome news relates to the fact that the Regional Seas Programme Activity Centre has become the "Programme Activity Centre for Oceans and Coastal Areas", or OCA/PAC. The name change reflects the Centre's enlarged mandate over UNEP's marine and coastal area activities.

OCA/PAC will now be responsible for co-ordinating UNEP programmes dealing with living marine resources -- such as fisheries, marine mammals, aquaculture, etc. -- in addition to its previous activities related to the global marine environment and regional seas.

Bringing all activities within UNEP's "Oceans" programme under a single roof helps to ensure that the three sub-programmes reflect the same general strategy and policy for solving the global problems of the oceans and adjacent coastal areas.

The new Programme Activity Centre for Oceans and Coastal Areas

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CARIBBEAN ENVIRONMENT: Today's decisions, tomorrow's realities

by Dallys Robles

Dallys Robles is the Acting Chairman of the Caribbean Action Plan Monitoring Committee. In December of 1984 she visited Venezuela, Mexico and the USA to bring these Governments up-to-date on the Caribbean Action Plan and to promote early ratification of the Cartagena Convention and the Oil Spill Protocol. She also met with representatives of Caribbean embassies to the U.S.A., permanent missions to the United Nations, and international, intergovernmental and non-governmental organizations.

During December 1984, I had the valuable opportunity of visiting a number of countries of the Wider Caribbean in order to promote the Caribbean Action Plan and encourage the payment of contributions to the Caribbean Trust Fund. Another purpose of the trip was to urge ratification of the regional legal agreements adopted at the Cartagena Conference of Plenipotentiaries in March of 1983: the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region, and the associated Protocol concerning co-operation in combating oil spills.

My final impression from the mission, along with the information received from other Caribbean countries, is that it is very likely that the first few months of 1985 will see the ratification, acceptance or approval of these two documents by several Caribbean States and Territories. The importance of the ratifications cannot be overemphasized, for these agreements provide the legal framwork for the Caribbean Action Plan.

Judging by the degree of receptivity and sensitivity shown by those persons with whom I met, there exists a definite political will to develop and to participate in

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A Practical Approach to "Environmental Capacity"

What is the waste receiving capacity of the marine environment?

This question, which continues to be a subject of widespread controversy among marine scientists, is central to all efforts to manage human use of the oceans. Some take the position that the marine environment should be protected from all forms of waste discharge. Others believe, to the contrary, that the oceans have an enormous capacity to receive and assimilate wastes which should be fully used.

UNEP continually finds itself in the middle of the debate as it develops regional action plans and legal agreements to help governments use their seas wisely and sustainably. The organization has received innumerable requests for guidelines for determining the waste receiving capacity of the marine environment, and for the assessment of the impact of waste on marine organisms and ecosystems. Such guidelines are essential for application of regional seas action plans and regional conventions and protocols.

The Food and Agriculture Organization of the United Nations (FAO) has also been put hard to task to develop guidelines which would take into account the use of the marine environment as a source of food. Coastal regions in particular require attention as the number and size of mariculture units increase. The World Health Organization (WHO), concerned with water quality criteria, recognized the importance of such a concept for protection of the health of large segments of the total global population.

UNEP turned to GESAMP* to help develop such guidelines by (1) defining the factors relevant to the assessment of the impact of waste on the marine environment, and (2) further developing and evaluating the concepts on which such an assessment should be based, including that of "environmental capacity."

At its fourteenth session in March 1984, GESAMP agreed to proceed

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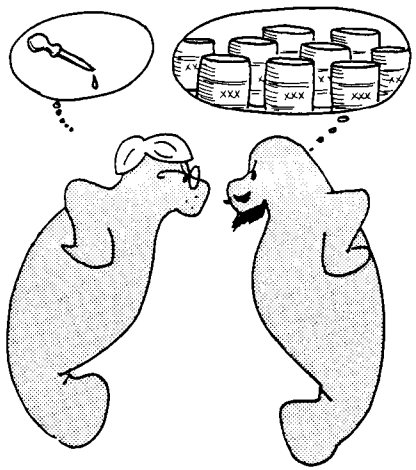
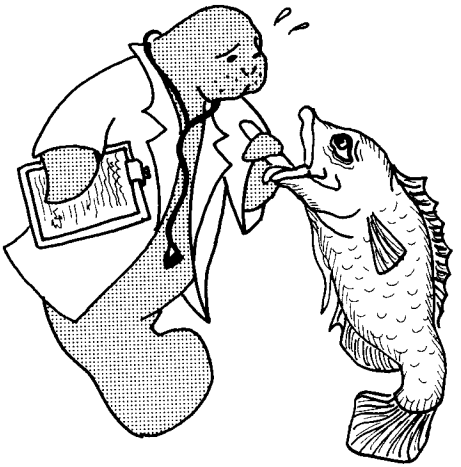


* the IMO/FAO/UNESCO/WMO/WHO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Pollution.



west and central africa

Thirteen national institutions from seven West African States have now joined the network of research centres participating in project WACAF/2: Monitoring of pollution in the marine environment.

Seven of these have signed research agreements to begin analysing heavy metals, organochlorines and petroleum hydrocarbons in marine organisms. Four institutions -- in Cameroon, Nigeria and Senegal -- have agreed to monitor oil pollution. Each month for a year they will measure the amount of tar and oil that collects on beaches in different parts of the region.

Activities in 1985 will concentrate on expanding the networks of institutes involved in measurements of beach tar and microbiological quality, and on intercalibration exercises for analysis of contaminants in marine organisms.

caribbean

The Technical Advisory Committee for the project on "Protection of the Marine and Coastal Environment of the Caribbean Islands" (CARICOM/PAHO/UNEP), met in St. Lucia on 29 and 30 November 1984 to review progress made over the past two years and recommend activities to be undertaken during the next two.

So far, country reports on land-based sources of pollution have been prepared for 11 island States, and a consolidated overview compiled by the Pan American Health Organization (PAHO). Information contained in these reports will be useful to individual governments in developing pollution control projects.

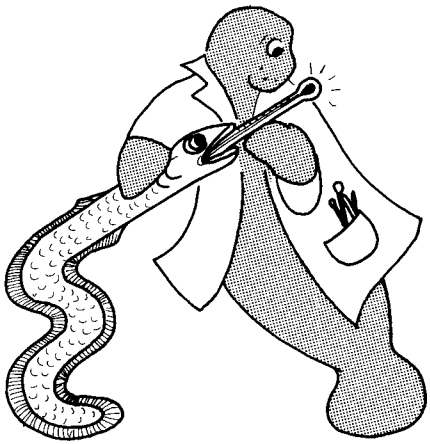
A programme of microbiological and chemical monitoring and ecological base-line studies carried out around St. Lucia has generated a wealth of data which are currently being analysed and consolidated into a report by the CARICOM Environmental Health Institute (CEHI). CEHI is now capable of training technicians from the region with the aim of forming a network of monitoring stations.

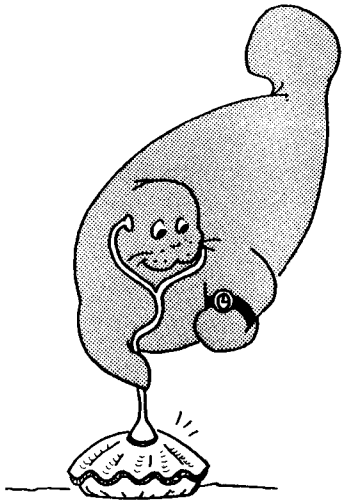
The Second Workshop on Environmental Management of Bay Ecosystems in the Caribbean took place in Havana from 10-14 December 1984. Held within the framework of the Pilot Project on Research and Control of Marine Pollution in Havana Bay, and with support from the Caribbean Trust Fund, the workshop was attended by eight participants from Colombia, Costa Rica, Dominican Republic, Mexico, Panama, Peru and Venezuela.

kuwait action plan region

Following the recommendations of the Technical Experts Committee on the draft land-based sources protocol (which met in Bahrain early in 1984), a series of meetings will be held in 1985 to refine the text of the protocol. In addition, the Regional Organization for the Protection of the Marine Environment (ROPME) will prepare three technical annexes to the protocol as well as working papers on the following subjects:

- guidelines for preparing regional standards,
- civil liability and damages to the marine environment from land-based sources of pollution,
- guidelines for environmental impact assessment procedures, and
- guidelines for monitoring of pollution from land-based sources.





mediterranean

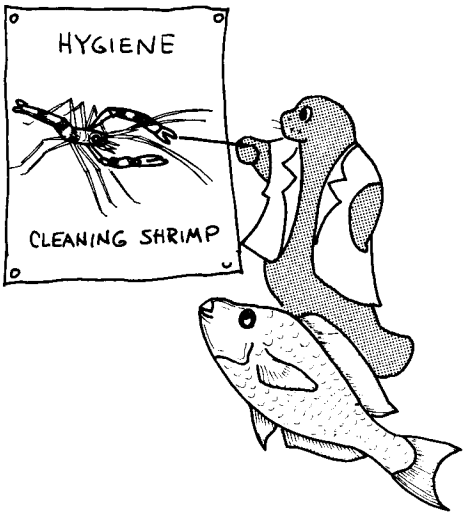
National monitoring agreements have been signed with six countries, and others are still under negotiation. At present 116 research projects are being supported as part of the Mediterranean Action Plan.

An agreement was signed by the Tunisian Government and UNEP which formally established the Regional Activity Centre for Specially Protected Areas in the Mediterranean, located in Tunis.

A meeting on toxicity of selected substances in the marine environment was held in Rovinj, 5-9 November, by FAO and UNEP.

Intercalibration exercises for methods of analysing marine microbes and petroleum hydrocarbons were held 12-16 November in Tunis (WHO/UNEP) and Barcelona (IOC/UNEP), respectively.

The 1984 MEDIPOL training exercise was held in Marseilles, 4-14 December, in collaboration with the Port Authority.



south asian seas

Work on country reports from the five States of the region is nearly complete. In addition to the consultancy assistance already provided by UNEP to Bangladesh, Maldives and Sri Lanka through the South Asian Co-operative Environment Programme (SACEP), UNEP is now negotiating directly with Pakistan to identify a suitable expert to assist the Government in preparing its report.

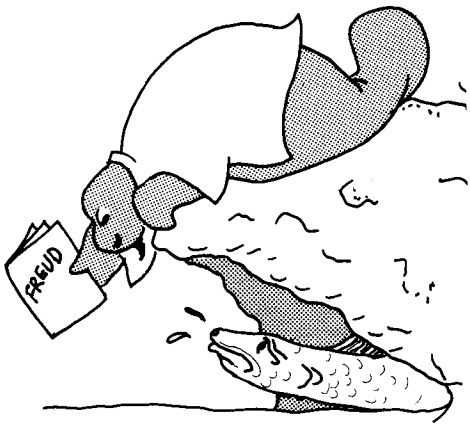
Sri Lanka, in collaboration with SACEP and UNEP, will undertake a hydrographic and ecological survey of Pigeon Island, off the east coast. Although the island is a declared marine sanctuary, increasing human activity -- such as tourism, dynamiting for fish, and lobster netting -- has contributed to the rapid destruction of adjacent corals. The survey will aid in the development of an integrated marine park management scheme to help strengthen the area's protected status.

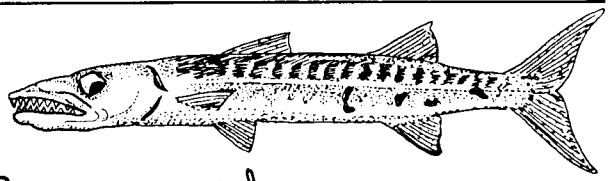
eastern africa

Assistance is being provided to East African Governments for specific national projects which should serve as models for similar activities throughout the region.

In November 1984, UNEP collaborated with the International Union for Conservation of Nature and Natural Resources (IUCN) to send a project development team to Mozambique to assist the Government in devising a conservation scheme for Inhaca Island. In February 1985, UNEP sent a consultant to the United Republic of Tanzania to help in formulating a project on coastal erosion.

Both projects will be submitted to the UNEP clearing-house with a view to identifying outside funding resources for their implementation.





south pacific

Interagency co-operation in the South Pacific is growing, as shown by a meeting of representatives of 12 United Nations and other organizations (UNDP, ILO, FAO, IOC/UNESCO, WHO, WMO, IMO, IAEA, WTO, IUCN, SPREP, and UNEP), held to promote practical co-operative activities for environmental protection in the South Pacific region (Geneva, 21-22 November 1984).

The meeting resulted in plans for 1985, including the Third Conference on South Pacific National Parks and Reserves, a number of environmental studies, and a series of training courses in marine pollution control, environmental impact assessment and solid waste management. Assistance was offered for drinking water quality monitoring, oil spill control, studies of natural radiation, legislation for pollution control and prevention, environmental assessment of touristic development, and pesticide use and regulation.

IMO organized a major regional training course in marine pollution in November 1984 in Fiji.

In addition, major financial contributions were made recently to SPREP and commitments to co-operative activities were made by the Commonwealth Science Council, ESCAP, WWF, UNESCO and the UNEP Regional Office for Asia and the Pacific.

Collaboration of this kind in 1985 will consolidate the SPREP networks of local organizations through which the programme's activities are carried out.

south-east pacific

The co-ordinated programme of research and monitoring of marine pollution in the South-East Pacific (CONPACSE - Phase I) has become fully operational. Its activities focus on (1) pollution by petroleum hydrocarbons and (2) pollution by domestic, agricultural, industrial and mining sources in ecologically sensitive areas. A regional network to implement CONPACSE was formed with the participation of 39 institutions. Within the network, the organizations and centres have been identified which will implement national contingency plans and the Regional Contingency Plan for the Combating of Oil Pollution in the South-East Pacific in Cases of Emergency.

DATE	PLACE	TITLE	ORGANIZERS
11-18 March	Dakar	Seminar/Workshop on Control of Coastal Erosion	UNESCO/ UN-DIESA/ UNEP
18-22 March	Panama	Second Course on Oil Spill Control in the South-East Pacific Region	IMO/CPPS/ UNEP
21-22 March	Tunis	Meeting of the Bureau of the Mediterranean Action Plan	UNEP
25-27 March	Panama	Workshop of Legal and Technical Experts on the Contingency Plans for the Combating of Oil Pollution in the South-East Pacific in Cases of Emergency	IMO/CPPS/ UNEP
25-29 March	New York	Fifteenth Session of GESAMP	United Nations
15-20 April	Split	Fourth Intercalibration Exercise and Consultation Meeting on Microbiological Methods for Coastal Water Quality Monitoring	WHO/ UNEP
15-17 April	Abidjan	Fourth Meeting of the Steering Committee for the Marine Environment of West and Central Africa	UNEP
18-20 April	Abidjan	Intergovernmental Review Meeting of the Action Plan for the West and Central African Region/First Meeting of the Contracting Parties to the Abidjan Convention	UNEP
21-23 April	Cancun	Fourth Meeting of the Monitoring Committee on the Action Plan for the the Caribbean Environment Programme	UNEP
24-26 April	Cancun	Third Intergovernmental Meeting on the the Action Plan for the Caribbean Environment Programme	UNEP
29 April-3 May	London	Meeting of Experts on Regional Arrangements for Co-operation in Combating Major Incidents of Marine Pollution	IMO/ UNEP
April	East Asian Seas Region	Fourth Meeting of the Co-ordinating Body on the Seas of East Asia (COBSEA)	UNEP

Bahía de La Habana -

Una experiencia piloto en el marco del Gran Caribe

por

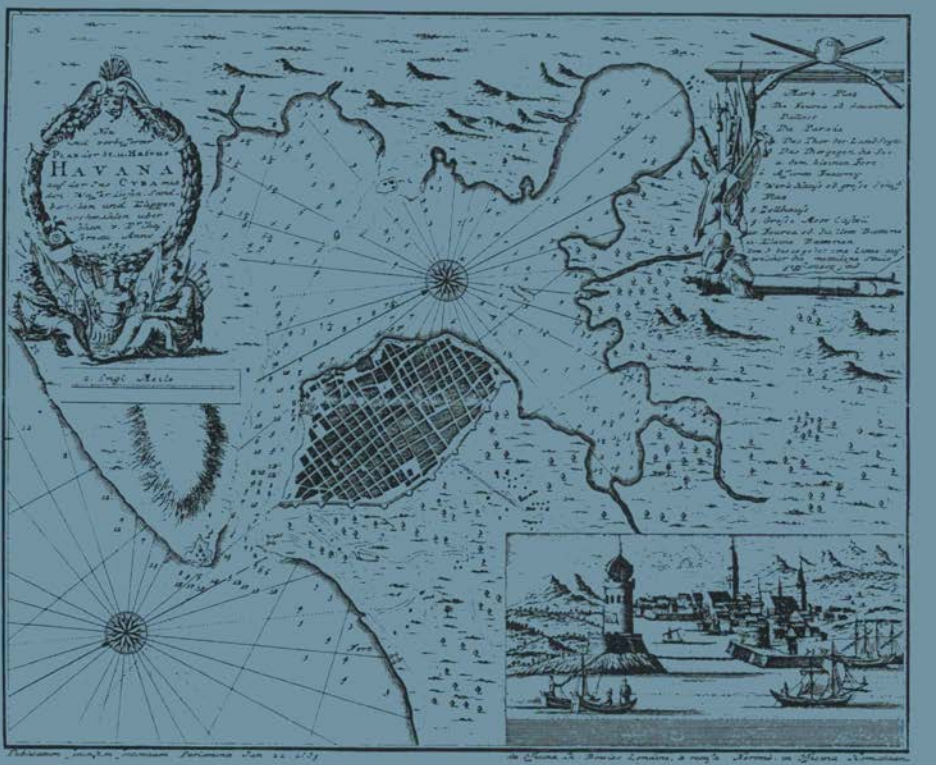
Santiago Raúl Olivier

Santiago Raúl Olivier es doctor en Ciencias Naturales con especialización en ecología marina. Ha sido Director-fundador del ex Instituto Interuniversitario de Biología Marina de Mar del Plata (Argentina), profesor e investigador de la Universidad Nacional de La Plata y experto en Ecología Marina de la UNESCO en México y Cuba. En este último país fue el Asesor Técnico Principal del Proyecto a que se refiere en el presente artículo. Ha sido consultor del PNUMA en varias misiones en Centro América y el Caribe. Actualmente es asesor del Consejo Nacional de Investigaciones Científicas y Técnicas de la Argentina. Es autor de una abundante bibliografía entre la que se destaca su libro "Ecología y subdesarrollo en América Latina".

El 31 de diciembre de 1984 terminó formalmente el proyecto sobre "Investigación y control de la contaminación marina en la bahía de La Habana (Cuba)" que, bajo los auspicios del Programa de la Naciones Unidas para el Desarrollo (PNUD) y el Programa de Naciones Unidas para el Medio Ambiente (PNUMA) ejecutó la Organización de las Naciones Unidas para la Educación, la Ciencia y la Cultura (UNESCO) a partir de enero de 1980. Fue la contraparte nacional el Instituto de Investigaciones del Transporte (I.I.T.) del Ministerio de Transportes de Cuba. Pocas semanas antes de la finalización del proyecto, expertos cubanos e internacionales se reunieron en el Palacio de Convenciones de La Habana para efec-

tuar el balance final de lo realizado y analizar las recomendaciones que, através del PNUD, se harán llegar al Gobierno de Cuba para que implemente las medidas de control de la contaminación. Estas acciones, que podrán ser tomadas en forma inmediata, a mediano plazo o a largo plazo según su envergadura, tendrán una base científico-técnica que surge de los resultados del Proyecto.

En el seminario a que hicimos referencia (el sexto organizado a lo largo de esos años), fue unánime la opinión de que el Proyecto había alcanzado los objetivos propuestos y aún los había superado en muchos aspectos. Es que en la actualidad no sólo se posee un diagnóstico valedero sobre la dinámica de la contaminación en la bahía y áreas vecinas, sino que Cuba ha podido montar, a partir del Proyecto, una infraestructura científico-técnica que le permitirá estudiar la contaminación marina en otras áreas del país y colaborar con los demás países de la región. Sus laboratorios se encuentran equipados con elementos técnicos de primera calidad y con recursos humanos que se han ido formando con el desarrollo del propio Proyecto. Tanto es así que



Gráfica No. 1. Plano que muestra la situación de La Bahía de La Habana en 1739.

diferentes instancias de las Naciones Unidas han considerado que el Proyecto se ha convertido en una experiencia piloto que podrá ser utilizada por otros países del área y aun por naciones fuera de la región.

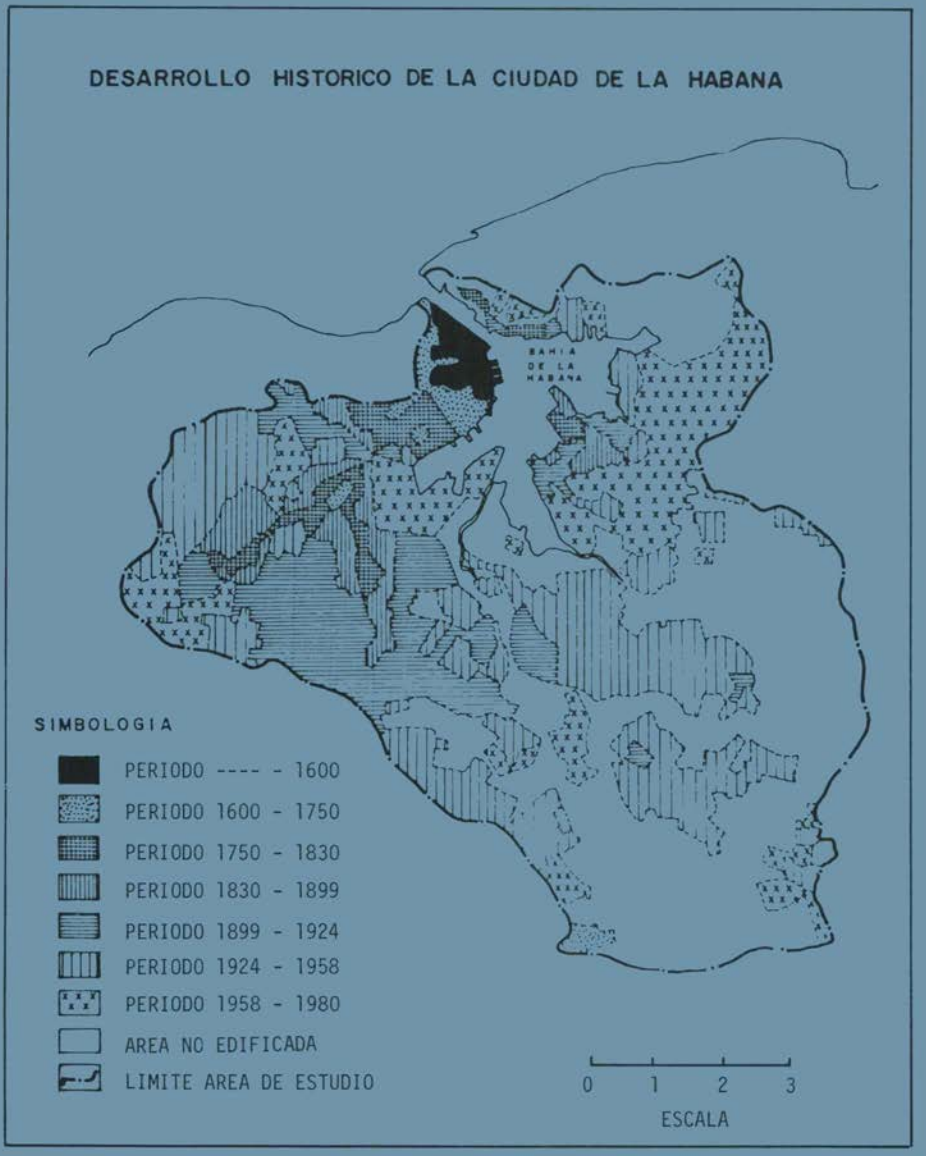
Pero ¿cuáles han sido los orígenes de tan acentuada polución que hoy muestra la bahía de La Habana? Debemos recordar que el puerto de La Habana fue utilizado desde los primeros tiempos de la colonización española para el aprovisionamiento y escala de los barcos que realizaban el transporte entre América Central y el norte de América del Sur y la metrópoli. A la bahía iban a parar no sólo los residuos originados en las embarcaciones sino también los de la naciente ciudad entre los que se destacaban el de los mataderos. Esa contaminación orgánica se fue acentuando junto al crecimiento urbano y a la destrucción del medio ambiente natural próximo a la bahía. A partir del siglo pasado se comenzaron a sumar los residuos de una incipiente industria (petrolera, eléctrica, alimentaria) que comenzó a alarmar a las autoridades de aquella época. El crecimiento demográfico e industrial ocurrido en el último cuarto de siglo no hizo más que agudizar la situación de desequilibrio ambiental preexistente.

La Habana tiene hoy unos dos millones de habitantes y por lo menos un 50% de los residuos domiciliarios van a parar a la bahía por un sistema cloacal que data de las primeras décadas del siglo. Otro tanto ocurre con las aguas del alcantarillado a cuya red han sido conectados clandestinamente desagües industriales y domésticos. Decenas de industrias vuelcan sus aguas en los pocos afluentes de agua dulce que posee la bahía y que se han convertido en zanjones de aguas negras. Una evaluación de las principales fuentes de polución y su carga contaminante ha sido realizada en el marco del Proyecto.

La bahía de La Habana ha sido a través de los tiempos el epicentro y la razón de ser de la ciudad. El casco viejo ha sido y es una reliquia histórica, íntimamente ligada a la bahía, por lo que el Gobierno de Cuba lo ha declarado monumento nacional y la UNESCO patrimonio cultural de la humanidad. Su restauración cuenta con el respaldo de dicha agencia pero el éxito dependerá en buena medida de lo que se haga para sanear a la bahía, ya que no se trata tan sólo de reparar edificios sino también de restablecer una relación armoniosa entre el mar litoral y el ecosistema urbano. Areas tan importantes del casco viejo como son el fuerte de la Cabaña, el Castillo del Morro, la alameda de Paula y parte del malecón habanero se encuentran sobre las propias márgenes de la bahía.

Como puede advertirse la bahía no es un ecosistema que se encuentre aislado sino que interactúa con varios sistemas vecinos como son, además del urbano y el mar aledaño, los ecosistemas rurales de su cuenca de drenaje (cultivos de café, caña de azúcar, cítricos y campos de pastoreo). Todas estas zonas rurales son abonadas, pulverizadas con insecticidas y herbicidas que las lluvias se encargan de lavar y transportar a los afluentes de la bahía. Las aguas contaminadas pasan luego a las áreas costeras del mar abierto contribuyendo al deterioro ambiental y a la afectación de zonas de uso recreativo y deportivo.

Por esas y otras razones que



Gráfica No. 2. Desarrollo histórico de la ciudad de La Habana, mostrando el crecimiento del area urbana.

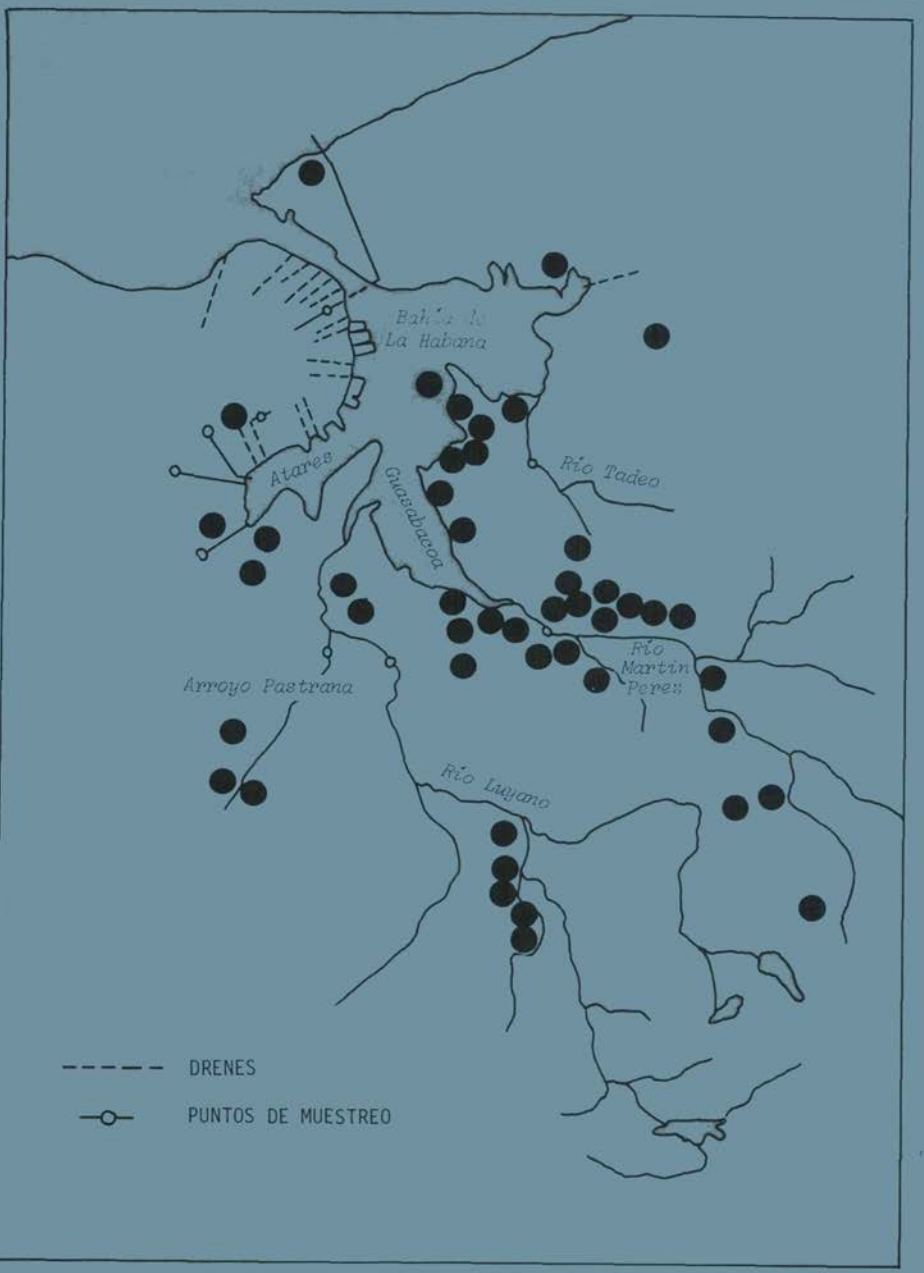
sería largo explicar, debieron implementarse estudios sobre la dinámica de las aguas oceánicas efectuando el correspondiente cálculo sobre el intercambio de masas de agua entre la bahía y el litoral, las corrientes que se encargan de la dispersión de los contaminantes y el papel que juegan los sedimentos. También fue preciso conocer los efectos que la contaminación provoca sobre el equilibrio natural y la salud humana. Muchas veces se piensa que los impactos de la contaminación afectan tan sólo a la vida marina, es decir que destruye la flora y fauna natural de un determinado sistema, pero en el caso por nosotros estudiado existe otra afectación que desde el punto de vista económico es aún más grave: el deterioro del parque industrial. Es que las aguas de la bahía se utilizan como refrigerante en varias industrias. Los ácidos que se vuelcan en las aguas entran en los circuitos provocando pérdidas millonarias. Al propio tiempo el agua así utilizada regresa a la bahía con temperaturas más altas que las normales con lo cual se genera contaminación térmica.

En el puerto de La Habana trabajan unos veinte mil operarios y en sus inmediaciones viven densas poblaciones. Las aguas de la bahía, debido a su alta carga orgánica, se han convertido en un caldo de cultivo de bacterias patógenas y virus causantes de enfermedades entéricas, hepatitis y otras parasitosis.

Las preguntas que seguramente el lector se estará haciendo son: ¿Hasta qué punto puede recuperarse el sistema? ¿A qué grado de descontaminación puede aspirarse? ¿Es posible restaurar las condiciones originales?

A pesar de que se podría desear restaurar el paisaje que con tanta admiración describieron los primeros cronistas de la colonia, las opciones más realistas se encuentran enmarcadas en los usos actuales, es decir: puerto de ultramar, zona industrial, turismo y recreación. No se pueden vislumbrar en el futuro mediato cambios sustanciales de esas tendencias. Tanto las autoridades cubanas como los expertos internacionales que las han asesorado, han llegado a la conclusión de que la opción más realista es la de aspirar a poseer un puerto "limpio", con condiciones sanitarias adecuadas que garanticen la salud de la población, eliminando de este modo el uso histórico que se ha hecho del sistema: el de servir de cuerpo receptor de las aguas residuales.

La bahía de La Habana tiene una capacidad de autodepuración que en la actualidad es posible calcular gracias a nuestras investigaciones de base. Es un reactor que será preciso utilizar en el futuro en beneficio de la sociedad. Es decir, se podrán seguir descargando cierto volumen de sustancias residuales que prodrán ser "digeridas" por el sistema sin afectar mayormente su estructura. Además, conociéndose como se conoce la calidad de la contaminación que aportan las diferentes fuentes, se podrán prevenir los impactos que provocan en el ambiente. A pesar de que la polución por petróleo y por las aguas negras son las que más se ponen en evidencia en la bahía de La Habana, no son las más peligrosas para la salud de la población. Mucho más lo son la causada por los desechos industriales que llevan consigo metales pesados como plomo, cobre, zinc, cobalto, vanadio, mercurio, etc., que pueden muy bien incorpo-


Bahía de La Habana
Atarés
Guasabacoa
Río Tadeo
Río Martín Pérez
Arroyo Pastrana
Río Luyano
DRENES
PUNTOS DE MUESTREO

rarse a las cadenas alimentarias del mar costero y acumularse en los peces y en los moluscos que son consumidos por la población.

Gracias a los estudios de los ingenieros ambientales que asesoraron el Proyecto, el Gobierno cubano tiene en la actualidad varias opciones cuya aplicación dependerá de factores socio-políticos y económicos. En primer lugar se hace prioritaria la modificación sustancial de la red cloacal y de alcantarillado. En este sentido las autoridades cubanas responsables han tomado la iniciativa programando a mediano plazo la construcción de grandes obras de infraestructura que se enmarcan dentro del Plan Director de Desarrollo Urbano. Será una inversión de millones de dólares que comenzará a ejecutarse en el próximo plan quinquenal. Los ingenieros sanitarios discuten actualmente con la contraparte nacional las soluciones técnicas más aconsejables a nivel de plantas depuradoras y colectores que enviarán los residuos pretratados mar afuera. En la destilería de petróleo, cuyos derrames afectan seriamente a las aguas de la bahía y del mar litoral (miles de toneladas se derraman anualmente), se están aplicando correcciones técnicas que permitan evitar esos escapes y que, de producirse, posibiliten su recuperación. Estas inversiones en nuevas tecnologías permitirán el ahorro de millones de dólares anuales en combustibles y el mejoramiento sustancial de la bahía y el litoral.

Si bien las mencionadas son las obras de mayor envergadura, como lo será también el saneamiento del arroyo Pastrana, una de las fuentes de contaminación más virulenta, otras medidas de menor cuantía y acciones reglamentarias están siendo implementadas. Entre estas se destacan la instalación de trampas de grasas en algunas industrias de la alimentación, la recolección de residuos sólidos flotantes por medio de embarcaciones limpiabahías, la instalación de balsas para la contención y recolección de petróleo, la toma de medidas sanitarias elementales en algunas industrias, el dragado y limpieza de los cursos de agua afluentes de la bahía, la aplicación de normas sanitarias portuarias para los barcos en operación, etc.

No es posible finalizar esta nota sin destacar un hecho plausible que por primera vez se ha registrado en América Latina. Nos referimos a la integración de un equipo interinstitucional e interdisciplinario para el estudio concreto de un caso puntual de contaminación marina. En la concreción de las investigaciones han participado no menos de una docena de instituciones del Estado y decenas de técnicos y especialistas en disciplinas tan diversas como son la planificación ambiental, historia, geogra-

Gráfica No. 3. Localización de las estaciones de muestreo y principales fuentes contaminantes en la región de la Bahía de La Habana. (Incluyendo: centrales eléctricas, fábricas, destañadores, tenerías. fertilizantes, refinerías, lavadores, licuadoras, alcantarillados, paraderos, recapadoras de gomas, drenes, puertos pesqueros, destilerías, terminales, marmoleras y efluentes.)

fía, oceanografía, geología, biología marina, microbiología, bioquímica, ingeniería ambiental, química industrial, matemática y química analítica. Nuestros becarios recibieron instrucción en países como Holanda, Francia, España, Hungría, México y la URSS. Veintiséis expertos internacionales fueron contratados por el Proyecto incluyendo entre ellos franceses, ingleses, españoles, norteamericanos, mexicanos, chilenos, uruguayos, colombianos, argentinos y de otras nacionalidades.

Como decíamos en un comienzo la experiencia metodológica acumulada deberá servir como base de trabajo para otros proyectos en la propia Cuba que se verá enfrentada a problemas ambientales en otras bahías con desarrollo urbano e industrial (Cienfuegos, Santiago, Nipe) y en países de la región con situaciones semejantes (Colombia, Venezuela, México, Panamá, Trinidad y Tabago, Jamaica).

Los países integrantes del Comité de Supervisión del Plan de Acción para la Protección Ambiental del Caribe reconocieron los méritos alcanzados por el proyecto cubano y le otorgaron, en 1984, 80,000 dólares con objeto de hacer extensa la experiencia de Cuba a otros países de la Region del Caribe. Con estos fondos se ofrecieron cuatro entrenamientos técnicos para profesionales de otros países que visitaron Cuba, y se organizó el segundo Taller Regional sobre el Manejo Ambiental de Bahías en el Caribe (La Habana, Diciembre 1984).

Esta es la razón por la cual las autoridades Cubanas han impulsado con buen criterio la realización de un proyecto regional dentro del marco del Plan de Acción del Gran Caribe que permita el intercambio de información, experiencias y metodologías con beneficio recíproco para todos los participantes. Será éste un desafío más de los muchos que tiene el área para su integración y colaboración pacífica.

Conférence mondiale sur les pêches

par Jean Carroz

Sous-directeur général
Département des pêches
Organisation des Nations Unies
pour l'alimentation et l'agriculture
(FAO)

Secrétaire général de la Conférence

La Conférence mondiale sur l'aménagement et le développement des pêches, convoquée à Rome par le Directeur général de la FAO du 27 juin au 6 juillet 1984, a été une première à plusieurs égards.

Tout d'abord, la Conférence constituait la première initiative au plan international pour examiner la mise en oeuvre pratique, dans un secteur particulier, des dispositions de la Convention des Nations Unies de 1982 sur le droit de la mer. Les objectifs de la Conférence étaient en fait beaucoup plus vastes, puisqu'ils comprenaient toute la question de l'utilisation optimale des ressources halieutiques, des points de vue économique, social et nutritionnel, et celle de la contribution du poisson à l'autosuffisance nationale en matière de production et de sécurité alimentaires. On peut donc dire que la Conférence était la première réunion sur les pêches organisée au niveau mondial pour s'occuper non seulement de problèmes techniques, mais également des aspects de politique générale afférents à la gestion rationnelle et au développement équilibré des pêches marines, des pêches intérieures et de l'aquaculture. Nombre des 147 délégations qui participèrent aux travaux étaient d'ailleurs conduites par des ministres. D'autre part, comme l'a fait ressortir le Directeur général de la FAO dans sa déclaration d'ouverture, c'était la première fois qu'une réunion sur les pêches accordait une importance aussi marquée aux

aspects sociaux du secteur et à l'avenir des pêcheurs artisans des pays en développement.

Enfin, c'est aussi la première fois qu'une conférence internationale a formulé et adopté une stratégie détaillée d'aménagement et de développement des pêches aux plans national, régional et mondial. La Conférence a également adopté cinq programmes d'action. L'adoption de programmes spécifiques d'un montant relativement modeste, et dont l'objet principal est d'aider les pays en développement à accroître leur production de poisson et à améliorer leur autosuffisance individuelle et collective, peut paraître banale; mais ces programmes représentent la première tentative visant à établir un plan cohérent et systématique d'assistance technique à l'échelle mondiale, et tenant compte non seulement des besoins et priorités des pays en développement, mais aussi des politiques d'aide et des objectifs prioritaires des organismes donateurs bilatéraux et multilatéraux.

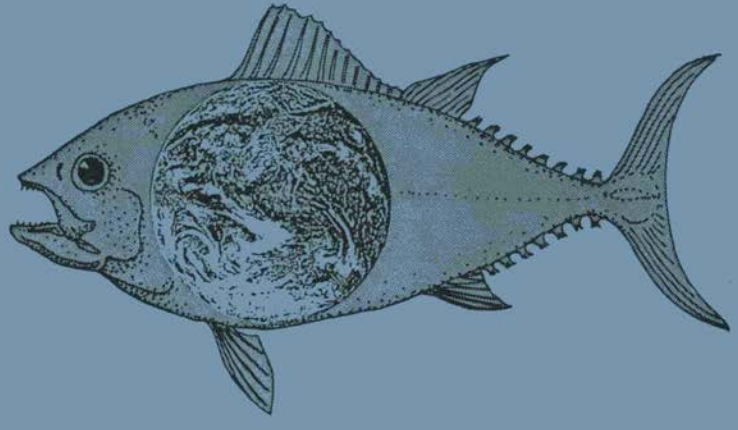
Ces résultats ont été facilités par plusieurs facteurs. On peut mentionner tout d'abord l'urgence qui s'attachait à l'adoption de mesures concrètes. En effet, il ne s'agissait pas seulement d'examiner les ajustements et changements requis par le nouveau régime juridique des océans. Ce nouveau régime est intervenu à un moment où la production mondiale de la pêche tend à plafonner. La production de poisson s'est élevée à environ 77 millions de tonnes en 1983. Ces dernières années, le rythme de progression de la production s'est ralenti et il est tombé à moins de 2% par an, contre plus de 5% pendant les années 50 et 60. Bon nombre des espèces marines actuellement capturées, en particulier celles qui sont destinées à la consommation humaine directe, sont pleinement exploitées ou même surexploitées. Or si, d'un côté, la croissance des captures mondiales s'est ralentie, d'un autre côté, la demande de poisson continue d'augmenter régulièrement. La consommation moyenne de poisson par personne est d'environ 12 kilogrammes par an. Pour qu'elle reste à ce niveau, il faudrait que la production annuelle de poisson de consommation double d'ici à l'an 2000.

Un écart sensible entre l'offre et la demande impliquerait de graves conséquences pour la population du monde en développement. Quoique en général, la consommation de poisson par habitant soit bien moins élevée dans le tiers monde que dans les pays industrialisés, la part revenant au poisson dans la ration totale de protéines animales y est beaucoup plus importante. On peut relever que les pays en développement effectuaient, il y a une vingtaine d'années, un tiers des captures marines. Leur part s'élève maintenant à environ la moitié. C'est sans doute un progrès, mais le but que peuvent se fixer ces pays n'est pas encore atteint, puisqu'on estime à près de 65% des stocks marins les ressources biologiques qui se trouvent dans les eaux sous leur juridiction.

Un autre facteur essentiel a été l'intérêt que les gouvernements ont porté aux préparatifs de la Conférence et leur participation active aux réunions techniques ou de politique générale tenues dans les deux années qui l'ont précédée. A l'ouverture de la Conférence, les

délégations savaient assez exactement jusqu'où elles pouvaient aller et quels amendements à tel ou tel élément de la Stratégie avaient une chance d'être retenus. Cela explique qu'il ait été possible à la Conférence d'adopter par consensus, et la Stratégie qui comporte plus d'une centaine de principes et de lignes directrices détaillées, et les Programmes d'action. Il est vrai cependant que les gouvernements ont fait des efforts considérables pour éviter de formuler des réserves au texte final de ces instruments. Seul le rapport sur les discussions de la Conférence et de ses commissions contient de très rares allusions aux réticences de quelques gouvernements concernant soit un point particulier, soit une question de portée générale. La seule réserve spécifique se réfère à un principe de la Stratégie selon lequel les accords prévoyant un droit d'accès à des navires de pêche étrangers dans les zones économiques exclusives devraient comporter des dispositions visant à protéger les opérations nationales, promouvoir le transfert de technologies appropriées et développer les capacités nationales.

La délégation d'un pays très important en matière de pêche a fait remarquer que la coopération technique et économique est souvent organisée conformément à des programmes généraux, indépendamment de l'existence d'accords de pêche entre les pays donateurs et bénéficiaires. D'une manière plus générale, trois délégations ont informé la Conférence que, tout en étant favorables à l'adoption de la Stratégie et des Programmes d'action, leurs pays reconnaîtraient et appliqueraient seulement les recommandations intéressant l'aménagement et le développement des pêches qui ne contreviennent pas aux dispositions de la Convention des Nations Unies sur le droit de la mer de 1982. Au contraire, lorsque l'Assemblée générale des Nations Unies a elle aussi approuvé par consensus, en décembre 1984, la Stratégie et les Programmes d'action, la délégation turque a indiqué que son approbation de la résolution pertinente de



l'Assemblée générale n'impliquerait en aucune manière l'acceptation par son pays des dispositions de la Convention de 1982; une autre délégation fit observer que l'adoption de la résolution ne devait pas être interprétée comme affectant la position de son gouvernement à l'égard de la Convention.

La retenue et la modération des gouvernements ont été d'autant plus méritoires que les difficultés et les divergences de points de vue ne faisaient pas défaut. Je me bornerai à donner deux exemples, le premier concernant les pays en développement et le second les pays développés. Les pays de l'Amérique latine ont beaucoup insisté, au cours de la Conférence, sur le concept essentiel de souveraineté des Etats riverains, qui devraient s'attacher à développer eux-mêmes les pêcheries, aussi bien industrielles qu'artisanales, dans leurs zones économiques exclusives. De nombreux pays africains ont fait valoir qu'il leur faudrait un certain temps pour atteindre les objectifs qu'ils se sont fixés pour mettre en valeur les pêches nationales. En attendant, ils seraient donc amenés à continuer d'accepter que des navires étrangers pêchent dans leurs zones. Il a été admis cependant que la conclusion d'accords de pêche ne devrait constituer qu'une étape transitoire. De même, on a fait valoir que l'accent mis dans les Programmes d'action sur la promotion des pêches artisanales des pays en développement ne signifiait pas que ces derniers devraient nécessairement laisser à des navires de pays développés le soin d'exploiter les pêcheries semi-industrielles ou industrielles.

L'autre exemple concerne essentiellement le commerce du poisson et des produits de la pêche entre pays industrialisés. Les délégations de ces pays ont débattu longuement le point de savoir si l'accès de flottes étrangères aux ressources des zones économiques exclusives pouvait être subordonné par les pays riverains à leur accès aux marchés des pays de pêche lointaine. Ces derniers peuvent ne pas vouloir importer de poisson ou limiter leurs importations à certains produits. Finalement, à la suggestion de la délégation de la CEE, la Conférence inséra dans la Stratégie une disposition souple selon laquelle on pourrait donner plus d'ampleur au commerce entre pays développés en offrant des possibilités de commercialisation accrues en échange de droits de pêche.

En guise de conclusion, on peut dire que la Conférence a permis à la communauté internationale de prendre conscience de la contribution actuelle et potentielle de la pêche comme source de nourriture, d'emplois et de devises. Le poisson et les produits de la pêche correspondent déjà, en poids, à plus de la moitié de la production de viande sous toutes ses formes. Même si, à lui seul, le poisson ne peut combler le déficit protéique mondial, il pourrait jouer un rôle plus important dans la lutte contre la sous-alimentation et la malnutrition. Il est donc évident que la Conférence n'était pas une fin en soi. Les participants l'ont d'ailleurs parfaitement reconnu et ils ont approuvé ou recommandé toute une série de mesures concrètes de suivi, qui sont déjà à l'examen des gouvernements, de la FAO et des autres organisations internationales concernées.

In search of the "best"

by Simon Aston

Simon Aston received his Ph.D. in chemical oceanography from the University of Liverpool, U.K. From 1974 to 1980 he was lecturer in geochemistry at the University of Lancaster. He joined the International Laboratory of Marine Radioactivity (ILMR) of the International Atomic Energy Agency (IAEA) in Monaco in 1980 as head of the geochemistry section. He is now co-ordinator of UNEP projects at the Monaco laboratory.

Methods for the analysis of marine environmental materials are now many and various. Much effort has been expended by marine scientists to measure those substances and micro-organisms which are of interest as potential pollutants of the oceans; e.g. heavy metals, chlorinated hydrocarbons and pathogenic bacteria. Out of this vast body of techniques, there is a real need to choose, test and intercalibrate specific methods which can be adopted as Reference Methods for UNEP's Regional Seas Programme.

A quotation from the preface which accompanies each published Reference Method helps to set the scene:

"One of the basic components of the action plans sponsored by UNEP in the framework of the Regional Seas Programme is the assessment of the state of the marine environment and of its resources, and of the sources and trends of the pollution, and the impact of pollution on human health, marine ecosystems and amenities. In order to assist those participating in this activity and to ensure that the data obtained through this assessment can be compared on a world-wide basis and thus contribute to the Global Environment Monitoring System (GEMS) of UNEP, a set of Reference Methods and Guidelines for marine pollution studies are being developed and are recommended for adoption by Governments participating in the Regional Seas Programme."

At a glance the obvious answer to the selection of a Reference Method is to choose the latest and best technique available. The problem begins with the question, "What does 'best' mean for the purposes to which Reference Methods will be used by participants in the Regional Seas Programme?"

The "best" method in this context is not necessarily the most sophisticated, accurate or precise technique. In the real world, several other factors have to be taken into account if the Reference Methods for marine pollution studies are to be of genuine practical use.

The above comment may raise the eyebrows of some analysts and marine scientists, but here I hope to explain why it is neither always necessary -- nor even desirable -- to go for the latest, greatest (and usually most expensive) method.

First, let us consider the four marine pollution monitoring studies in Regional Seas action plans. These may be summarised as:

a. Monitoring of sources of pollution to provide information on the type and amount of pollutants reaching the [illegible] coastal sources.

b. Monitoring of the coastal waters, including estuaries, within the limits defined by the relevant action plan and convention, under the direct influence of pollutants from identifiable primary (e.g. outfalls, discharge or coastal dumping points) or secondary (rivers and other water courses) sources.

c. Monitoring of reference areas which are not under direct influence of pollutants from identifiable primary or secondary sources.

d. Monitoring of the transport through the atmosphere of pollutants to the marine and coastal areas defined by the action plan and convention.

Each monitoring programme is supported by selected research activities carried out in in order to provide the scientifically sound rationale and justification for the monitoring. The research and monitoring programmes are executed by government-nominated national institutions of the countries participating in the regional action plans. The Methods are frequently incorporated in relevant national legislation as mandatory standard methods. The Reference Methods officially adopted by governments participating in the Regional Seas Programme serve also in clarifying inter-governmental disputes arising from transfrontier pollution incidents or accidents.

The Reference Methods being developed cover a wide range of pollutants, e.g. trace metals, chlorinated hydrocarbons, petroleum hydrocarbons, tar, bacteria, etc., and provide guidelines for sampling strategies, preparation of samples, toxicity tests, data handling and evaluation. In addition, they include information on how basic oceanographic parameters are to be assessed and used to supplement the data on marine pollution.

It is apparent then that the Reference Methods must be formulated in such a way as to meet some substantial requirements. These requirements include:

a. Analytical methods must be applicable throughout the world,

including many developing countries. Thus, they must make use of easily available and serviceable equipment, reagents and facilities.

b. They must be reliable and produce data which are reasonably accurate, precise and reproducible. "Reasonably" means of sufficient accuracy and precision to allow meaningful interpretation for the purposes and objectives of regional marine pollution studies. They should be adequate for intra-regional and inter-regional comparisons for the GEMS of UNEP.

c. The Methods must be used in conjunction with appropriate mandatory quality control which is achieved through reference materials (standards) available on an international basis.

Furthermore, the Methods cannot ever be regarded as "once only". Rather, as analytical techniques and instrumentation improve and become more generally available, the Reference Methods are revised and re-tested. One of the most important constraints is that the availability of instrumentation and other facilities does, of course, vary throughout the world. This is perhaps the most important factor in determining the "best" Method for a given pollutant.

With the above in mind, the actual formulation of the Reference Methods is as follows:

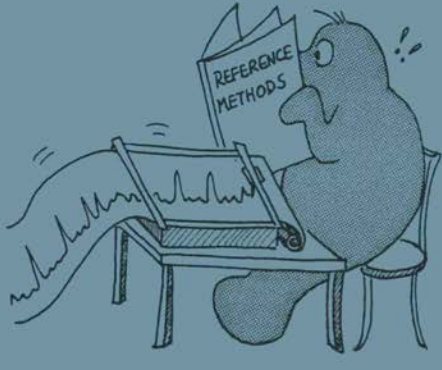
They are developed and tested through inter-agency co-operation (e.g. UNEP, WHO, FAO, WMO, IOC, IMO, UNESCO, IAEA, ICES), with the assistance of consultant experts, marine research institutes and individual scientists. The Methods are also reviewed by the IOC/UNEP co-sponsored Group of Experts on Methods, Standards and Intercalibration (GEMSI).

The first draft of the Method is usually prepared by an expert in the relevant field. The draft is widely distributed to selected experts, usually though not exclusively to those participating in the Regional Seas Programme, with an invitation to

test the Method. The results of the tests are then reviewed by expert group meetings and the draft is afterwards turned into a regular issue which is recommended to be used by all participants in the Programme. After further experience is gained with the application of the Method it may be revised, again as a result of recommendation from an expert group meeting.

Reference Methods which have been thoroughly tested and found to satisfy the legal requirements of the countries participating in the Regional Seas Programme are submitted to the governments (at intergovernmental meetings) for formal adoption as mandatory Methods in the context of specific Regional Seas action plans and conventions. The technical co-ordination of the development and testing of Reference Methods is carried out by the International Laboratory for Marine Radioactivity of the IAEA in Monaco on behalf of UNEP.

This multi-lateral and comprehensive approach to the development, drafting, revision and testing of the Reference Methods is conceived as an indispensable approach to satisfy the requirements of marine pollution studies in the framework of the Regional Seas Programme. This procedure ensures that, inter alia, methodologies are effectively optimised and updated with respect to the specific requirements of the Programme. Furthermore, it provides a viable mechanism for continued and wide-ranging co-operation on the improvement of Reference Methods in the light of the development and availability of analytical technology on a global basis.



Finally, an important factor in the growth and strength of the Methods is the use of intercalibration and intercomparison exercises. This depends on the availability of suitable samples of materials from the marine environment, e.g. homogenates of fish flesh, molluscs, marine sediments, sea water, etc. These materials provide a sound basis for the development of Reference Methods. It is a costly and time-consuming business to collect, prepare, and distribute such substances, and to analyse statistically the results of intercalibration exercises. At its sixth session in November 1984, GEMSI made a strong recommendation that a mechanism be adopted to ensure the continued availability of appropriate materials, and to optimise international efforts to co-ordinate such activities. I believe this is an excellent move which will greatly aid the quality of the Reference Methods and give Regional Seas and other marine pollution programmes even greater confidence.

I am always happy to receive any comments on Reference Methods, and I would urge everyone involved in their use to write to me. This will ensure that they are updated and improved as much as possible.

Environmental Challenges in Asia and the Pacific

by Nay Htun

Nay Htun became UNEP's Regional Director and Representative for Asia and the Pacific in July 1983. Prior to the appointment, he was with the UNEP Industry and Environment Office in Paris for seven years. Before joining UNEP, he was Professor of Environmental Engineering at the Asian Institute of Technology, as well as the Department Manager of a multinational energy company. Nay Htun received his Ph.D. degree in Chemical Engineering from Imperial College, London University, in 1966.

The Siren: What are the major problems for the marine environment of Asia and the Pacific?

Nay Htun: Concentration of people and ill-conceived development activities in and around coastal areas. Let me elaborate: the region at present contains 2.6 billion people or approximately 52 per cent of the world's population. Economically it is also one of the fastest growing regions. In 1980, of the 25 most populous cities worldwide, 11 were in the Asia-Pacific region. By the year 2000, the share will be increased to 15. These cities will each contain numbers of inhabitants ranging from a minimum of 10 million to over 25 million. Of these 15 cities, only two -- New Delhi and Teheran -- are inland, the rest are situated on the coast.

Unless there is adequate waste collection and treatment systems for these cities, as well as control of human settlements, the volume of wastes discharged into the marine environment (a traditional receptacle for wastes) will increase significantly, exacerbating already critical conditions. When this situation is

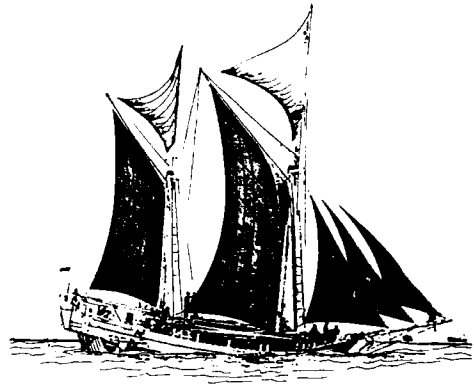
combined with a lack of enforcement of measures regulating industrial discharge, coastal land reclamation projects, agrochemical runoff and harbour, port and communication developments, then it is obvious that there is tremendous and increasing pressure on the marine environment.

Q: What is likely to be the most effective strategy for addressing these issues?

A: There must be a mix of institutional, organizational, technical and economic measures, the composition adapting to location and time.

Most countries have laws and legislation to protect the marine environment. However, these need to be strengthened and enforced. Rural development and agrarian reform should be accelerated to check migration to cities, and industrial development around coastal areas should be effectively co-ordinated. A good example is Thailand's Eastern Seaboard Development Programme, which will amount to approximately four billion U.S. dollars for the next seven to ten years. A ministerial committee under the chairmanship of the Prime Minister has been effectively established to integrate the different aspects of development.

Presently, five sub-committees, each headed by a minister, are responsible for (1) industrial and petrochemical development, (2) port development, (3) social and educational development, (4) investment promotion, and (5) managerial and institutional aspects of development. Environmental impact assessment studies of proposed development activities in the seaboard area are also being undertaken.



Q: How can UNEP be most effective in helping the region's governments?

A: By making available policy guidelines and information on what can be done to promote sustainable development. This should be augmented with technical assistance to help countries implement the recommended guidelines, once these are accepted.

Q: How much public concern about the environment do you see in the region?

A: Very much, and it is increasing all the time. One indication is the number of newspaper articles on environmental issues. Another is the growth in non-governmental environmental organizations. In India, a 1984 survey listed nearly 200 NGOs, while another 160 from other countries in the region appeared in a 1982 survey.

Q: Where is public concern concentrated, and how does it differ between areas?

A: We see it more in the urban areas, because of better media availability and coverage as well as the fact that environmental quality degradation caused by air pollution, noise, lack of recreational facilities, slum dwellings, etc. is accentuated.

In the rural areas, where the majority of the population lives, environmental concerns focus on the immediate needs for survival, even though there is clear recognition that, for example, not cutting down trees for firewood today will bring a better tomorrow.

But will there be a tomorrow, if they and their children do not survive today? Under these circumstances, one today is worth two tomorrows! This is the stark choice confronting nearly a billion people in the region.

Q: Which countries are most active in environmental protection?

A: Naturally, activity is concentrated in those countries which have the most active NGOs and journalists.

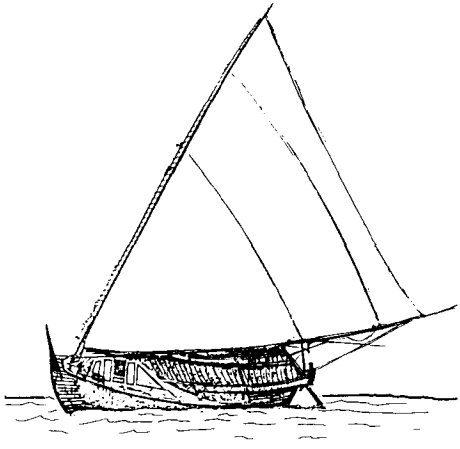
In fact there are many active NGOs in the region and their sense of mission and dedication is most impressive, particularly as many are operating on very limited budgets.

To name just a few: the Sahabat Alam Malaysia, the regional office of the International Organization of Consumers Unions; Wildlife Fund Thailand; and the Centre for Science and Environment, India. In Japan there is the Defense of Green Earth Foundation, the Environmental Association, and the Wild Birds Association; in Australia, the Wilderness Society, the Total Environment Center, and the Australian Conservation Foundation; and in New Zealand, Environment and Conservation Organizations of New Zealand and the Royal Forest and Bird Protection Society of New Zealand.

NGOs are most active and effective when they maintain their credibility. This requires well researched and articulated causes backed up by good team work.

Q: Is the press active and supportive of environmental concerns? If so, where?

A: Yes, extremely so. UNEP has been collaborating very closely with the Press Foundation of Asia -- a regional organization with a membership consisting of major newspapers--



in a number of activities, including training workshops.

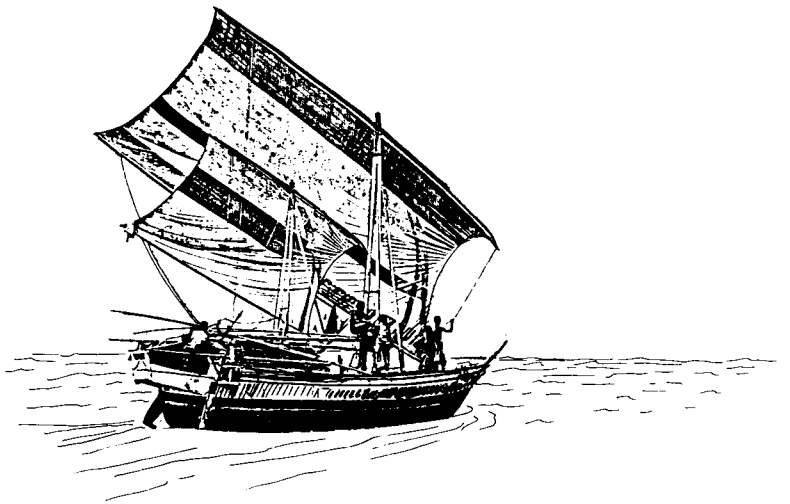
Q: What are some of the least publicized but most serious problems in the region -- the ones people might be surprised to learn about in other regions?

A: Two such problems are the dwindling availability of fresh water and the increasing rate of desertification or soil with zero productivity. This is particularly surprising since there is a common perception that a greater part of the region is under the influence of monsoons or typhoons. Take, for example, the state of Maharashtra, India, which had a target of supplying water to 15,000 villages. It was found instead that 22,000 villages had lost their water supplies. The situation is similar in different parts of the country, including Kerala in the extreme South, which has rain seven months of the year.

Q: What are relations like between environmentalists and the business community in the region?

A: Relations are improving because the business community now recognizes that environmental concerns and NGOs are not a passing fad but are firmly established, while NGOs are acknowledging that business can play a key role, either positively or negatively.

But there is still some mistrust. There needs to be more and better dialogue between the two groups -- all the time and not only when issues burst into news.



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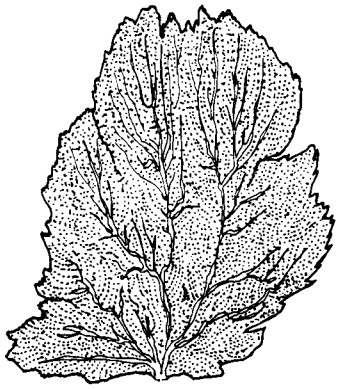
the programme at the regional, sub-regional and national levels.

Nevertheless, the mission revealed that in a number of countries there was a certain lack, at the decision-making level, of up-to-date information on the progress of the programme, including the status of implementation of the projects. Some of the problems may be due to the institutional arrangements which assign management responsibility to officials who are unfamiliar with the background of the programme, in which case the Secretariat would be advised to keep an up-to-date register of all political, administrative and technical officials who deal with action plan activities, and to devise flexible national mechanisms of communication and information exchange.

More effective promotion of the philosophy enshrined in the Caribbean Environment Programme, and of the alternative solutions to common environmental problems, will serve to facilitate decision-making at the highest level and to ensure satisfactory development of action plan projects.

While facing the present economic crisis, Caribbean governments are giving priority to economic growth. Nevertheless it would be prudent to keep in mind the promise to make rational use of natural resources and to plan the development of our countries on the basis of sensible, sustainable and well-balanced management of the environment to ensure its long-term benefit. This is the only way to guarantee our future generations a legacy of resources which can allow continuous and ecologically-acceptable development.



With these ideas in mind, and taking into account the main objectives of the Caribbean Action Plan, I suggest that responsible national authorities make a special effort to raise the level of the awareness of their citizenry to ensure that they never allow their natural resources to be irreversibly damaged.

It is enough to see the painful reality of conditions in countries of other continents, where peoples await their death in inhospitable desert surroundings, as the result of the environmental deterioration brought about by a combination of natural phenomena and human mismanagement of environmental resources. These images, which oppress the very heart of humankind, constitute a warning which should make each one of us conscious of the fact that today's decisions will inevitably influence and transform our environment, whether positively or negatively.

The Caribbean Environment Programme is based on the proposition that the key to acceptable development from an environmental standpoint

must be sought through the management of resources on a sustainable basis. Such management must make allowance for the carrying capacity of the environment, as well as the objectives of development as defined by competent national authorities, and consistent with the economic viability of those objectives.

Admittedly, some of the States and Territories of the Wider Caribbean are making concerted efforts towards satisfying their most important environmental needs, but we must also recognize that small countries and territories are in special need of regional and sub-regional co-operation to supplement their available national resources.

The general framework for such co-operation has been laid down by the Caribbean Action Plan, but there are many areas of co-operation between the developing countries that can be generated. It will be necessary to look inwards and to identify the resources available nationally in order to deal with local, regional and sub-regional environmental problems, and to make use of the frame of reference already established to strengthen co-operation between the Caribbean States and Territories.

We feel it opportune to express our gratitude to the small States and Territories of the Wider Caribbean for the special effort made by them to pay their voluntary contributions to the Caribbean Trust Fund for the 1984-1985 biennium, and we urge the remaining participating countries to consider the possibility of meeting their obligations in a timely way.

Similarly, we express our gratitude to all the international, regional (both governmental and non-governmental), and bilateral co-operative agencies which have allocated funds for the implementation of Caribbean environmental projects. We recommend that these resources should as far as possible be channelled through the Caribbean Action Plan, and be applied to the priority activities designated by the Monitoring Committee.

....continued from page 3

with the UNEP proposal and established Working Group 23 on the Methodologies and Guidelines for the Assessment of the Impact of Pollutants on the Marine Environment. Its work will initially be limited to providing guidelines concerning the impact of substances from land-based, or coastal, sources, and to demonstrating their applicability to concrete case studies -- thereby putting theory into practice from the very beginning.

The meeting of the Working Group, held in Bangkok in October

1984, developed a set of guidelines and applied them to the first case study. Thailand, particularly its eastern seaboard region, was chosen as a good example of intensive industrialization in a less-developed country. The study provided a detailed description of the area in question (Map Ta Phut Development Area) and the development projects proposed, with an assessment of the impact of the pollution likely to be produced by such development. It also tested the concept of environmental capacity as a tool in development planning.

The Working Group was convened by FAO as technical secretariat, with the co-operation of the Thai National Environment Board, UNEP, UNESCO, WHO, IMO, and IAEA. The report of the group will be submitted to the next session of GESAMP in New York, 25-29 March 1985.

A second case study to test the guidelines formulated in Bangkok was carried out in Chile (Concepción, December 1984) by experts of the South-East Pacific region. The study was sponsored by the Permanent Commission for the South Pacific (CPPS) assisted by UNEP, ECLAC and UNDP. The ecosystems of the Bio-Bio River and Gulf of Arauco, where the coastal area is polluted by river discharges, was the target of the study.

The quick application of the Bangkok guidelines to field studies attests to their practicability. Whether the underlying scientific controversy is ever resolved, the guidelines for impact assessment developed thus far by GESAMP seem to provide pragmatic environmentalists and their governments with a powerful management tool. ◇

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is charged with specific responsibilities within each category:

Through the sub-programme on Global Marine Environment, it will continue to contribute to international efforts for assessing marine pollution, promote the development of standardized methodology and quality control of marine pollution monitoring and research, and encourage global policies and practices appropriate for the protection and management of marine resources.

Through the Regional Seas Programme, it will carry on much as in the past, with increased emphasis on harmonizing activities among the various regions when they deal with similar subjects, and ensuring that the data generated by the regional programmes are comparable and contribute to other UNEP activities, such as the Global Environment Monitoring System (GEMS).

Assuming the responsibilities for the programme on Living Marine Resources will include co-ordination of the FAO/UNEP Global Plan of Action for the Conservation, Management and Utilization of Marine Mammals and the activities related to the protection of living resources from pollution and environmental degradation.

The Siren will still be the newsletter of the Regional Seas Programme, concentrating on the activities in each of the eleven regional seas. But it will naturally contain a great deal of news from the other, closely related, OCA/PAC programmes.

The Siren welcomes all her new friends! ◇

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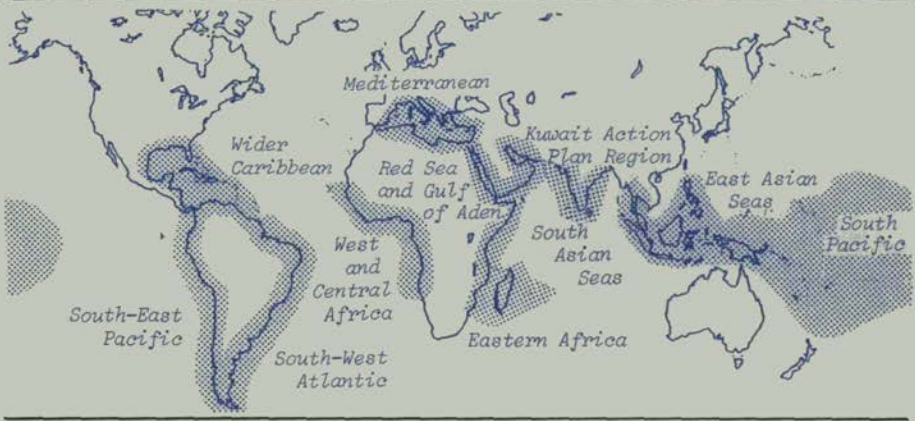
the regional seas



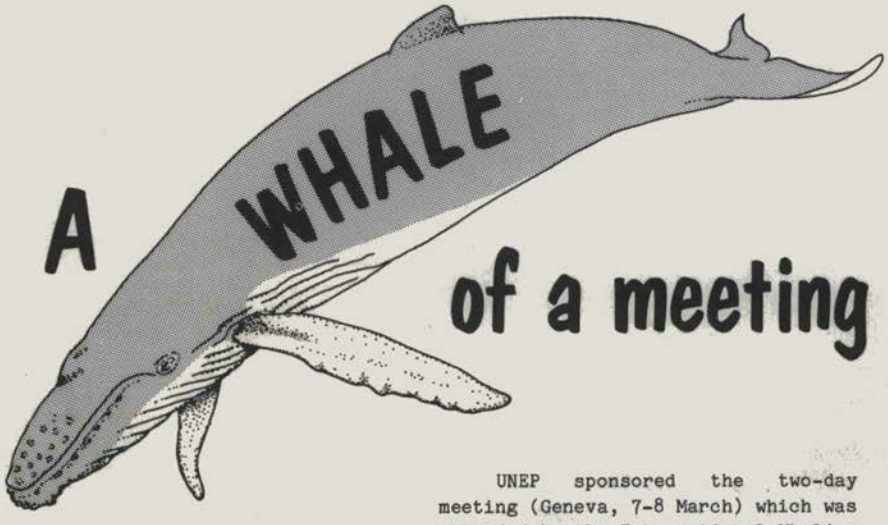
The Siren is issued four times a year in English, French and Spanish. It is intended as an informal presentation of the news from the Regional Seas Programme of the United Nations Environment Programme (UNEP), and does not necessarily reflect the official opinions of UNEP or its staff.

If you wish to receive The Siren regularly, or would like to propose an article on a subject of current interest and controversy related to marine science and environmental protection, please address: Nikki Meith, Editor, The Siren, Programme Activity Centre for Oceans and Coastal Areas, UNEP, Palais, des Nations, 1211 Geneva 10, Switzerland.

Number 28 May 1985

THE SIREN

news from UNEP's Regional Seas Programme



A WHALE of a meeting

Fourteen active international organizations -- scientific, environmental, intergovernmental and United Nations -- have agreed to co-operate closely to save endangered marine mammals.

"This is a major practical step towards co-operation on the part of a large number of quite different but important organizations within the framework of a global plan to protect marine mammals such as dolphins and dugongs, whales and walruses, otters and seals, sea lions and polar bears," declared Dr. Stjepan Keckes, who directs the marine activities of the United Nations Environment Programme (UNEP).

UNEP sponsored the two-day meeting (Geneva, 7-8 March) which was attended by the International Whaling Commission (IWC), Greenpeace, the Cousteau Society, the International Union for Conservation of Nature and Natural Resources (IUCN), the World Wildlife Fund, the Secretariat of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the International Council for the Exploration of the Seas, the Scientific Committee on Antarctic Research, the European Association for Aquatic Mammals, the Connecticut Cetacean Society, the Intergovernmental Oceanographic Commission (UNESCO), the Food and Agriculture Organization (FAO), the World Tourism Organisation, and UNEP.

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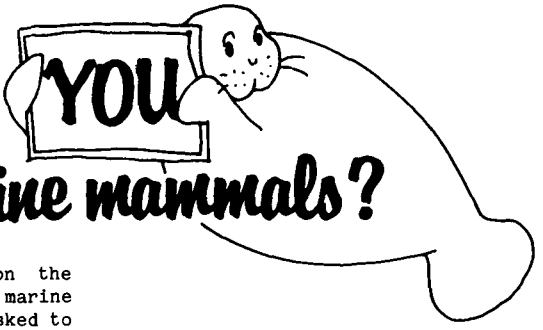
How would YOU protect marine mammals?



At the recent meeting on the Global Action Plan for marine mammals, participants were asked to give The Siren a short personal statement answering the following question:

"Of all the problems associated with marine mammal conservation and/or management that you deal with personally, which do you feel is most urgent, and what is the best way of solving it?"

The Siren received the following answers, which are personal opinions and do not necessarily reflect the official positions or priorities of the organizations represented at the meeting.

peaceful interaction

Robbins Barstow

Retired educator and volunteer whale advocate
Executive Director
Connecticut Cetacean Society, USA

I feel the most urgent problem involving marine mammal conservation is that of helping people around the globe to come to appreciate the uses and values of "whales alive". Living cetaceans have an almost incredible capacity for enriching the lives of human beings. Under suitable circumstances, I believe that humans can also enrich the lives of cetaceans.

The ultimate key to constructive conservation and positive coexistence for humans and marine mammals lies in increasing public awareness. This is where I believe non-governmental organizations like the Connecticut Cetacean society and Greenpeace can play a significant role.

We can help promote benign marine mammal research under UNEP auspices and broadly publicize its results. We can also stress educational and cultural values, and extend areas of peaceful human/marine mammal interaction through such activities as controlled recreational whale watching in all of the Regional Seas.

fisheries conflicts

Jon Beddington
Director, IUCN/IIED
Marine Resources Assessment Group
Imperial College, London

Fishermen and marine mammals operate in the same environment In many parts of the world marine mammals are killed incidentally by

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UNEP ponders the future

What are the most effective practical steps UNEP can take over the next 10-15 years to improve the environment? What have been its greatest accomplishments so far? What are its best programmes and what are the secrets of their success? How should UNEP respond to the broad trends in the world's political and environmental situation? Is environmental degradation likely to threaten peace and stability in the coming years, and if so, what can be done about it?

These are some of the questions addressed by a workshop entitled "UNEP in 1990" convened recently in Nairobi. The purpose of the meeting was to give UNEP a positive, success-oriented direction for the next 15 years, to outline specific targets and to discuss how the organization of UNEP activities should be adapted for the accomplishment of the specified goals.

Targets set for the UNEP Oceans programme included further development of action plans, conventions and protocols in the regional seas; the setting of environmental quality standards for beaches, seafood, and coastal waters; increasing the reliability of pollution assessment; reversal of the trend of pollution in the Mediterranean; increasing the number of specially protected areas by 30%; and implementation of the plan of action for marine mammals.

UNEP programmes singled out for praise included the Regional Seas Programme, the International Register of Potentially Toxic Chemicals (IRPTC) and the Global Environment Monitoring System (GEMS).

The Siren is sorry to announce the departure of two professional staff members of the UNEP Oceans and Coastal Areas Programme Activity Centre: Francisco Szekely, Deputy Director of OCA/PAC, and Dan Elder, Programme Officer.

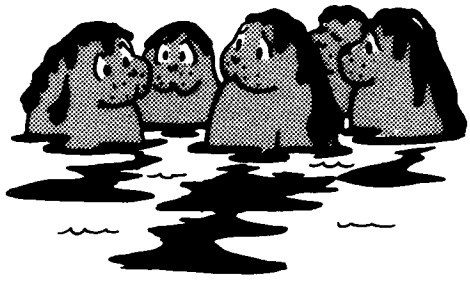
Thanks for a job well done, and best of luck!

Oslo and Paris reporting

The Oslo and Paris Commissions have recently published their Annual Reports covering the period from June 1983 to June 1984.

Both reports contain results of a 1982 joint monitoring programme for mercury, cadmium and PCBs in marine organisms, and mercury and cadmium in sea water; they also contain a document entitled "A Strategy for the Future" on goals for the coming decade, issued on the occasion of the tenth anniversary of the Oslo and Paris Conventions.

Arab States join forces



The twenty-one Arab States participating in the Regional Seas Programme are determined to maximize the benefits of their environmental efforts by combining their expertise and experience. Such was the purpose of the recent Inter-secretariat meeting on Arab Regional Co-operation for the Protection and Development of the Marine Environment and Coastal Areas Resources held in Athens, 16-17 February 1985.

Participants agreed to keep each other informed about the progress of the five programmes they represent (Mediterranean, Kuwait, Red Sea and Gulf of Aden, West and Central Africa, and Eastern Africa), through direct contacts, periodic consultations, and a publication to be prepared by UNEP. They also recommended that the Marine Emergency Mutual Aid Centre in Bahrain and the Regional Oil Combating Centre in Malta should strengthen their ties. They urged the organizing of joint technical meetings, methodological consultations and training courses, and further development of environmental legislation.

news from the regions

caribbean

The Fourth meeting of the Monitoring Committee took place in Cancun, Mexico, from 21 to 23 April 1985, followed immediately by the Third Intergovernmental Meeting at the same venue from 24 to 26 April. A full report will appear in the next issue of The Siren.

As part of preparations for the meetings, Ms. Dallys Robles, Acting Chairman of the Monitoring Committee, continued her mission to various States of the region, visiting Costa Rica and the Dominican Republic in February 1985. She had previously visited Venezuela, Mexico and the USA (see The Siren no. 27).

Judging by the number of project proposals received by the Secretariat for submission to the Monitoring Committee for approval and financial support from the Caribbean Trust Fund, there is still considerable interest in the Action Plan. Fifteen proposals were received from eleven international organizations, and twelve proposals were received from six governments. The estimated financial requirements are US$ 6.2 million of which US$ 3.3 million was sought from the Trust Fund and the rest would be contributed by the proposers of the projects.

south-east pacific

Oil pollution control is the current hot topic in the South-East Pacific. Two major activities were organized during March by the International Maritime Organization (IMO), the Permanent Commission for the South Pacific (CPPS) and UNEP.

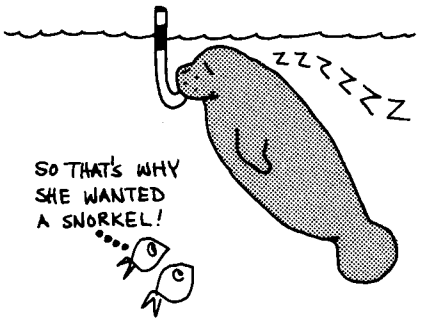
A course on oil spill control in the region was held in Panama (18-22 March) and attended by 10 experts from Colombia, Ecuador, Chile, Panama and Peru. Lectures were given on international norms to prevent oil pollution, prediction of oil movements in the sea, revision of methods of re-collection, dispersion and waste disposal, risk assessment, and methods of communication. A simulation exercise was conducted to demonstrate how the methods are put into practice.

The course was followed by a workshop of legal and technical experts on the contingency plan for combating of oil pollution in cases of emergency (25-27 March). The ten participants examined national contingency plans of their five countries and how they related to the regional contingency plan to combat oil pollution in cases of emergency in the South-East Pacific, adopted in Quito, July 1983. They then discussed an operational strategy for execution of the regional contingency plan.

Both meetings profited from the advice and experience of a number of experts provided by the participating organizations.

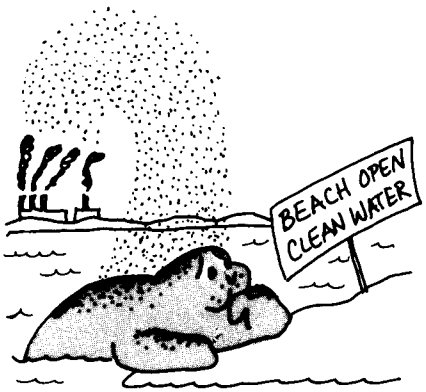
red sea & gulf of aden

The provisional Executive Council of the Red Sea and Gulf of Aden Environment Programme met in Jeddah during the period 24-26 February 1985. It reviewed the progress achieved in the implementation of this programme and advised on follow-up activities.



eastern africa

The International Union for Conservation of Nature and Natural Resources (IUCN)/UNEP team which went to Mozambique has submitted a project proposal to the UNEP clearing-house for the development and management of Inhaca Island. Along with the national project on coastal erosion in the United Republic of Tanzania and the Mozambique national project, a proposal has been made to investigate the problem of coral sand extraction in Mauritius. This, too, will be submitted to the UNEP clearing-house in order to identify funding resources for its implementation.



mediterranean

An expert consultation on atmospheric transport of pollutants into the Mediterranean region was hosted by the Mediterranean Co-ordinating Unit (Athens, 21-25 January 1985).

A seminar on oil pollution was organized by the Petroleum-Oil Industry International Exploration and Production Forum, the Oil Companies' European Organization for Environmental and Health Protection (CONCAWE), and UNEP to provide mechanisms for an exchange of technical information and views on oil pollution prevention between governments and the oil industry, with emphasis on (1) oil spill combating and (2) treatment of production water from off-shore oil operations. The seminar was attended by 104 participants from 12 Mediterranean countries (Athens, 11-13 March).

An expert meeting was held on integrated planning and management of coastal zones by the Priority Actions Programme Regional Activity Centre in Split (18-19 February).

The third meeting of the Steering Committee of the Blue Plan was held to discuss the progress of the second phase of the Blue Plan. (Sophia Antipolis, 21-23 February)

A consultation meeting was held on data processing requirements of the Mediterranean Action Plan (Athens, 14-15 March).

A meeting of experts was held on the rehabilitation and reconstruction of historic settlements (Split, 18-19 March).

The bureau of the Contracting Parties to the Barcelona Convention met in Tunis (21-22 March).

south asian seas

Work on four of the five national reports on environmental problems in South Asia is complete. The fifth report is due in soon and while waiting for its completion the UNEP secretariat has begun the task of preparing the regional overview report, based on the national reports, reviewing environmental problems of the region defined as priority areas.

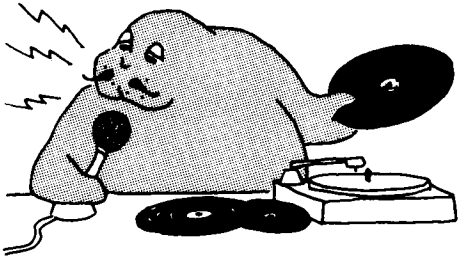
south pacific

A major environmental education effort is under way in the South Pacific to make island peoples aware of environmental problems in the region and ways they can help to solve them.

The Environmental Radio Project for the South Pacific Regional Environment Programme (SPREP) got under way in November 1983. Radio was seen as an effective way to communicate with, and facilitate communication between, the Pacific islanders in more than 20 countries covered by the programme. A major goal of the project is to stimulate island broadcasters to make their own programmes about their island's environmental problems, and to put across the message that caring for the environment is something which should involve everyone. The project organizes training courses for the broadcasters and local organizations in order to stimulate full community involvement.

A report has been completed on a SPREP survey of pollution sources in the Kingdom of Tonga. The most acute environmental hazard was discovered to be coral death from sewage discharge and destructive fishing practices. Chronic hazards included use of lead in paint on water catchment systems, increasing pesticide use, siltation of harbours and construction of causeways without ducts for water circulation. The report, which also suggests some measures to prevent pollution problems in the future, is considered a good model for such studies in other countries, and will soon be available for distribution.

SPREP is also currently circulating a brochure entitled "Opportunities for training in environmental sciences and resource management in tropical Pacific islands".



west and central africa

Coastal erosion is a growing problem throughout Africa, and 14 West and Central countries recently participated in a workshop designed to find effective ways to deal with it in their region.

Thirty-two participants met in Dakar, Senegal (11-18 March) to analyse erosion problems in each country and in the region as a whole, to consider alternatives for coastal management, and to recommend national and regional co-operative efforts. The workshop included field trips and demonstrations of methods to monitor and control coastal erosion.

Documents presented for consideration by the workshop included individual country reports, a draft overview prepared from the country reports by participating agencies (UNESCO, UN/DIESA and UNEP), and a draft regional bibliography. The final versions of these documents will be published in English and French in mid-1985.

DATE	PLACE	TITLE	ORGANIZERS
29 April - 3 May	London	IMO/UNEP Inter-regional meeting of experts on regional arrangements for co-operation in combating major incidents of marine pollution	IMO/UNEP
6 - 9 May	Athens	Joint meeting of Blue Plan and Priority Actions Programme Focal Points	UNEP
27 - 31 May	Athens	Third meeting of the working group for scientific and technical co-operation for MED POL	UNEP
27 - 31 May	Athens	XVII Meeting of Inter-Agency Advisory Committee of MED POL	UNEP
June	Abidjan	Meeting of experts on contingency planning for marine pollution emergencies	IMO/UNEP
27 May - 1 June	Tahiti	Inter-regional meeting on coral reef management	SPREP/COBSEA/ UNEP
17 - 22 June	Eastern African Region	Conference of Plenipotentiaries on the protection, management and development of the marine and coastal environment of the Eastern African Region	UNEP
8 - 10 July	Quito	Meeting of experts on the South East Pacific Action Plan	CPPS/IOC/ UNEP
11 - 12 July	Quito	Second Intergovernmental Meeting on the South East Pacific Action Plan	CPPS/UNEP
9 - 13 September	Genoa	Fourth Meeting of the Contracting Parties to the Barcelona Convention	UNEP

WASTE DISPOSAL: Where should it be? Land or sea?

by

Charles L. Osterberg

Charles L. Osterberg is an oceanographer, marine biologist, radioecologist, teacher, newspaper columnist, and environmental hell-raiser. For three years he was Director of the International Laboratory of Marine Radioactivity in Monaco, and currently holds the post of Marine Scientist, Division of Ecology, Office of Health and Environment of the U. S. Department of Energy.

THE SOIL AS A GIANT SPONGE

One of the great "truths" sustaining the dumping industry in the U.S. has taken some well-deserved criticism lately. It had been supposed that the land behaves as a giant sponge, soaking up and holding pollutants, isolating them from man. Thus, most people believe wastes can be buried and forgotten. If I suggest that some of these wastes might more properly go into the ocean instead of being covered up, these same people accuse me of having an "out of sight, out of mind" mentality. The pot calling the kettle black!

It has long been known that waste sites on land were leaking into underground aquifers and contaminants were showing up far from their sources. A meeting in late 1984 put the problem into perspective for me.

The President's Council on Environmental Quality in Washington, D.C., held a series of meetings on "Long Term Environmental Research and Development." The National Science Foundation, a non-political organization that funds most of the pure science in the United States, was asked to provide knowledgeable scientists to look at several aspects of the major environmental problems facing mankind.

The bad news for those who consider the soil a perfect sponge that will retain their "buried problems" forever, came from the conclusions of the panel on "Geochemical and Hydrological Processes and their Protection," nearly all of whom were soil scientists or hydrologists. The air and the ocean are dispersive media, while the soil is "retentive"; that is, only the land holds and assimilates wastes, or so the theory goes. That was not acceptable to those present, for as Professor Loehr of Cornell University reported, "the fact that the assimilative capacity of the soil is poorly understood and has been exceeded is increasingly obvious. Groundwater supplies have been contaminated by septic tanks, agricultural activities, and industrial chemicals."

Professor Pettyjohn of Oklahoma State University agreed that "many agricultural chemicals thought to be immobile in the subsurface are appearing in groundwater over wide areas, and indicate leachate from landfills and dumps has contaminated domestic, industrial, and municipal wells alike."

The problem is compounded, according to Pettyjohn, because we have chosen rocks of low permeability, such as shale and glacial till, in which to place our most hazardous wastes. Unfortunately, these are the very rocks that are most susceptible to fracturing. Pettyjohn concludes, "consequently, instead of retaining leachate, the fractures permit rapid transfer of fluids along paths not readily traceable."

Thibodeaux, a soil scientist from Louisiana State University, pointed out that "the air side of the land/air interface is exceedingly simple, compared with the soil side."

As an oceanographer who has had to listen for nearly thirty years to

the nonsense that we know almost nothing about the ocean, it was refreshing to hear about the ground beneath our feet, where questions are many and answers are rare and tentative.

Very few wells are specifically drilled to study the movement of underground waters, and the speeds and directions of underground water travel are almost impossible to predict. We can't easily probe very far into the earth, and the random mixture of rock, sand, soil, clay, gravel, and organic humus does strange things to water movements and chemistry. How organic materials behave beneath the ground is apparently a great mystery, and the retentiveness of the soil (for contaminants) varies with soil water, which is almost never constant.

Few if any of the many oceanographic cruises I've been on have passed without sending a string of sampling bottles into the depths of the ocean, and sonar regularly records the shape of the bottom and life in the depths. There is a chemical constancy to sea water that is far rarer in fresh water, and sea water is extremely homogeneous physically compared to the heterogeneous soil beneath our feet. In the sea, differences in composition are often measured in parts per million.

On the other hand, none of the ecological transects on land that I've been involved with or heard of have looked specifically at the waters beneath the surface of the land. These aquifers are so poorly understood that many well-drillers seek the aid of sorcerers carrying willow sticks or divining rods, to decide where to drill for water.

Oceanography is, I believe, beyond that stage. Whoever said that we know more about the back side of the moon than we do the bottom of the ocean did oceanography a great disservice; that is certainly no longer true. The ocean holds its secrets, to be sure, but its overall workings, water movements, and general chemistry are far better known than the same processes operating in fresh water in the top few hundred feet below the surface of the earth. The pH of the ocean is carefully buffered, and varies little, while fresh waters can vary enormously in acidity and other properties over short distances.

But it is not my intent to embarrass soil scientists and extoll oceanographers. I just want the decision-makers responsible for regulating waste disposal to know the limitations of both the land and sea, and the relative strengths of each medium so wise decisions will result.

My views are prejudiced by the fact that the land provides 99 per cent of our food, all of our fibre, nearly all of our building materials, and, most importantly, the land spawns and holds all of our vulnerable drinking water.

While, as a marine ecologist, I know that the air, land and water are tied together in one system and that we need all three to live, I believe the chain of life contains a very weak link. That weak link is not the sea but fresh water. For, although there are something like 330 million cubic miles of water on this planet, less than one per cent of it is fresh. So, while the Oceanic Society, Greenpeace, and even UNEP loudly shout "Save Our Seas", I look at a pie chart of the water on planet Earth and see mostly salt water, noxious to man, and only a very thin slice of fresh water upon which the

lives of more than four billion people depend.

Save our seas? Fine, but not at the expense of our fresh water. And how can we protect our fresh water? For one thing, we can forget the nonsense that the soil is a perfect sponge, or that plastic or clay liners last forever, before we irreversibly poison our aquifers.

THE UNPRODUCTIVE OCEAN

It is not an accident that the ocean provides only one per cent of our food (Roels, 1982), and about three per cent of our protein (Holt, 1969). That is to say, the ocean is not a vast resource of protein just waiting for us to harvest its bounty. The truth is, there is no great unrealized ocean bounty. Of course, there is more there than we presently harvest, but the ocean's potential for production is seriously limited.

Why does the ocean, which covers 71 per cent of the planet's surface and absorbs 7/8 of the sunlight, provide so little food for man? In the first place, it doesn't even produce as much dry organic material as the smaller land. According to Leith (1972), as quoted by Larcher (1975), the land and its associated fresh waters produce 100.2×10^9 tons per year while the ocean only produces about 55×10^9 tons in the same period. Since all food derives from photosynthesis, with sunlight providing the energy for inorganic materials and nutrients to be converted to organic molecules on which life depends (except for the relatively few organisms sustained by sulfur emerging from vents in the deep sea), one might expect the ocean to be a large producer. After all, sunlight penetrates over 100 metres in places, and phytoplankton cells are common throughout the upper layers, and grow very rapidly when conditions are right.

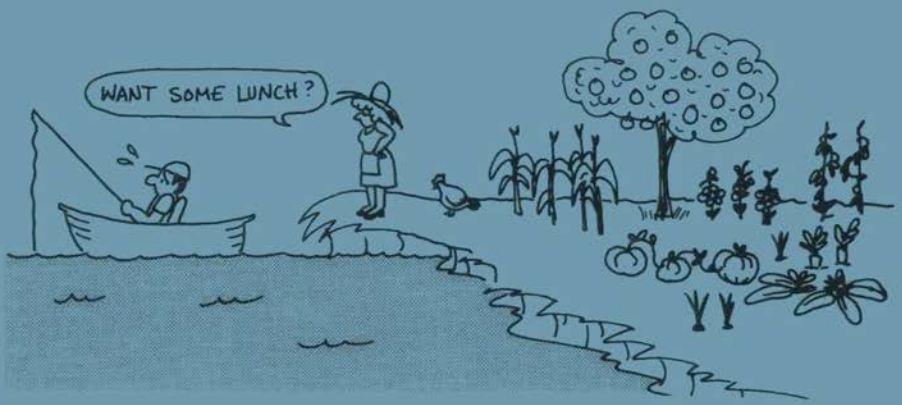
Conditions are rarely right, for the ocean is poorly designed for the production of food for man. Let us accept Roel's word that the land out-produces the ocean 100 to one. Since the ocean covers 71 per cent of the planet's surface, and the land only 29 per cent, the ratio of areas is $71/29 = 2.44$. Combining the two numbers, we see that the land out-produces the ocean in food for mankind by a fantastic 244 to one, per unit surface area.

So far, I have examined only some of the reasons why this should be. There may be other reasons, and, in any case, I'm not entirely sure of their order of importance. But my guess is as follows:

1) The ocean does poorly because the light vital to photosynthesis is in the top few hundred meters, while most of the nutrients plants need for growth are locked in the darkness below the thermocline and unavailable. (That is why production of dry plant matter on land is nearly double that in the ocean.)

2) Because phytoplankton, the plants at the base of marine food chains, are so small, many steps are needed before the energy they harvest from sunlight can be passed on to man, the consumer.

Before the anchovy disappeared from off Peru, up to 20 million tons were produced yearly, of which about 10 or 11 tons went to man and the rest to the birds. Now sardines, which replaced the anchovies but are one step higher on the food chain, are caught at the rate of one or two million tons per year. Sardines swim deeper, and thus fewer are caught by



birds. The drop from 20 to one or two million tons per year comes from losses due to the extra link in the food chain. Marine food chains are long and inefficient compared with those on land. La Fond and La Fond (1971) write that it takes 1000 pounds of phytoplankton to make one pound of the predacious fish that man usually chooses for his dinner plate.

3) The ocean is a wild system, with the juvenile fishes relentlessly pursued by larger fishes. Only a few survive and grow to grace our tables. The system is well designed for survival of the fittest, but poorly designed to provide food to mankind.

The juveniles, which grow fastest and thus produce the most, suffer the greatest losses in the wild. With animal husbandry as practiced on land, man protects the helpless young of the food animals and nurtures them through their period of greatest vulnerability and growth.

4) We have yet to develop husbandry techniques for wild populations of fish, and may be unable to do so for most species.

Already we see that aquaculture on the west coast of the U.S. is developing strains of salmon that can't climb rivers, jump obstacles or, worse yet, can't avoid predators or catch as much to eat at sea as their wild brethren.

Light and nutrients -- a world apart.

If you examine the distributions of nutrients in the world's oceans, you will see that except after winter mixing the upper layers of water are depleted in phosphate, nitrate, and silicate. It is only in the shallow coastal waters where turbulence causes enough mixing to keep nutrients exposed to light for long periods of time, in the few areas of upwelling throughout the world, that production is large. Only about two per cent of the ocean's waters are of 1000 metres or less in depth, and yet these waters produce 85 per cent of our seafood. The remaining 15 per cent is nearly all taken from the upper 1000 metres of the ocean, above deeper water.

The bad news is that most of the ocean is nearly barren. Since 55 per cent of planet Earth is covered by 3000 metres or more of sea water, that is an awfully large biosphere

with not much in it. Von Arx (1974) writes that sea water in general contains only one part per million of edible biomass. There are 12 elements (not counting water and salt; i.e., H_2, O_2, Na and Cl) more abundant in sea water than in seafood.

Isaacs (1969) writes that in the deeper waters, which means most of the ocean, biomass makes up only one part per 100 million of that of water. This deep barren water is so isolated from man that it contains far fewer anthropogenic contaminants and yet enjoys more legal protection from pollution than does our precious fresh water, which is constantly subject to contamination from the effluents of civilization -- both inadvertantly because of proximity, and, more deliberately, by laws that favor land disposal of wastes. Since the average American produces each year (or has produced in fulfilling his needs) 10 tons of non-hazardous wastes, one ton of hazardous wastes, and about 60 pounds of sewage sludge, disposal is an ever increasing problem as available land area diminishes. At the same time, more and more fresh water is required as pure water supplies grow smaller.

Light and nutrients together:
A recipe for bountifulness

On the land, light and nutrients are found together at the surface of the land, and rain or irrigation provide the necessary water. When nutrients are deficient, they can be easily added. With all ingredients

necessary for the growing of plants in the same plane, the surface of the earth, growth is profuse. Protected against disease and insect damage, using seeds developed for maximum yield, and harvesting at the correct time, creates the bounty of food on which human beings rely.

Since land plants are relatively large, some are used directly for food. Spinach, lettuce, cabbage and many other plants are edible, meaning no loss up the food chain. Other plants produce seeds, and the bountiful grains of wheat and corn, particularly, have given mankind the leisure time that has allowed civilization to flourish.

Terrestrial animals in the human diet are amost all grazers, so food chains on land are short and efficient. For example, 1000 pounds of feed provides 481 pounds of chicken, or 510 pounds of catfish. These are special feeds, and the animals are well cared for, and slaughtered at the optimal time for maximum yield. A catfish can look forward to growing to one pound before slaughter, while most U.S. chickens are killed after six weeks (U. S. Department of Agriculture).

There is little need to continue the comparison -- the sea is clearly outclassed by land production. It is a system designed by man for man, the product of years of agricultural improvements in machinery, seeds, and breeding stock. Such improvements will come harder at sea, where the fish belong to everyone and no one, and it is to no one's advantage to improve the stock. Unfortunately, maximum profit at sea comes from a maximum catch rate before someone else catches the fish, right up until the stock disappears.

WASTE DISPOSAL IN THE SEA

I have explained why wastes should be kept away from the land where they are likely to contaminate our food and water. The same degree of pollution in the ocean is less serious. The long marine food chains that are so wasteful of energy are also leaky carriers of pollutants, returning only a small fraction through human food chains. While our drinking water comes from the sea, it is purified by distillation by sunlight before falling as rain or snow on land. Most pollutants are left behind in this process, and nearly pure water falls from the clouds.

Although the ocean is a dispersive medium, and currents can carry materials for many miles, the principal force on particles is gravity, and the primary movement is downward, into the sediments. Particles, billions of them, sweeping through the water column pick up many contaminants, carrying them into the sediments. There, at the ocean bottom, they are less hazardous to humans than at almost any other place on Earth, for, while we talk of cycles, in most cases ocean disposal is a one-way street, with most materials remaining in the ocean bottom. Marine organisms are rare in the deep ocean, food chains are long, and few materials will be carried back to mankind. That, of course, is what waste disposal is all about.

Unfortunately, most people think of the ocean as that bit of brackish water in the nearest harbour or estuary. These shallow productive areas should be protected. My comments on ocean disposal apply to the oceanographer's ocean -- the deep, open ocean -- a veritable lifeless desert compared with the estuaries. With

330 million cubic miles of mostly open sea water, it doesn't make sense to pollute the Chesapeake Bay, which contains only 18 cubic miles of brackish water but produces more sea food than nearly all of the oceans at depths greater than 2000 metres.

BAD NEWS FOR THE LAND

Since the land outproduces the ocean so handily, and is more vulnerable to pollution, it seems that scientists and intellectuals, at least, will soon insist that we take better care of our land, even though that means greater use of the sea for the disposal of wastes. That happy day when the properties of wastes are examined free of political bias, and wastes are placed in the land, air or sea according to best scientific judgements, is a long way off.

According to the Environmental Law Institute, at the same Council of Environmental Quality conference where the soil scientists were so pessimistic, changes will not come easy. They quote a report from the Conservation Foundation which points out that even if we knew how best to proceed with disposal of a toxic substance, "one must still face the formidable forces of the entrenched interest groups associated with the status quo." Unfortunately that includes such powerful groups as the environmentalists who have kept the pot boiling to build up membership lists and increase their coffers and influence, the various committees of Congress with jurisdiction over one medium but not the others, but which refuse to give up any power by accepting a multimedia approach, and a number of laboratories and waste disposal firms that owe their existence to the present laws. Even the Environmental Protection Agency is an obstacle, because it too enjoys a greater status and budget when the waste disposal controversy is erupting.

Whether we like it or not, a lot of people are making a good living out of the waste disposal dilemma, and don't want it solved. Our land and precious fresh water are being harmed by this inertia, while the ocean alone is favored. If this imbalance prevails much longer, the Ancient Mariner will have been correct -- "Water water everywhere, nor any a drop to drink!" Not even on land!

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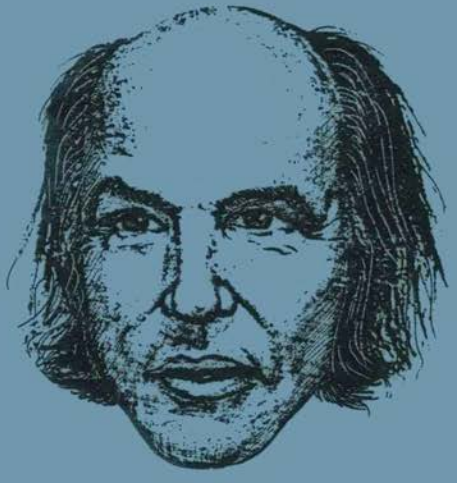
CLAM SHELLS AND ECOTOXICOLOGY:

Ca^{++} regulation in the oceans



Egon T. Degens

Director
SCOPE[1]/UNEP International Carbon Centre
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The following article was translated from the original French.

In 1899, the French physicist J. Joly, basing himself on the annual amount of sodium added to the sea by the great rivers, calculated the age of the ocean as approximately 90 million years. This was a remarkable achievement at the time, since the chemistry of the great rivers and the quantities they discharged were only approximately known. About 30 years later, V. M. Goldschmidt, using considerably more data, proved that a large quantity of sea water ions, such as chlorine and boron, did not come from the continents but were formed as a result of underwater volcanic activity. During the following three decades, every famous geochemist sometime and somehow tried to calculate geochemical masses, i.e., the masses of volcanic magma rock decomposed since the Earth's creation and sedimentary matter resulting therefrom. However, possible variations in the chemistry of sea water in the course of the Earth's history played only a small role in their calculations.

The first doubts concerning the validity of such figures arose in the mid-1960s with the detection -- along the active rift zones in the Red Sea and the East African rifts -- of hydrothermal solutions whose chemistry was entirely different from that of the ocean. We are indebted to a group of researchers of the Woods Hole Oceanographic Institution of Massachusetts (U.S.A.), and to the National Institute of Oceanography at Wormley, England, not only for the discovery of underwater hot springs but also for the knowledge that such springs have considerably helped to regulate the chemistry of the ocean in the course of time. There could

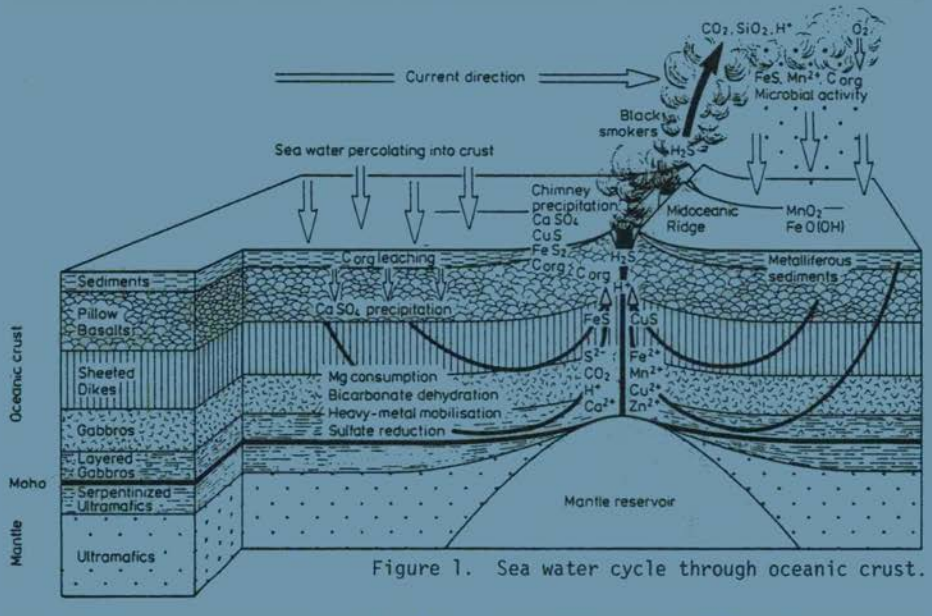


Figure 1. Sea water cycle through oceanic crust.

no longer be any question of a constant chemistry of sea water over billions of years.

Since then, hydrothermal activity has been confirmed at many places along rift zones under the open seas. The biggest sensation is undoubtedly the new organisms associated with the "black smokers" and the sulphur deposits in the region of the Galapagos rift, which were discovered during an expedition with the "Alvin," the Woods Hole Oceanographic Institution's underwater vessel, at a depth of 2,000 metres. An initial analysis of the situation suggests the idea that a volume of sea water passes through the organic crust and then, over a period of approximately five million years, re-enters the ocean by way of hydrothermal activity. The proportions are roughly indicated in Figure 1.

After this condensed background, I would like to deal with an aspect of this general hydrothermal scenario that has had a remarkable influence on the development and preservation of aquatic organisms: Ca^{++}. In this context, the following factors are important: (i) hydrothermal circulation in the oceanic crust results in the massive release of Ca^{++} associated with a mineral in the aqueous phase and in the extraction of Mg++ dissolved by the formation of new minerals; (ii) considerable quantities of Ca^{++} are released into the sea by the decomposition of limestone; and (iii) a reflux of Ca++ into interstitial and sedimentary waters is caused by biological activity in recent sediments. How is Ca^{++} removed from the oceanic cycle? Contrary to general opinion, Ca^{++} cannot be released in the form of $CaCO_3$ in the open sea:

$$Ca^{++} + 2\ HCO_3 \longrightarrow CaCO_3 + CO_2 + H_2O$$

On the other hand, Ca++ is extracted from sea water almost

exclusively through the intermediary of organisms that form skeletons, such as bivalves, calcareous algae or foraminifera, in accordance with the formula:

$$Ca^{++} + 2\ HCO_3^- \rightarrow Ca(HCO_3)_2 \rightarrow CaCO_3 + H_2CO_3$$

The process is controlled by enzymes. This logically leads to the following question: Is shell formation a manifestation of a defense strategy by marine organisms against increased Ca^{++} in the environment? After all, the intracellular Ca^{++} content is approximately 10^{-7} M, while in the extracellular zone one finds values of 10^{-2} and 10^{-4} M. What is decisive in this connection is that the Ca^{++} is an essential element for many physiological functions and at the same time forms a large part of the structure of biological membranes. Too little or too much cellular Ca^{++} would have a lethal effect on organisms.

In passing from the environment into the cell, toxic substances must overcome a barrier in the form of a membrane. The speed and volume of the transfer depend on the structure of the membrane and the way in which the agent alters its permeability. Once the toxic substance enters the organism, synergistic processes begin to produce a large number of structural abnormalities harmful to the organism. A change in the stereospecificity of enzymes, for example, is considered a particularly serious development. As regards the Ca^{++}, the intracellular Ca^{++} content regulates the opening and closing of the gap junctions in the membranes. Ca^{++} forms the geometric structure of the junction channels and controls the transfer of molecules and ions. If there is normal cytosolic Ca^{++} content, junction channels can be easily penetrated by a large number of molecules of various sizes, the upper limit of the size of peptide molecules, for example, being approximately 2,000 daltons. An increase of Ca^{++} to 5×10^{-5} at the point of junction sharply reduces permeability. A cross-section (Figure 2) shows the structural details of a bilayer membrane and the Ca^{++} co-ordination. As a rule, "metallic-phosphate networks" render a plasma membrane relatively impermeable to extracellular Ca^{++}. Consequently, the electrochemical gradient of Ca^{++} is high. The fixing of Ca^{++} at certain places on the inner side of the membrane alters the structure of the membrane's elements and thus allows the transfer or passage of hydrophilic substances through the barrier formed by lipids. Proteins and glycoproteins, which have a strong affinity for Ca^{++}, confer the specificity of fixing, removing and transporting Ca^{++}.

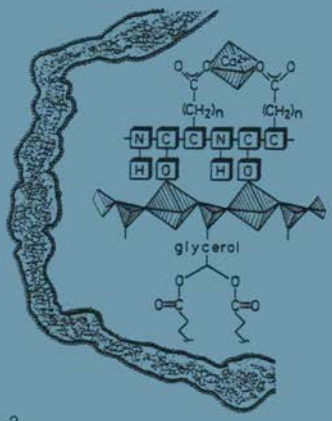


Figure 2.

An increase in conductance of Ca^{++} and an injury to the plasma membrane could result in the piercing of the permeability barrier and thus cause an inflow of Ca^{++}. A large number of toxins, for example, only become active if the extracellular Ca^{++} content is hugh but not if the concentrations are weak. For this reason, one must assume a high Ca^{++} gradient extending through the plasma membrane to describe the toxicity of different agents. What is more, one may suppose that a lethal flow of Ca^{++} along the steep electrochemical gradient between the outside and the inside of the cell is the decisive factor which enables toxins to enter the cell.

A defensive mechanism of the cell against environmental disturbances caused by Ca^{++} consists of the excretion of large quantities of a peptide of low molecular weight and strong affinity for Ca^{++} capable of compounding the Ca^{++} present in the environment (see The Siren No.22, 1983, 9-12). Moreover, the beginning of calcification in biological systems some 600 million years ago is believed to be the consequence of a strong Ca^{++} content in the primitive ocean. Since then, temporary fluctuations in the Ca^{++} content of the ocean have subjected marine organisms to varying amounts of stress from Ca^{++} caused by the changing degrees of activity in the rifts, and this is responsible for the total extinction of a number of species and the production of large or thick shells by others.

Calcium is still not a common term in the field of exotoxicology. One may assume that the regulating mechanism for Ca^{++} in marine organisms has been strongly affected by human interference with nature, i.e. by the continuous introduction of toxic substances into estuaries and low-water areas, especially in the Northern Hemisphere. One must also assume that many pathological changes in marine organisms are associated with their Ca^{++}-regulating mechanism. The electronic picture of a brown alga affected by the environment (Figure 3) should give us some food for thought.

This general subject is also part of the research project in the North Sea subsidized by the Ministry

Figure 3.

a b

Photo: S. Honjo, Woods Hole Oceanographic Institution

of Research and Technology. Researchers of the SCOPE International Carbon Centre and of UNEP are studying the reasons for the frequent and widespread fish diseases encountered in a 50-km wide belt running from the English Channel to the Norwegian Corridor. Suspicion is directed to Al^{+++}, Ca^{++} and a series of other toxic metallic ions and molecules, whose combined action causes a dislocation of Ca^{++} at the gap junctions of membranes and thus results in such syndromes as ulcerations in fish.

It may well be that in coming years Ca^{++} will become a familiar term in ecotoxicology.

[1]Scientific Committee on Problems of the Environment of the International Council of Scientific Unions

PANDORA'S BOX: CPPS and the nuclear issue

Joaquín Fonseca Truque

Deputy Secretary General for Programming of CPPS

Ambassador of Colombia to the Third United Nations Conference on the Law of the Sea

Under-Secretary for International Agencies and Conferences of the Ministry of Foreign Affairs of Colombia

The following article was translated from the Spanish.

On 6 July 1984 the office of the Secretary General of the Permanent Commission of the South Pacific (CPPS) announced a Declaration by the four CPPS countries which stated:

1. The French nuclear explosions on the Mururoa Atoll, resumed since last May, constitute a grave threat to the marine environment and its natural resources and are seriously prejudicial to the interests of the Member States of the South-East Pacific Maritime System.

2. In pursuance of their common policy on protection of the marine environment, the Ministers of Foreign Affairs of Colombia, Chile, Ecuador

and Peru reaffirmed in the Declaration of Viña del Mar, adopted in February 1984, "their Governments' opposition to nuclear explosions".

3. Accordingly, CPPS expresses its opposition to the aforementioned nuclear explosions, protests energetically against such acts and demands that they cease forthwith.

The foregoing Declaration was transmitted by the CPPS to the Government of France, forwarded simultaneously to the Secretary General of the United Nations through the four countries' permanent missions in New York, and distributed to all the delegations of the United Nations member countries as a document of the Thirty-eighth Session of the General Assembly. Similar action was then taken to bring it to the attention of the Organization of American States (OAS) in Washington and the Executive Director of UNEP.

The Declaration was likewise communicated through various channels to the governments of the Pacific littoral countries and the regional agencies and other institutions on the other side of the Pacific Basin, notably the South Pacific Commission (SPC), Pacific Forum, the Forum Pacific Agency, the South Pacific Bureau for Economic Co-operation (SPEC), the Secretary General of the Association of South-East Asian Nations (ASEAN), the East-West Center in Hawaii, and the University of the South Pacific. The Declaration was also sent to the Preparatory Commission for the International Seabed Authority in Jamaica, to the International Maritime Organization (IMO), and to the International Atomic Energy Agency (IAEA). The international press, for their part, gave wide publicity to the declaration.

The CPPS has had encouraging replies and extremely interesting comments from various Pacific countries and regional organizations; the need is becoming more evident every day for Pacific-wide co-ordination to secure a ban on nuclear explosions in the great Basin and the creation in the South Pacific of a zone free from nuclear weapons and tests and from any kind of radioactive discharge or nuclear waste. For the promotion of these objectives the scientific and financial support and sponsorship of the United Nations will be a sine qua non.

A thorough study of the reports on nuclear explosions and on the varying levels of radioactivity in some Pacific regions (notably "Report of a New Zealand, Australian, and Papua New Guinea Scientific Mission to Mururoa Atoll" and "Radioactivity in the South Pacific", SPREP/Topic Review 14, published by the South Pacific Regional Environment Programme), have left the CPPS Secretary General's Office deeply concerned as to the medium-term and long-term effects of radioactive contamination in the Pacific.

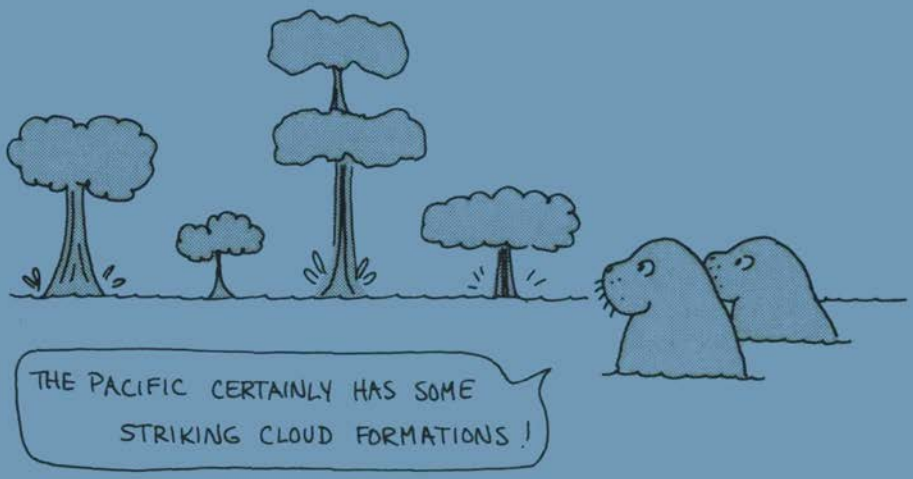
Account has to be taken of military-type restrictions that considerably hamper access to the sites of explosions and limit the scope of scientific surveys and investigations to determine the possibility of radioactive infiltration into the marine environment.

Far more alarming to read is an article by Bengt Danielsson, "Under a Cloud of Secrecy: the French Nuclear Tests in the Southeastern Pacific," published in Volume XIII, No. 5-6 (1984) of the journal AMBIO of the Royal Swedish Academy of Sciences in co-operation with the World Resources

Institute, which cites concrete data to show that the utilization of the Pacific as a nuclear weapons testing ground constitutes perhaps the murkiest chapter in the history of the Pacific Basin. Before the Partial Test Ban Treaty came into effect in 1983, it points out, the United States had exploded no less than 103 nuclear bombs in the area. Since that year, however, Americans, Soviets and British alike have relinquished for good their testing grounds in the Pacific and the only people still conducting tests on the islands of Mururoa and Fangataufa are the French, who since 1966 have exploded no less than 105 nuclear bombs. The article goes on to say that the devastation and ecological disasters caused by such tests are a continuing source of controversy in the South Pacific and that, regrettably, the French government has systematically refused to supply reliable data on the high levels of radioactive precipitation or to divulge the true extent of radioactive contamination in the Tuamotu Archipelago.

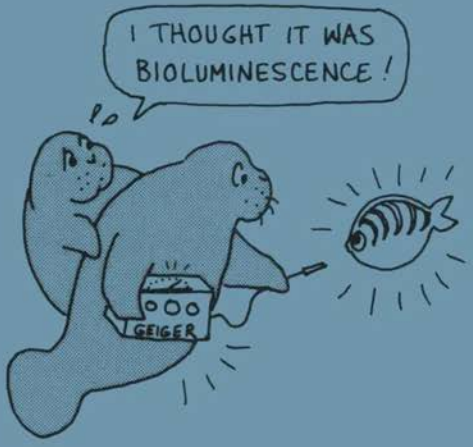
The CPPS Secretary General's Office is particularly sceptical of the statements put out in France to the effect that the nuclear tests being conducted in the Pacific entail no risk of contamination, while the French Government denies free access to the test sites and to the entire region of French Polynesia. It is at any rate paradoxical that France should have been especially careful to choose a testing ground as far away as possible from its metropolitan territory.

The Secretary General's Office has submitted for the consideration of the CPPS member countries two alternative courses of action: (1) to hold a seminar on radioactive contamination in the Pacific and



invite as many as possible of the littoral countries of the Basin to take part; and (2) to conduct a scientific sampling programme along the lines of SPREP. These suggestions have been made in the realization that both would require financial, technical and scientific co-sponsorship by UNEP, by the United Nations Commissions for Latin America and the Caribbean and for South-East Asia, and by specialized agencies such as IAEA.

The particular interest CPPS has been taking in the dynamic development of the Action Plan for the Protection of the Marine Environment and Coastal Areas of the South-East Pacific, under the sponsorship of UNEP, and its concern with the problem of radioactive contamination reflect its firm belief in the enormous importance of fishery resources for the economic and social development of the member countries of the South Pacific Maritime System. It must be borne in mind that the basic principles set out in the 1972 Stockholm Declaration on the Human Environment include control of pollution, including radioactive contamination, and the need to save human beings and their environment from the effects of nuclear weapons.



We know that the multiplicity of ecosystems that make up the Pacific Ocean, rich in natural resources of incalculable value for the progress of present and future generations, took millions of years to reach their present ecological balance, and we know that the process of recovery of the marine environment from radioactive contamination will also take millions of years. We are not unaware, either, that the harmful effects of radioactive contamination penetrating into the food chains in the marine environment and eventually reaching human beings can bring about genetic defects, malformations, undesirable chromosomal mutations, premature ageing and even cancer with its relentless course.

Eminent scientists such as Oppenheimer who took part in the "Manhattan Project" as members of the team which, after strenuous efforts, achieved the first successful atomic bomb test at Alamogordo in 1945, in the hope of putting an end to the Second World War, realized later with sorrow, when they heard of the nuclear holocaust of Hiroshima and Nagasaki, that they, like Epimetheus in the Greek myth, had unwittingly opened the fatal box which Zeus had given to Pandora, and in which were locked a few good things alongside all the ills of mankind. Today, faced with the spectre of the nuclear arms race between the major powers, we know that nothing remains in that box except the hope that well-disposed countries can achieve some results in the cause of international equity and peace, under the auspices of the United Nations.

....continued from page 2

fisheries operations and by fishermen or agents acting for fishermen. In the former case the use of synthetic nets has dramatically increased the scale of the problem. In the latter case overexploitation of fish stocks has brought pressure on fishermen to protect their perceived interests. Many fishermen see marine mammals as pests which compete with them for their shared prey.

Both problems require a mixture of survey work to identify the scale of the problem, scientific investigations to demonstrate the true scale of the damage, and education to promulgate the results to the relevant managers and fishermen.

entanglement

Nigel Bonner
Marine mammal specialist
Chairman, Conservation Sub-Committee
Scientific Committee on Antarctic
Research (SCAR)

Comparatively few marine mammal stocks are today threatened by commercial exploitation, but there are wider issues.

The ultimate problem for marine mammals, like most wildlife, is competition with an increasing human population for those features of the environment that Man can also use. For marine mammals these are chiefly common food resources and ocean space, which Man tends to use, deliberately or inadvertently, as a dumping ground for wastes. The only solution to this problem is the development by Man of a more responsible attitude to his environment, in particular by regulating the demands he puts on it. A world population increasing at present rates does not give much room for optimism.

A more immediate problem for many marine mammals is entanglement with lost nets, netting scraps and other debris. The use of synthetic twine has given nets an almost indefinite life at sea. Lost nets, particularly gill nets, can now drift at sea, catching and drowning marine mammals (and other animals) perhaps for years. Even on the remote beaches of the Antarctic plastic rubbish litters the shores. Some marine mammals are attracted by such rubbish, and fur seals in particular are often seen "collared" by netting scraps or plastic packing bands which, as the animal grows, can cause severe wounds and perhaps even death.

This is a difficult problem to solve, or even investigate. Restrictions on dumping rubbish at sea should help, but many nets are lost accidentally. Again, the solution must lie in cultivating a greater respect for our environment, being aware of risks and doing all we can to avoid them.

moratorium

Leslie Busby

Whale conservationist
Greenpeace International

The most important problem is, in my view, ensuring the full and timely implementation of the International Whaling Commission's moratorium on commercial whaling, agreed in 1982 and now in jeopardy because of outstanding objections to it by three Member States. A successfully implemented moratorium is important not only for the whales but also as a test case for other situations where international measures are needed to correct the results of mismanaged commercial exploitation of wildlife. Its success would also be an encouraging signal that public opinion in support of conservation can in fact prevail over the interests of the exploiting industry.

Continuing scientific work into the status of exploited whale populations needs to be complemented by enhanced public awareness of the issues and public pressure on the Member States to uphold the IWC's decisions. This pressure includes lobbying governments, holding public events and demonstrations, and encouraging selective use by private citizens of their purchasing power.

trusteeship

Jacques Constans

Vice President for International
Scientific Affairs
Fondation Cousteau, Monaco

In the Bill of Rights for Future Generations of the Cousteau Society/ Fondation Cousteau, Article 2 is of special significance. It reads as follows:

"Each generation, sharing in the estate and heritage of the Earth, has a duty as trustee for future generations to prevent irreversible and irreparable harm to life on Earth and to human freedom and dignity."

The views of the Cousteau Society on all the problems and issues involved in marine mammals conservation and/or management are directly inspired by the above principle.

The indiscriminate exploitation and/or killing of marine mammals, especially when done for international commerce, must be prohibited until populations have grown back to "maximum yield" levels -- or at least, as a first step, strictly regulated.

Another important aspect is the need for scientific research on marine mammals. If such research can exceptionally be permitted on captive animals, we strongly encourage the development of technologies to study wild animals in their own element, even in an environment as difficult as the seas and oceans.

revised management procedure

Ray Gambell
Whale biologist
Secretary
International Whaling Commission

Since the beginning of whaling, our ability to kill the whales has been greater than the reproductive capacities of the various stocks. In 1946 the International Convention for the Regulation of Whaling was signed "to provide for the proper conservation of whale stocks and thus make possible the orderly development of the whaling industry." But even this failed to prevent the depletion of most of the major species and stocks.

In 1975 a new management strategy was implemented by the International Whaling Commission. However, it has now become apparent that we have little chance of knowing enough about the numbers of whales, their rates of reproduction and mortality, to effectively manage the resource by regulation of the industry under this regime.

Thus the most urgent need for conservation of the whale stocks is improvement of our knowledge of all aspects of their population dynamics. This can then be built into a revised management procedure which will ensure that the depleted stocks are allowed to rebuild their numbers, and that any harvesting in the future does not exceed the capacity of the stocks to sustain it.

communication

John Harwood
Population biologist
Head, Sea Mammal Research Unit
International Council for the
Exploration of the Sea (ICES)

I consider the most urgent problem in marine mammal conservation is the effective communication of scientific advice on the status of individual marine mammal stocks. Scientists are, quite rightly, paying more and more attention to the uncertainties and biases in their assessments. However, as a result, resource managers find it difficult to interpret and act upon their advice.

I see no simple solution to this until there are formal methods for incorporating uncertainty into management. Until that time both advisers and managers must be sympathetic to the theoretical and practical difficulties each group faces.

small cetaceans

Sidney Holt

Marine resources research and management consultant for UNEP

It is very difficult to identify a single, absolute priority, so I shall mention two very different ones.

The first is to bring about a pause in commercial whaling, in full implementation of the IWC decision of 1982. This would provide an important model for environmental action at many levels, demonstrating how (1) to prevent depletion of populations before they become endangered rather than scrambling to save remnants; (2) to evolve effective international mechanisms for action, rather than calculated inaction; (3) to evolve policies that will be responsive to uncertainties in our assessments of populations and the results of their exploitation; (4) to trigger a critical appraisal of scientific methods; (5) to permit consideration of new kinds of management procedures and of different ways of using resources; and (6) to test the ability of the world community to put into practice its expressed concern for the options of resource use that may be available for future human generations.

To do this, public awareness and understanding of the issues, including interest in the activities of the IWC, must be encouraged through public debate in the media.

The second priority is creation of international mechanisms for the conservation of "small cetaceans." It is clear that for a variety of reasons the IWC cannot be expected to move on this matter -- there are legal and political impediments, and even its present consultative role on scientific aspects is now challenged by some Member States.

All cetaceans are listed in the new Law of the Sea Convention as "Highly Migratory Species" and therefore due to be "managed" through inter-governmental mechanisms; but no such mechanism yet exists for species the catching of which is not at present regulated by IWC. I believe that it is time for consideration to be given to creating appropriate mechanisms, either through a traditional governmental initiative, or a request to UNEP to prepare a draft agreement and follow it through to completion.

research

Armin Lindquist
Director
Fishery Resources and Environment Division
Fisheries Department
FAO

The success of management of marine mammals depends ententirely on good scientific advice and for providing such advice adequate research

is needed. The Global Plan of Action is the result of work through many years, with a great number of scientists involved, and it has been endorsed by all important bodies. The plan contains numerous proposals for action in different fields, of which the most important ones are those concerned with research. I give them the highest priority for financing. Crucial questions in this context are how to estimate abundance of marine mammals when there is no catch of them, and how seals and whales affect fish stocks.

pollution assessment

Rolf Schneider
Fisheries biologist specialised in marine pollution research and monitoring
Consultant, Intergovernmental Oceanographic Commssion (IOC)

Of the problems associated with marine mammal conservation that I deal with personally, the most urgent is probably that of producing a scientifically sound assessment of the threat posed by contaminants. In a few cases, a harmful effect of a pollutant could be proven, as in the case of reproductive failures in Californian sea lions, the populations of which recovered soon after the input of organochlorines into their environment stopped. In other cases, e.g., in Baltic seals, reproductive failures have been attributed to elevated organochlorine body burdens, but the cause/effect relationship is still in some doubt.

To solve these problems, an assessment of all information available and identification of the gaps in our knowledge of this matter should be carried out, preferably through co-operation of the working groups with expertise in all aspects of the problem, especially within ICES and IOC. Research should then be carried out to fill the gaps in our knowledge.

Of course the best way to solve the problem would be to avoid pollution in the first place, but unfortunately this appears unrealistic.

conflict of interests

Robert Scott
Wildlife ecologist
Executive Officer of the Species Survival Commission
International Union for Conservation of Nature and Natural Resources (IUCN)

A most pervasive and fundamental problem is the world-wide conflict between various human interests -- especially fisheries -- and the welfare or even survival of marine

mammals. How real the competition of marine mammals is for fish resources also sought by man, for example, has yet to be established, although damage to a fisherman's gear is always clear in his view.

A more immediate aspect of the problem is the damaging effects of lost or abandoned nets and the like now recognized as a growing problem throughout the world's oceans. The solution will not be either simple or quick, but will require successful exercise of the whole spectrum of conservation activities, ranging from fundamental research, through information and education, to legislation and enforcement.

working together

Andries Von Foreest
Veterinary Surgeon
President
European Association for Aquatic Mammals (EAAM)

I think the the most serious problem comes from the fact that the people who are involved with marine mammal conservation, management and utilization have so many different aims that they do not seem to understand the situation and each other. They must begin to talk and work together as mature human beings. I would like to see that as many people as possible do something <u>together</u>, whether working individually or within their organizations, to save our marine mammals.

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These organizations outlined more than 50 on-going marine mammal projects that cost over US$ 20 million, and said they should be considered as contributions to the implementation of the Global Plan of Action for the Conservation, Management and Utilization of Marine Mammals. The Plan was drawn up by FAO and UNEP experts after seven years of work, helped by other organizations, especially IUCN and the IWC.

The activities range from protecting whales in the Galapagos Islands National Park off Ecuador, all cetaceans in the Indian Ocean, river dolphins in Pakistan, manatees in the Amazon, the Caribbean and West Africa, and the habitats of harbour seals and porpoises in the Wadden Zee in northwestern Europe, to sighting and counting minke whales in the Antarctic, identifying and conserving marine habitats for dugongs in the waters off Saudi Arabia, and saving Hooker's sea lion in New Zealand.

While funds for marine mammal projects are limited, Dr. Keckes told the meeting, UNEP hopes to be able to contribute close to US$ 400,000 to on-going programmes this year.

"This doesn't sound like much money when you think of the magnitude of the problem," Bent Nielsen, UNEP marine mammal specialist, conceded, "but it is surprising how much can be done with an apparently insignificant sum. For example, we can supplement an already-existing project to conserve mangroves in West Africa by providing a specialist in manatees. This means that most of the costs of the conservation project are borne by the mangrove group, and UNEP pays only for the manatee specialist.

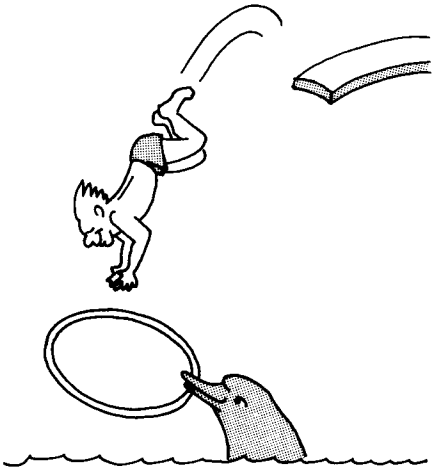
Take another example actually being carried out: a marine mammal expert is on a commercial fishing vessel off New Zealand, looking into accidental catches of Hooker's sea lion. Everyone benefits from this piggy-back arrangement.

"UNEP's role, as usual, is to plant seed money here and there, to coordinate, to catalyse, i.e., to get things moving, and to avoid duplication.

"The Geneva meeting made clear what is currently being done for marine mammals by the major international organizations all over the world, what needs to be done and, practically speaking, what can be done. We asked the participating organizations to submit new projects which we could jointly fund with them for 1985, 1986 and 1987. At the meeting they came up with 27, and promised to submit quite a few others rapidly. Still other proposals are expected from 15 to 20 organizations dealing with the problems of marine mammals, but unable to attend the meeting. By convening such meetings, UNEP can act as a clearing-house for projects that fit into the Action Plan."

The new project proposals to UNEP include, for example, studies of Antarctic seal behaviour through satellite telemetry, an assessment of the decrease in dolphin mortality in the eastern tropical Pacific, mammal watching-and-counting cruises, and many more.

Most of the reasons for some species of marine mammals being in danger of extinction and others perilously low in numbers are man-made: over-hunting, accidental or deliberate killing in fishing operations, reduction of food supplies, pollution, tourism and



coastal development which destroy the habitat of some marine mammals.

Nonetheless, there is hope for most marine mammals. The porpoise is a case in point. In the 1960s and 1970s around 500,000 porpoises were killed annually by tuna fisherman in the eastern tropical Pacific. Then the U. S. Government imposed rules and restraints on these fishermen, and the annual loss has now dropped sharply to around 20,000 a year.

Besides, the idea is catching on that marine mammals are worth more alive than dead.

"We shall be meeting again in October to see where we stand and what has been accomplished. By that time we will know what funds are available to carry out projects in 1986 and 1987 and what governments are doing on behalf of marine mammals. These national activities will be co-ordinated through the Global Action Plan. The first replies have been encouraging.

"In any event", concluded Dr. Keckes, "we have really done enough talking, discussing and arguing. The time has come to act."

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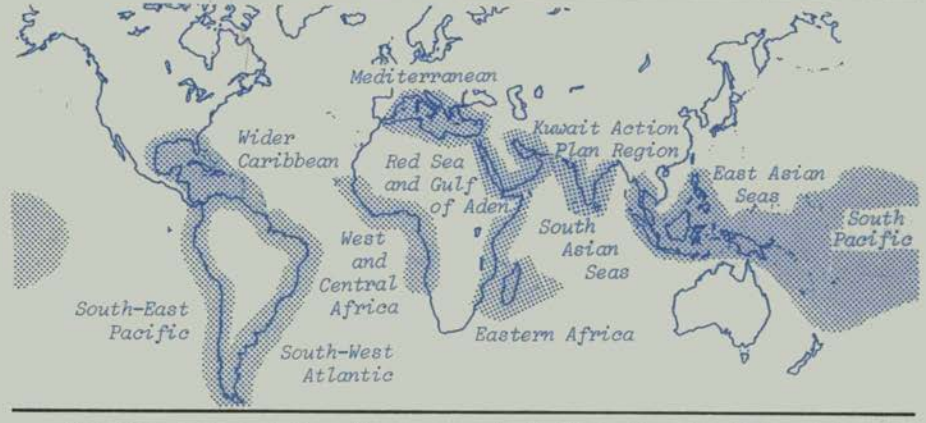
the regional seas



The Siren is issued four times a year in English, French and Spanish. It is intended as an informal presentation of the news from the Regional Seas Programme of the United Nations Environment Programme (UNEP), and does not necessarily reflect the official opinions of UNEP or its staff.

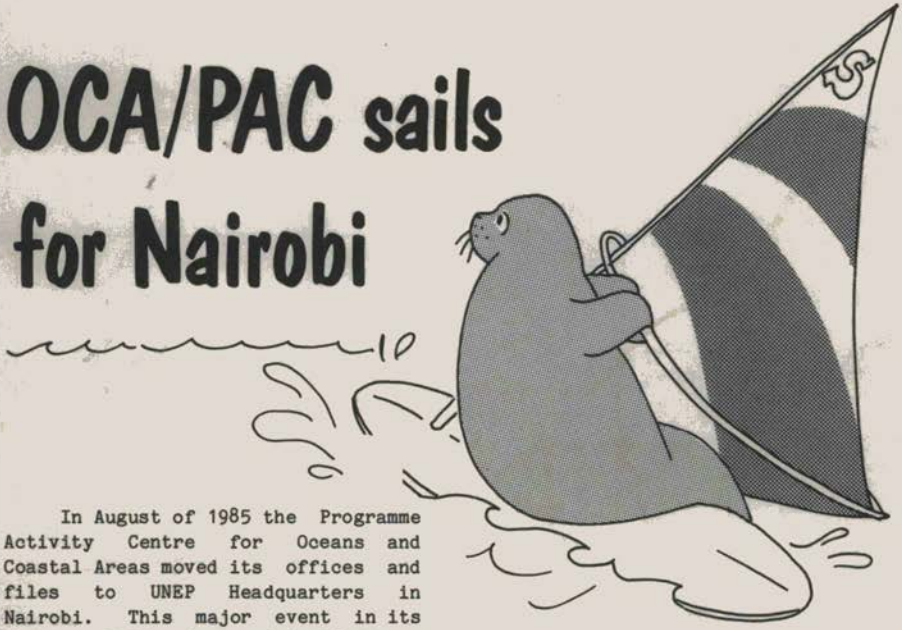
If you wish to receive The Siren regularly, or would like to propose an article on a subject of current interest and controversy related to marine science and environmental protection, please address: Nikki Meith, Editor, The Siren, Programme Activity Centre for Oceans and Coastal Areas, UNEP, Palais, des Nations, 1211 Geneva 10, Switzerland.

Number 29 September 1985

THE SIREN

news from UNEP's Regional Seas Programme

OCA/PAC sails for Nairobi



In August of 1985 the Programme Activity Centre for Oceans and Coastal Areas moved its offices and files to UNEP Headquarters in Nairobi. This major event in its history followed a period of intense activity: during the months of April through July 1985 four major meetings were held on the action plans for West and Central Africa (Abidjan, 18-20 April), the Wider Caribbean (Cancun, 24-26 April), Eastern Africa (17-22 June), and the South-East Pacific (11-12 July). (For more detailed reports, see "News from the regions", p. 6).

During the same period, another dozen workshops, expert meetings and preparatory sessions were held as part of the regular activities of the Regional Seas Programme.

"It is fortunate that we got these four meetings successfully under our belts before we had to pack up our files -- which are OCA/PAC's nervous system," commented Stjepan Keckes, Director of the Centre. "Organization of our new offices may take some time. We ask our colleagues who are associated with the Programme around the world to bear with any interruptions in our normal procedures until OCA/PAC can get its new offices running smoothly.

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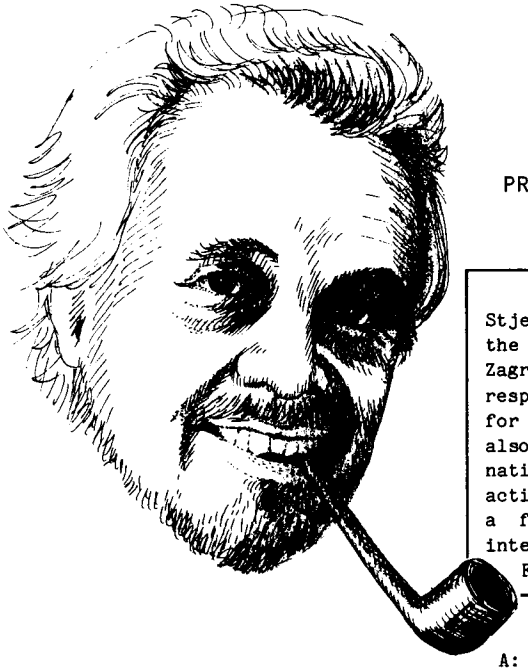
GONE WITH THE WIND



AN INTERVIEW WITH

Stjepan Keckes

DIRECTOR

PROGRAMME ACTIVITY CENTRE FOR OCEANS AND COASTAL AREAS

(OCA/PAC)

Before joining UNEP in 1974, Stjepan Keckes was Deputy Director of the Rudjer Boskovic Institute in Zagreb, Yugoslavia, and specifically responsible for running its Centre for Marine Research in Rovinj. He also worked five years for the International Laboratory for Marine Radioactivity of IAEA in Monaco, and was a frequent consultant for various international organizations including FAO, WHO and IOC.

The Siren: It's been 11 years since the beginning of the Regional Seas Programme, and you've been with it from the first. It has been a lot of hard work -- was it worth it?

Stjepan Keckes: The last ten years were the most rewarding years of my professional life. I shall always remember with fondness and pride the team with which I have worked, and our achievements.

Q: How would you describe OCA/PAC and summarize its achievements in that time?

A: The staff consisted of seven dedicated professionals and 10 first-class secretaries. We had excellent direct relations with more than 120 governments. We enjoyed exemplary co-operation with more than 100 international and national organizations and the collaboration of more than 200 individual scientists. Our annual budget was about 3 million US dollars, about 30 per cent of it spent to run the OCA/PAC office. Additional tens of millions were mobilized through special trust funds and direct contributions of governments and scientific institutions participating in the programme.

Action plans were adopted in nine regions, seven of them supported by regional treaties. OCA/PAC served directly as secretariat for six action plans/conventions (for two of them on an interim basis).

The global plan of action for marine mammals advanced from the planning stage to action.

Large-scale monitoring programmes in all regions were carried out using a common methodology.

Q: What has been the most satisfying moment for you during these years, and the greatest disappointment?

A: We were told repeatedly that we had no chance of succeeding. In spite of all the obvious odds, and without false modesty, we have shown what a small group, with limited resources but with determination, can achieve. Could I need any greater satisfaction? As for the disappointments, there were plenty of them. They did not discourage us but, rather, they served as healthy stimulants.

Q: The programme has been considered a great success from its very beginning. What is its secret?

A: There is no secret. The undeniable success of our team was not achieved by anybody's grandiose plans -- I am not saying that we did not

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global news

GESAMP XV

The annual session of GESAMP (see The Siren No. 25) was held in New York (25-29 March 1985) in the usual constructive but fighting spirit. Under the chairmanship of Dr. Edgardo Gomez of the Philippines, the 32 participants were called upon to review several reports submitted to them for final approval, and to decide which of a wide range of subjects will be included in future reports.

The report on cadmium, lead and tin in the marine environment, which had caused considerable controversy at the previous session of GESAMP, was approved for publication. Reports

on other topics in the same series (organosilicons, arsenic, selenium, mercury, nutrients, carcinogenic substances) are expected to be on the table and ready for approval by GESAMP XVI.

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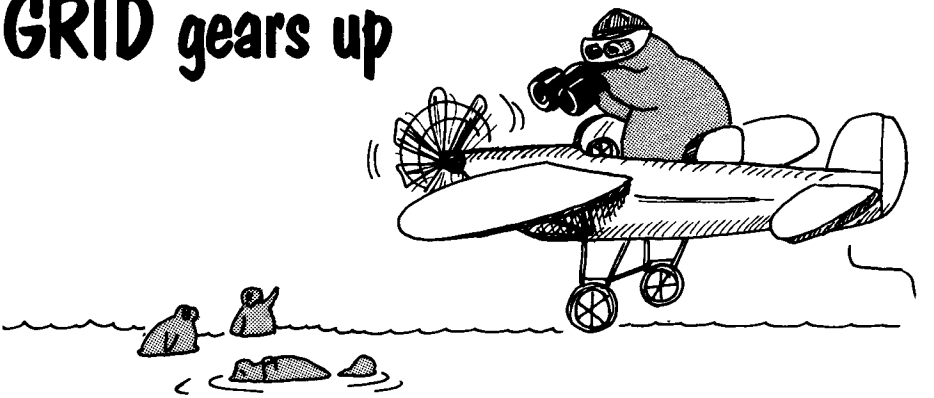
GRID gears up



People making decisions which will affect the health of our planet need a great deal of information. The Global Environmental Monitoring System (GEMS) of UNEP was created in 1974 to help provide them with information on the Earth's climate, long-range transport of air-borne pollutants, renewable resources, oceans and human health.

But once the environmental data has been gathered, it must be stored, analysed and channeled to those who can use it. This is the function of GRID, the Global Resource Information Database.

GRID will have three major functions during its initial phase: bringing together existing environmental data sets; analysing existing information in order to pinpoint areas of environmental concern; and training people from both developing and developed countries in the use of GRID technology. It is planned as a distributed system consisting of several parts over the globe linked by telecommunications. Two of these parts, or "nodes," are being set up in Geneva and Nairobi during a two-year pilot phase.

Data for monitoring resources can be obtained from satellites, from aircraft and on the ground. Satellites including the Landsat series, which has been in operation since 1972, can provide data on large areas. Light aircraft are sometimes employed for more detailed data on vegetation and ground structure and for low-level counts of both wild and domestic animals. And in the field, geologists, biologists and geographers gather more detailed information at specific locations. All three types of data, plus data from maps on such things as soils and topography, can be analyzed using the GRID system.

Ultimately, the success of GRID will be determined by its applications -- how many people, governments and international programmes find it useful. One programme which is likely to benefit from GRID almost immediately is the Mediterranean Action Plan (MAP). Once the existing database of MAP is entered into GRID's geographic information system, computerised analyses can be carried out for the Mediterranean area in general or specific locations.

INTER-REGIONAL RAP

The protection and management of coral reefs is a concern shared by most of the Regional Seas programmes. Experts from five of them -- Eastern Africa, South Asian Seas, the Wider Caribbean, East Asian Seas, and the South Pacific -- met in Tahiti on 31 May at a workshop on inter-regional co-operation for coral reef assessment and management, in conjunction with the 5th International Coral Reef Congress (27 May-1 June).

The workshop's first order of business was to review the activities of the Regional Seas Programme relating to coral reef management, and the status of coral research and management in each of the five regional programmes. Participants then discussed draft guidelines for the survey and management of reef protected areas, and considered how best to co-operate and exchange information with one other. They recognized the need for more public awareness activities, and made plans to meet every two years to further the cause of inter-regional co-operation. The next meeting will be held during the 1987 Pacific Science Congress.

HELMEPA's youthful approach

HELMEPA'S third anniversary was a happy one. Since its inauguration in June 1982 (see The Siren nos.18 and 26). Its supporters have multiplied, its activities expanded and its spirits blossomed.

From the beginning, HELMEPA has used a double approach, directed both at seamen and ship's officers on the one hand, and at the general public on the other. Both efforts have proved successful.

Today, HELMEPA'S philosophy remains the same. As Dimitris Mitsatsos, its Director General, explains, "Our initial goal was to educate and motivate people within the shipping community to co-operate voluntarily in efforts to keep the

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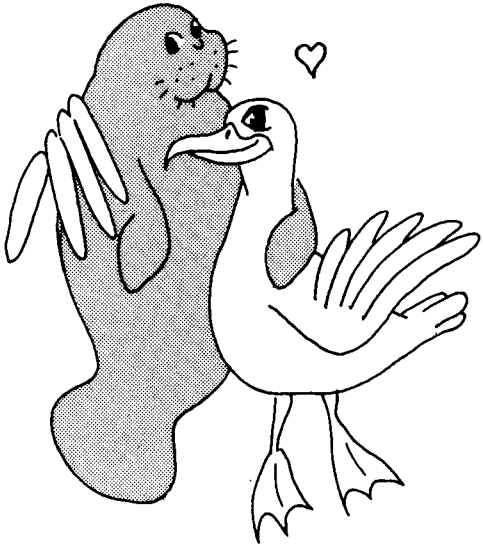

kuwait action plan region

That war can be harmful to the marine environment has been made clear during the last four years: of 157 maritime pollution accidents in the region, 133 have resulted from acts of war.

Who is liable for marine pollution caused by such accidents? Who has the authority to make such a determination?

These are some of the problems facing the countries of the Kuwait Action Plan region and the Council of their Regional Organization for the Protection of the Marine Environment (ROPME), which met for the fourth time in Kuwait, 24-25 April 1985.

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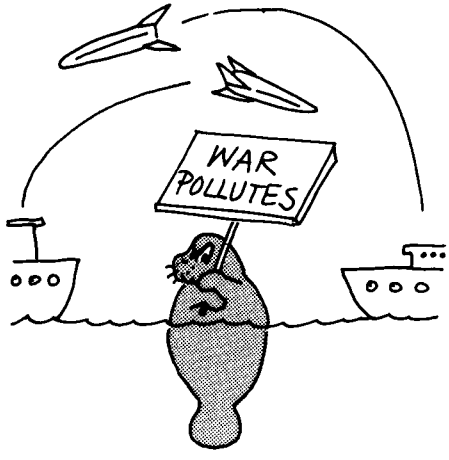

eastern africa

During a time when considerable social, economic and political difficulties are confronting the nine countries of Eastern Africa, they have joined together to fight environmental deterioration in their region.

At a Conference of Plenipotentiaries held in Nairobi, 17-21 June, they adopted the Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region.

The Final Act of the Conference, containing the Convention, its two protocols and a plan of action, was immediately signed by six States -- Kenya, France, Madagascar, Mozambique, Seychelles and Somalia. The other three (Comoros, Mauritius and Tanzania) and the European Economic Community are expected to join the original signatories soon.

The treaty is the result of five years of preparation and negotiation, and is the seventh of its kind adopted as part of the Regional Seas Programme. Every signatory will commit itself to promoting the health of the marine and coastal environment through sound environmental management, appropriate national legislation, exchange of information, pollution research and monitoring, and perhaps establishment of a pollution and conservation data bank.

The protocols address two of the major environmental threats to the region.

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west and central africa

The Contracting Parties to the 1981 Abidjan Convention met for the first time April 18-20 in Abidjan. Representatives of the Gambia, Guinea, Ivory Coast, Togo and Senegal were joined by four countries which have not yet ratified the Convention (Congo, Gabon, Ghana and Zaire) and observers from various international, governmental and regional organizations. The meeting was chaired by H.E. Mr. Lamine Fadika of the Ivory Coast.

The major goals of the meeting were to review progress made in implementation of the Action Plan for the West and Central African Region as well as the status of ratifications of the Abidjan Convention (which entered into force in August 1984), and of contributions to the regional Trust Fund.

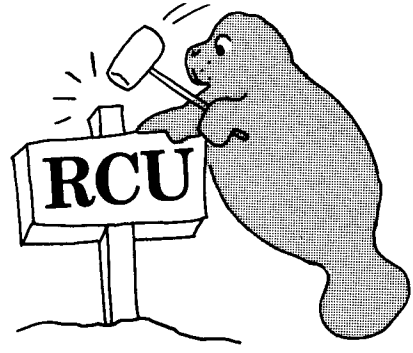
In perhaps the most dramatic move of the three-day meeting, the Contracting Parties decided to establish the Regional Co-ordinating Unit (RCU) for the Action Plan in Abidjan by mid-1986. Work will begin immediately on the administrative and financial negotiations necessary for setting up the RCU, and each State of the region will be asked to help with staff recruitment by providing the names of suitable candidates.

In another major decision, the Trust Fund was extended through the two-year period 1986-1987 and will be financed according to proportional contributions from the region's 20 States totalling over one million U.S. dollars per year.

When time came to consider the status of the action plan projects, the meeting noted that more attention should be focused on the problem of coastal erosion, described in the meeting report as having become "a real scourge in the region". The nine projects were then assigned the following order of priority for the next two years:

(1) development of contingency plans for marine pollution emergencies; (2) monitoring of marine pollution; (3) marine pollution impact assessment; (4) development of environmental legislation; (5) preparation of a manual on coastal erosion; (6) establishment of a regional documentation centre on coastal erosion by the RCU; (7) establishment of specially-protected areas; and (8) determination of the distribution and status of the West and Central African manatee.

If the Meeting of Contracting Parties seemed to run especially smoothly and efficiently, it was largely because of the detailed preparation on the part of the WACAF Steering Committee, which had just held its fourth meeting (15-17 April).



caribbean

Eight Caribbean environmental projects have been given a green light -- and funding -- for 1985-86 by the Caribbean governments.

At the third intergovernmental meeting on the Action Plan for the Caribbean Environment Programme (Cancun, Mexico, 24 - 26 April), representatives of 14 Caribbean States approved for immediate implementation projects on:

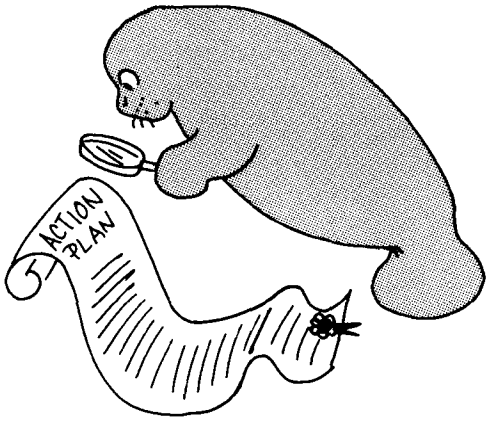
- research and monitoring of pollutants in selected organisms and sediments;
- environmental management of bays and coastal zones;
- protection of the marine and coastal environment of the Caribbean islands;
- assessment of the effectiveness, toxicity and biodegradability of oil dispersants in Caribbean waters;
- sampling of marine waters and beaches to determine the level of pollution by petroleum;
- a demonstration project on the treatment of rum distillery vinegars by methanisation;
- the determination of the critical coastal zones of the region; and
- the formulation of marine water quality criteria.

A total of US$ 620,600 was allocated for these projects from the Caribbean Trust Fund, while another 14 proposals were put on a waiting list until funds become available.

The meeting unanimously adopted a resolution calling upon all Caribbean States and Territories to prohibit the illegal and indiscriminate dumping or incineration of toxic and hazardous substances. It also agreed to establish the Regional Co-ordinating Unit (RCU) in Kingston, Jamaica, by the end of 1985, depending on forthcoming allocations and support from the Trust Fund, the Jamaican Government and UNEP.

The Intergovernmental meeting was preceded by a three-day preparatory meeting of the Caribbean Action Plan's Monitoring Committee.

south-east pacific



Twenty experts from the South-East Pacific region have given the three major action plan programmes under way in their region a thorough going-over.

Meeting in preparation for the Second Intergovernmental Meeting on the South-East Pacific Action Plan in August, the experts analyzed initial results from the first phase of the co-ordinated programme of research and monitoring of marine pollution in the South-East Pacific (CONPACSE), which dealt with monitoring and control of oil pollution; monitoring of pollution from domestic, agricultural and mining sources; and development of a contingency plan for oil pollution emergencies. They recommended ways of revising the programme, and also reviewed work on environmental impact assessment carried out within the framework of the action plan.

The experts agreed on 22 recommendations, which may be summarized as follows:

1) to continue to support the marine pollution monitoring programme of CONPACSE, and to publish its results;

2) to conduct three regional training courses in 1986: on rapid assessment of air and water pollution, on analytical techniques to determine the concentration of heavy metals in marine organisms and sediments, and on advanced oil pollution contingency planning;

3) to develop a case study of a port development scheme in the region; and

4) to request the countries of the region to ratify, as soon as possible, the Lima Convention and its protocols, and to pay their contributions to the South-East Pacific Trust Fund.

The experts noted that in spite of financial limitations, the 15 national institutions participating in the action plan began working at their own expense (with some UNEP support), using their own laboratories, equipment, ships and specialized personnel.

Implementation of the action plan had also been facilitated by a number of workshops held during the previous biennium, and the preparation of national atlases of "critical areas, vulnerable resources and priority protection areas" in the region.

The Second Meeting of Experts on the South-East Pacific Action Plan was held in Quito, 8-10 July 1985, and attended by experts from Colombia, Chile, Ecuador, Panama and Peru as well as representatives of six international organizations.

south pacific

In order that traditional techniques of tuna fishing might be remembered, written and videotape records are being kept of the methods used by the Tokelauan people. The study is a joint project of SPREP and the Tuna and Billfish Programme of the South Pacific Commission (SPC). It is the beginning of a larger effort to ensure that remaining traditional knowledge be preserved for future generations of Tokelau islanders, based on the finding that highly sophisticated and environmentally sound techniques of crop cultivation, fishing and medicine preparation have long been practiced on the islands, but are in danger of being forgotten.

In an effort to help the public understand how development projects can affect coastal resources, a two-week training course (13-30 May) was held by the South Pacific Regional Environment Programme (SPREP) and the Coastal Resources Management Office of the Commonwealth of the Northern Mariana Islands. The course was open to the general public as well as government employees and students, and focused on the effects of industrial and port development on shorelines, lagoons, reefs and wetlands.

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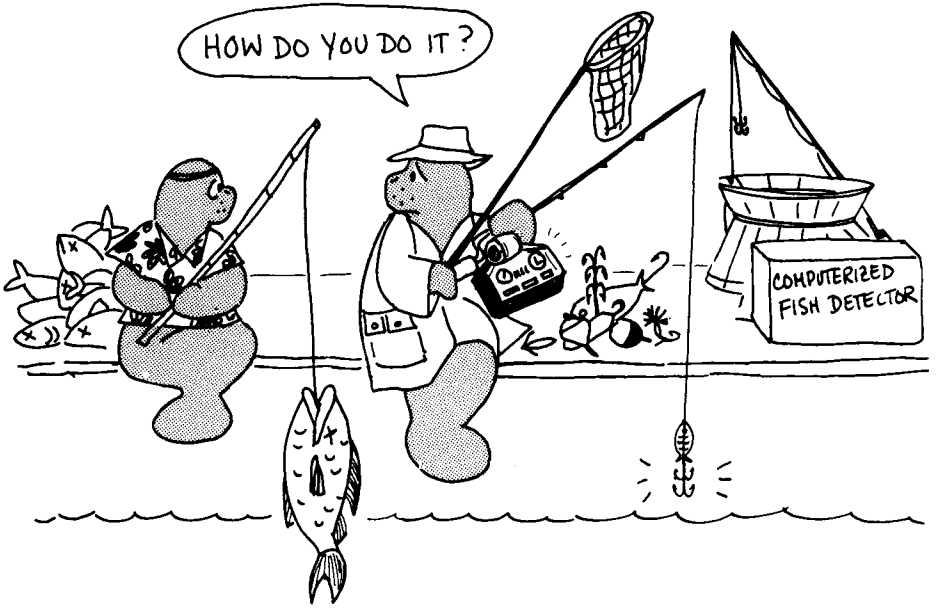


mediterranean

Earthquakes are a quite common problem in many Mediterranean countries, and the Priority Actions Programme (PAP) is attempting to come up with ways to mitigate their effects in the region through proper land-use planning. A seminar on the subject was held 27-29 June in Cetinje, Yugoslavia, which, on the basis of three case studies and national reports, recommended that work begin immediately to find the most appropriate approach to physical planning in the nine-country earthquake zone. Initial activities will focus on gathering information from relevant institutions in the region, preparation of further case studies, and setting up a network for technical co-operation, training and information exchange.

Another major concern of the PAP is the rehabilitation and reconstruction of historic settlements. A seminar was held in Split, Yugoslavia, 22-24 May, to recommend specific settlements thought to need attention.

As a result, case studies will be prepared on: Lalahum, a neighborhood in the Casba of Algiers (Algeria); the historic area of Nicosia (Cyprus); Panier, an historic quarter of Marseille (France); Santorini, a settlement in Greece with well-developed tourism; Yasso (Israel), where an environmental impact assessment will be carried out; the historic core of Genoa (Italy); the Medina of Fez (Morocco); an archeological complex at Bosra (Syria); the Trinidad-Perchel quarter of Malaga (Spain); Hafsia, a quarter in the Medina of Tunis (Tunisia); the small

town of Saframbolu (Turkey); and the historic core of Split (Yugoslavia).

The Blue Plan is making good progress in the preparation of scenarios which will take into account national goals and strategies for development and projected trends in the exchange of goods, technologies and people; in land use strategies for development; and in pollution. A document is being prepared to describe these scenarios, the procedures which will be used to prepare them, and the goals to be achieved by their preparation.

The Siren would like to welcome M. Michel Batisse, who was named by the French Government as President of the Blue Plan Regional Activity Centre in Sophia Antipolis, France.

south asian seas

A 60-page report on the management and conservation of renewable marine resources in the South Asian Seas region has just been produced jointly by the International Union for Conservation of Nature and Natural Resources (IUCN) and UNEP, as UNEP Regional Seas Reports and Studies No. 62.

east asian seas

Projects on oceanographic phenomena, oil pollution, information and data exchange, and effects of pollution on coral ecosystems in East Asian Seas got a financial boost from the fourth meeting of COBSEA (the Co-ordinating Body for the Seas of East Asia).

Two additional projects were given a go-ahead; these will provide (1) technical and scientific support to national and regional contingency plans for dealing with oil spills, and (2) a pollution survey of urban rivers with a view to clean-up.

Another three projects will be started as funds become available. These involve (1) development of principles and guidelines for discharge of wastes into coastal waters, (2) assessment of the environmental impact of non-oil pollutants from land-based sources, and (3) assessment of the impact of pollution on mangrove ecosystems.

The meeting also asked UNEP to continue its technical co-ordination of the Action Plan and management of the Trust Fund during the next biennium.

The fourth meeting of COBSEA was held in Manila, 22-23 April 1985, and attended by delegates from the five member nations: Indonesia, Malaysia, Singapore, Thailand and the Philippines.

meetings

DATE	PLACE	TITLE	ORGANIZERS
October	West and Central African Region	Workshop on Marine Pollution Monitoring in the West and Central African Region	IOC/FAO/ WHO/IAEA/ UNEP
2 - 5 October	Split	International Conference on Pollution of the Mediterranean	YSWP/WHO/ IAWPRC/ UNEP
7 - 11 October	Blanes	Effects of Pollution on Marine Ecosystems	UNEP
21 - 25 October	Follonica	Consultations Meeting on the Correlation between Coastal Water Quality and Health Effects	WHO/UNEP
18 - 23 November	Marseille	Fifth Intercalibration Exercise and Consultation Meeting on Microbiological Methods for Coastal Water Quality Monitoring	WHO/UNEP
9 - 13 December	Athens	Meeting of Governmental Experts on the Technical Implementation of the Land-based Sources Protocol	UNEP

The poisoning of the Pacific

by

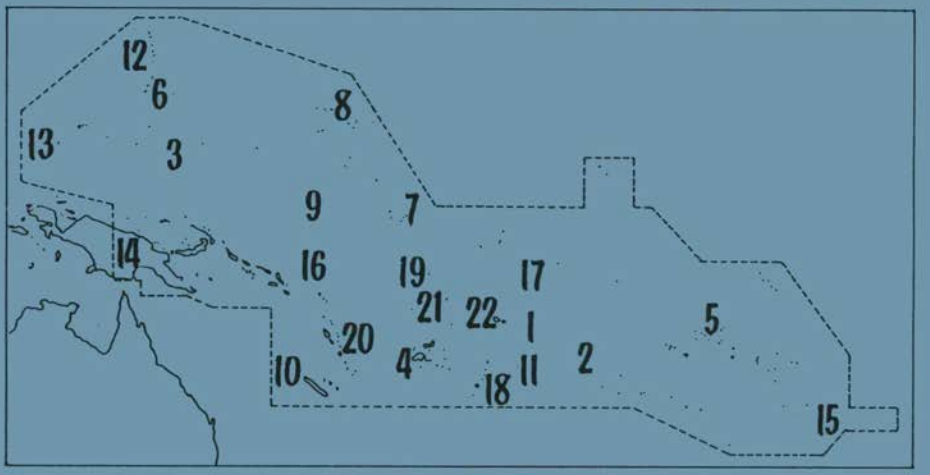
David Mowbray

David Mowbray, a biologist specialized in the effects of pesticides on wildlife, received his PhD from Sydney University in 1978. Since 1977 he has been a lecturer in biology at the University of Papua New Guinea, and has advised and represented the Government of Papua New Guinea in matters related to toxicity and regulation of pesticides and other substances. In 1983 he was appointed Principal Investigator of the Pesticide Project of the South Pacific Regional Environment Programme (SPREP), and is at present completing a report on pesticide use in the South Pacific on which the following article is based.

Mention the Pacific environment and one of two words will usually spring to peoples' minds: "radioactivity" or "nuclear". This is because of the wide publicity that nuclear weapons testing and proposals to dump radioactive waste in the Pacific have received. But to the scientists who look closely at the current situation, the many problems associated with pesticide mis-use in the region are revealed as much more widespread, and potentially threatening to the health of more human beings, than radioactivity.

There are many pesticides currently in use in the South Pacific. And most countries in the region lack the technical expertise which could provide them with sound advice about how to use these often dangerous chemicals effectively and safely. Nor do they have the necessary legislation -- combined with effective enforcement procedures -- which would put such advice into practice; nor are there adequate records of what pesticides were used where, and how much.

This state of affairs persists



The area served by the South Pacific Commission, including (1) American Samoa, (2) Cook Islands, (3) Federated States of Micronesia, (4) Fiji, (5) French Polynesia, (6) Guam, (7) Kiribati, (8) Marshall Islands, (9) Nauru, (10) New Caledonia, (11) Niue, (12) Northern Mariana Islands, (13) Palau, (14) Papua New Guinea, (15) Pitcairn Island, (16) Solomon Islands, (17) Tokelau, (18) Tonga, (19) Tuvalu, (20) Vanuatu, (21) Wallis and Futuna, and (22) Western Samoa.

in spite of the fact that many of the formulations of pesticides in use are classed by the World Health Organization (WHO) as extremely or highly hazardous. Many are banned or severely restricted elsewhere in the world. As one might expect, numerous poisonings of humans, domestic animals and wildlife have been reported. And since very little is known about the fate of pesticides in small island ecosystems, there are doubtless other effects on the fauna and flora of the region about which we are completely unaware.

Recognizing the severity of the situation, SPREP initiated in 1983 a Pesticide Project to review the situation in the 20 countries and territories of the South Pacific Region. The objectives of the project included a review of existing legislation and registration requirements; a review of existing information on the use and problems resulting from the use of pesticides; identification of technical expertise available in the region; and development of a pesticide monitoring programme.

LEGISLATION

The legislative situation in the region is rather bleak. Although about half of the countries or territories have their own pesticide legislation, most have neither the ability to enforce it nor the expertise to evaluate the chemicals for registration in the first place. Countries wishing to introduce legislation have similar problems; Papua New Guinea, for example has had draft pesticide legislation since 1977 but does not yet have an operative law. At present its hopes lie in gazetting pesticide regulations under existing environmental legislation.

AVAILABILITY

In the past decade, the number of pesticides available in the region have increased from 162 to 589 (not counting those chemicals used in quarantine, timber preservation, or all household pesticides). A typical example is Papua New Guinea, where the number of available pesticides (measured in terms of active ingredients rather than formulated products), have increased from 65 to 226.

The most widely available chemical, found in 19 countries, is malathion, an agricultural insecticide also used to control animal ectoparasites. It is followed by warfarin, an anticoagulant for killing rats and mice (16 countries). Benomyl (a protective and eradicant fungicide), diazinon (insecticide) and methyl bromide (a potent fumigant insecticide) are available in 15 countries. Captan (a fungicide used largely on fruit trees), dieldrin (a persistent insecticide), glyphosate (herbicide useful for deep-rooted weeds and grasses), and paraquat (a contact herbicide) are found in 14 countries.

QUANTITY

Very little reliable data is available on the quantities of pesticide used in most countries of the region, although we know that Papua New Guinea and Fiji use the most. In 1981 Fiji imported more than 500 metric tons of pesticide (insecticides, herbicides and fungicides combined) worth about US$ 2.4 million. In 1982 Papua New Guinea imported around 300 metric tons of active ingredient, or about 930 metric tons of formulated pesticide valued at US$ 2.5 million.

An interesting sidelight of this issue: in 1982-83 20 metric tons of pesticide were brought into Tonga. About one-third of this came as relief aid after a major hurricane.

WHICH?

It is difficult to obtain reliable data to tell us which individual pesticides are used most in the region. However, we do have data for one large user, Papua New Guinea, and a small user, Tonga.

Papua New Guinea used the following pesticides in large quantities, measured as active ingredient, in 1982:

More than 50,000 kg:	paraquat
More than 40,000 kg:	DDT
More than 20,000 kg:	dalapan and atrazine (selective herbicides)
More than 10,000 kg:	diuron (photosynthesis-inhibiting herbicide), ametryne and tebutryn (selective herbicides for broad-leaved weeds and grasses)
More than 5,000 kg:	2,4-D (systemic herbicide), MSMA (contact herbicide) and malathion

Tonga uses a rather different list of chemicals. For 1982-83 these were:

More than 2,000 kg:	mancozeb (protective fungicide)
More than 1,000 kg:	malathion
More than 800 kg:	paraquat
More than 500 kg:	carbofuran (persistent acaricide, insecticide and nematicide)
More than 400 kg:	carbaryl (insecticide) and benomyl

BANNED AND RESTRICTED

A great deal of concern has been expressed in recent years that many pesticides which are banned or severely restricted in their country of origin, or restricted to use by certified operators, are exported to and freely available in Third World countries.

There are several possible reasons for a chemical to be banned or restricted, and special heed should be paid when they involve human or environmental hazards. Recently the Food and Agriculture Organization of the United Nations distributed a draft "International Code on the Distribution and Use of Pesticides", which incorporates the principle of "prior informed consent," (whereby importing countries must first give approval for pesticides banned or restricted in their country of manufacture before they can be exported to the importing country). This has been amended to incorporate the "provisional notification scheme" of the International Register of Potentially Toxic Chemicals (IRPTC) of UNEP, which requires countries which ban or severely restrict pesticides to notify, directly or indirectly, the designated national authorities in other countries.

The problem in the South Pacific for both proposals is that there is not necessarily a designated national authority. Where there is, this authority, or registrar, is usually grossly over-burdened with other responsibilities.

The result: of 589 compounds available in the South Pacific, 34 are classified as "extremely hazardous" by WHO, another 52 are "highly hazardous"; 16 are "banned, withdrawn, not approved" in the USA; 24 are "severely restricted" in the USA; 57 are for "restricted use" in the USA; and 55 are banned, withdrawn or not approved elsewhere in the world.

DECISIONS

The person who decides whether to use a pesticide ideally should possess detailed knowledge of the biology and natural history of the target organism and the environmental behaviour of the pesticide, and be aware of alternative and complementary methods of pest control. Furthermore, the choice of what pesticide to use, as well as when and where to use it, requires a certain

degree of experience and expertise, especially if one is to avoid effects on wildlife and non-target organisms and such phenomena as pest resistance, resurgence and secondary outbreak. Obviously, only a trained person is capable of making such decisions.

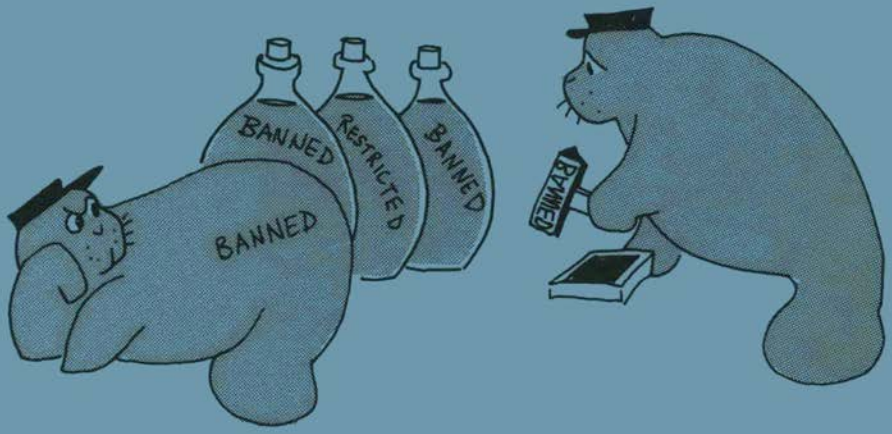
Unfortunately there are very few trained plant pathologists, entomologists or public health workers in the South Pacific who might possess sufficient expertise. Of the 20 countries, 11 employ trained personnel, but they are few in number and primarily non-nationals. The South Pacific Commission (SPC), FAO, and various research organizations and universities in the region assist by providing experts and training in agricultural pest control.

POISONING

Many of the pesticides in use in the region have been implicated in cases of human poisoning and, occasionally, deaths. The main problem chemical is paraquat, resulting mostly from its intentional misuse and wide availability. Paraquat kills green plants on contact, and is used to clean stubble, dessicate crops, control weeds on plantations and between vegetable rows, and to prepare ground for resowing without the need for ploughing. In humans, superficial exposure to paraquat can cause skin blisters and severe eye damage; ingestion can be fatal.

Poisoning by paraquat is common in Western Samoa, Fiji and Papua New Guinea, but most of the deaths which have occurred have apparently been suicides. Some have been accidental, the result of drinking paraquat which had been stored in unlabelled drinking containers.

No reports have been made on the possible chronic effects to pesticide users in the region, partly because such effects would be hard to distinguish. The only study of residues in humans found low levels of the following chemicals in the breast milk of women in Papua New Guinea: aldrin (soil insecticide), DDT, dieldrin, hexachlorobenzene or HCB (selective fungicide), HCH (stomach insecticide), heptachlor and heptachlor



epoxide (agricultural and domestic insecticides), lindane (a particular grade of HCH) and oxychlordane (insecticide and fungicide).

Isolated instances have been reported of poisonings of domestic and wild animals in the South Pacific. The largest kills have involved cattle: in Papua New Guinea in 1984, 44 of 53 cattle died within 30 minutes after being sprayed with "decomposed" diazinon; in the Northern Mariana Islands, 75 cattle died after drinking water stored in drums which previously held an organoarsenate herbicide.

Fish have reportedly been killed in rivers, streams, or coastal waters in French Polynesia (by the insecticide deltamethrin and other agricultural chemicals), Papua New Guinea (DDT and lindane), Tokelau (lindane and DDT), Truk (the foliar insecticide endrin) and Yap (endrin and a sodium arsenite herbicide).

RESIDUES

A very few studies have been carried out to determine the quantity of pesticide residues in crops, soil, water and fauna. One such study in Western Samoa indicated that residues of lindane, aldrin, heptachlor and DDT in some food stuffs are above accepted international limits. So far nothing has been done to determine the fate of pesticides in the environment of the South Pacific. In spite of interest and willingness to participate in a comprehensive monitoring programme expressed by several institutions in the region, there are at present very few nationals who are sufficiently trained in the analytical procedures necessary.

WHAT NOW?

Clearly something must be done about the pesticide problem in the South Pacific, first to determine just how serious it is through monitoring and assessment, then to establish the necessary infrastructure to deal with it.

I believe that a suitable way to approach the problem is at the regional level, through creation of the following:

1. A Pesticide Information Centre. Such a centre would carry out three major tasks. First, it would collate and compile data on pesticides used in the region, and create a central "register" for the entire South Pacific. Then, it would provide regional library service and maintain a bibliography of articles on pesticide use and associated problems. Finally, it would provide individual countries and territories with technical information as required.

2. A Regional Pesticide Advisory Committee. Made up of experts from within the region, the committee would provide a collective expertise on matters relating to pesticide use and effects; it would make recommendations concerning which pesticides to register or use, in which circumstances, for which crops, etc.; and it would establish guidelines for harmonization of pesticide registration and toxicological requirements and other methods of control.

3. A Network of Regional Pesticide Residue Laboratories. Each participating laboratory would carry out small-scale monitoring of pesticide residues in water supplies, agricultural products, environmental

samples, human tissues, etc., and participate in such international programmes as "Mussel Watch".

The problem with the above proposal is that the region today lacks the manpower and funds to effectively establish any of the above. Most of its countries are poor, with what their governments consider "more pressing development priorities". Most will depend for many more years on expatriates to provide the necessary technical expertise, because so few suitably qualified nationals are available for the necessary training.

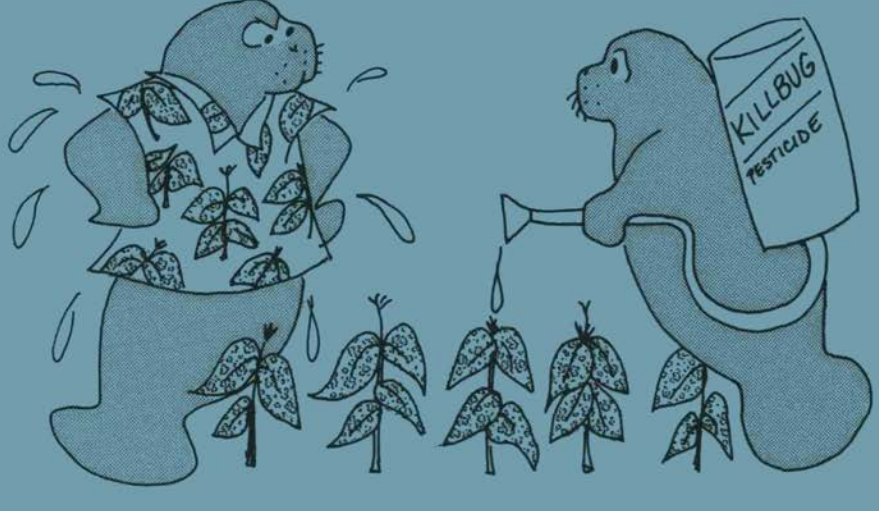
Both the South Pacific Commission Plant Protection Office and SPREP support the establishment of all three. United Nations and other agencies have been approached for financial support and technical assistance. Except for limited support from UNEP's Programme Activity Centre for Oceans and Coastal Areas, no such support has yet been forthcoming. We continue to seek such support for our proposals.

A MATTER OF PERCEPTION

The peoples of the Pacific see nuclear testing and dumping as an example of unjustified exploitation of their environment by countries outside the region. Some also see the Pacific as a dumping ground for dangerous chemicals -- often because their toxicity renders them unmarketable in the countries of their production.

Of course, developing countries need pesticides and they don't need radioactive waste or fallout. So the answer lies in adequate knowledge and regulation of pesticides, and in their safe and efficient use, not in full-fledged opposition to their use.

But we must act soon to get that knowledge, so that legislation can be adopted and enforced. Only then will pesticides be correctly used and the poisoning of the Pacific cease.



Problèmes d'érosion côtière dans le golfe du Bénin

par

Moïse Akle

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Son article est une contribution à l'effort de sensibilisation déjà en cours sur l'érosion côtière en Afrique de l'Ouest et du Centre.

INTRODUCTION

Avec leurs plages de cocotiers déchaussées et plusieurs routes détruites dans certains secteurs, les littoraux des pays du golfe du Bénin en Afrique de l'Ouest (Togo, Bénin, Nigéria) offrent des exemples saisissants de milieux naturels "instables" (J. Tricart, 1973); la cause essentielle en est l'érosion marine qui fait régresser lentement mais de manière sensible la ligne de rivage depuis le début du siècle.

Dans plusieurs cas, ce phénomème d'abord imperceptible s'est combiné avec celui non moins important de la pollution des rivages par les effluents industriels et les produits pétroliers, ce qui a progressivement réveillé l'attention des autorités portuaires et de travaux publics, de sorte qu'aujourd'hui, face à l'éventail des solutions techniques de lutte existantes et face aux maigres ressources disponibles dans les pays concernés, il apparaît extrêmement important de fournir aux décideurs, sous forme d'alternatives d'aménagement, quelques éléments d'un choix rationnel de solutions. Le présent article se propose de répondre à ce besoin.

EROSION COTIERE ET EVOLUTION DU LITTORAL

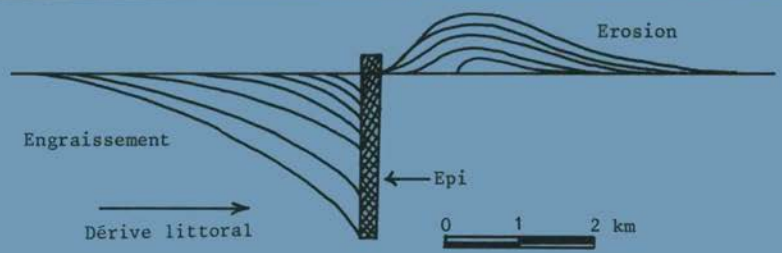
Au Togo et au Bénin

Les premières observations sur l'érosion côtière datent de 1908. Au Bénin (ex-Dahomey), elles ont été conduites par le naturaliste français Henri Hubert, qui observa que la mer avait reculé de plus de 20 m entre 1892 et 1900 et avancé de plus de 7 m entre 1900 et 1905 à Grand-Popo; plus récemment, selon une étude effectuée sur photographies aériennes par M. Sikirou Adam, enseignant de géographie physique à l'Université nationale du Bénin, le rivage aurait gagné en treize ans une capacité considérable de sable jusque sur le plateau continental, ce qu'attestent d'ailleurs les bourrelets sous-marins mis de temps en temps en évidence au large.

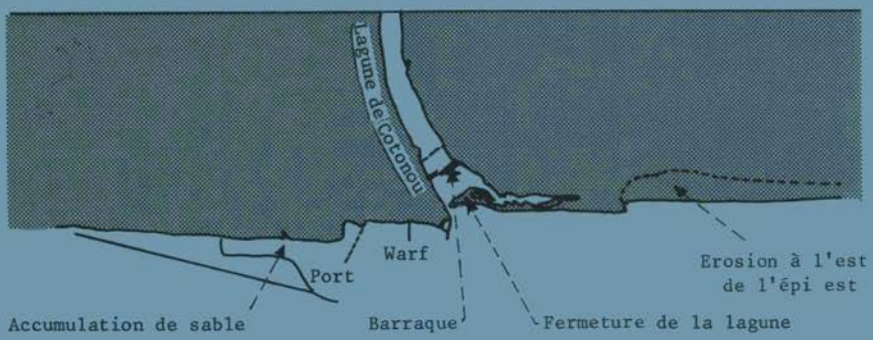
A partir de 1901, l'érosion côtière s'est lentement développée et la mer a repris possession des plates-formes abandonnées lors des dernières régressions du plioquaternaire (280 BP). Le phénomène s'est ensuite généralisé et aggravé, notamment à partir de 1960, date à laquelle d'importants travaux ont été effectués dans un pays voisin (barrage d'Akossombo au Ghana) et sur le littoral des deux pays (route inter-Etats n° 1, ports de Lomé et de Cotonou, diverses infrastructures hôtelières, urbanisation, installation de carrières de sable, etc.).

Bien que les spécialistes s'accordent sur l'origine géophysique de ce phénomène (élévation constante du niveau marin de 1,2 mm à 1,5 mm par an depuis un siècle environ), la cause essentielle de cette érosion semble être liée au déficit sédimentaire créé par la construction du barrage d'Akossombo sur le fleuve Volta au Ghana et la construction des ports de Lomé et de Cotonou.

Le premier ouvrage constitue en effet un piège à sédiments alluvionnaires dont une part importante était, avant la construction du barrage, amenée sur la côte et, reprise dans un mouvement ouest-est par la dérive littorale, redistribuée sur tout le littoral du golfe du Bénin (plus de 1,5 million de mètres cubes d'accumulation sableuse par an). Or, depuis la construction de l'ouvrage d'Akossombo, une bonne partie des sédiments alluvionnaires



Modèle simulé de l'évolution du littoral de Cotonou lors des études du port (d'après SIREYJOL).



Le littoral de Cotonou (Bénin).

est bloquée derrière le barrage, créant ainsi un déficit sédimentaire que le courant de la dérive littorale s'empresse de combler par érosion des fonds et des littoraux adjacents. Cette érosion s'est manifestée d'abord au niveau de l'embouchure du fleuve (destruction des villes d'Ada et de Keta au Ghana même) puis au-delà (gare routière de Lomé au Togo).

Plus tard, avec la construction du port de Lomé, l'érosion s'est amplifiée, au Togo, et notamment tout le secteur compris entre la jetée est et Anécho a été attaqué, les apports de sable devenant nuls à l'est du port par suite d'un nouveau piégeage du sable provoqué par ladite jetée (effets classiques des épis et jetées), ce qui a eu pour conséquence l'engraissement actuellement observé à l'ouest du port. Par contre, à l'est du port, l'érosion s'est particulièrement centrée sur les secteurs de l'hôtel Tropicana, Gbodjomé, Bobolekopé, Agbédrafo, Kpémé, Anécho, Sanvekondji et au-delà jusqu'à Grand-Popo en République populaire du Bénin.

Toutefois, l'érosion semble être freinée depuis un an dans le secteur de l'hôtel Tropicana, phénomène lié, semble-t-il, à l'exhumation du "beach rock" (le beach rock est un matériau de plage formé de sédiments sableux consolidés en grès par un ciment calcaire sur les rivages des mers chaudes. Sa résistance (300 à 400 kg/cm^2) et son épaisseur en font un brise-lames naturel capable de freiner l'érosion après exhumation.

Au Bénin, outre le secteur d'Hillacondji-Grand-Popo, situé dans le prolongement de la zone d'influence directe du port de Lomé et de la jetée du warf phosphatier de Kpémé, l'érosion se manifeste particulièrement à l'est du port de Cotonou. Ainsi, alors qu'un phénomène d'engraissement est observé dans la zone ouest du port, les vagues se sont mises à éroder le rivage dans la zone qui s'étend immédiatement à l'est de ce dernier entre le débouché lagunaire et l'épi est (zone de la crique) et dans la zone des carrières de Sèmè actuellement en engraissement par suite de la fermeture desdites carrières.

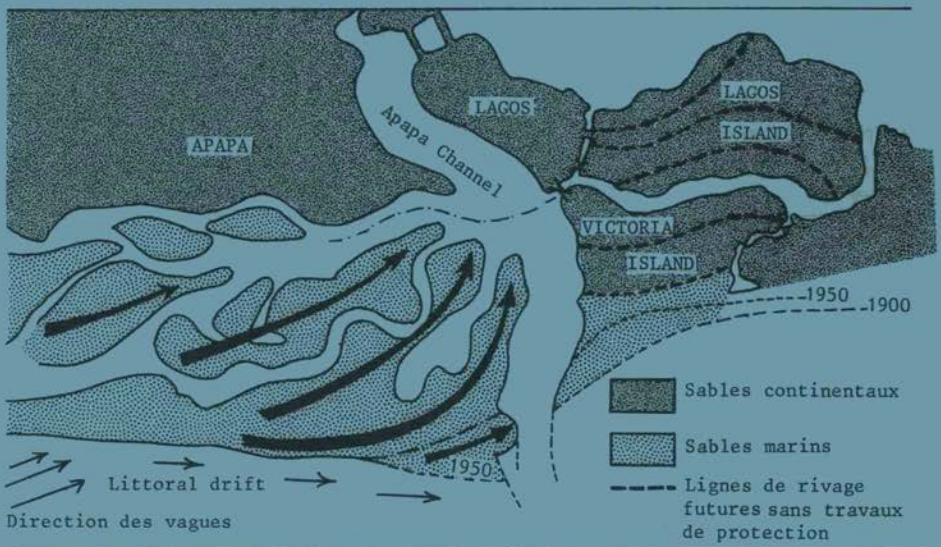
La zone de la crique est soumise à une érosion depuis la construction du port en 1960-1961; un recul maximal de 450 m a été enregistré à la fin de 1981. Ce processus pourrait se poursuivre dans les années à venir si

Evolution du littoral à l'est du port de Cotonou sans travaux de protection jusqu'en l'an 2005 (d'après NEDECO).

aucune mesure de protection ne venait à être prise et la société néerlandaise NEDECO a prévu grâce à un modèle mathématique que le recul maximal du rivage aura atteint environ 800 m en l'an 2005.

Au Nigéria

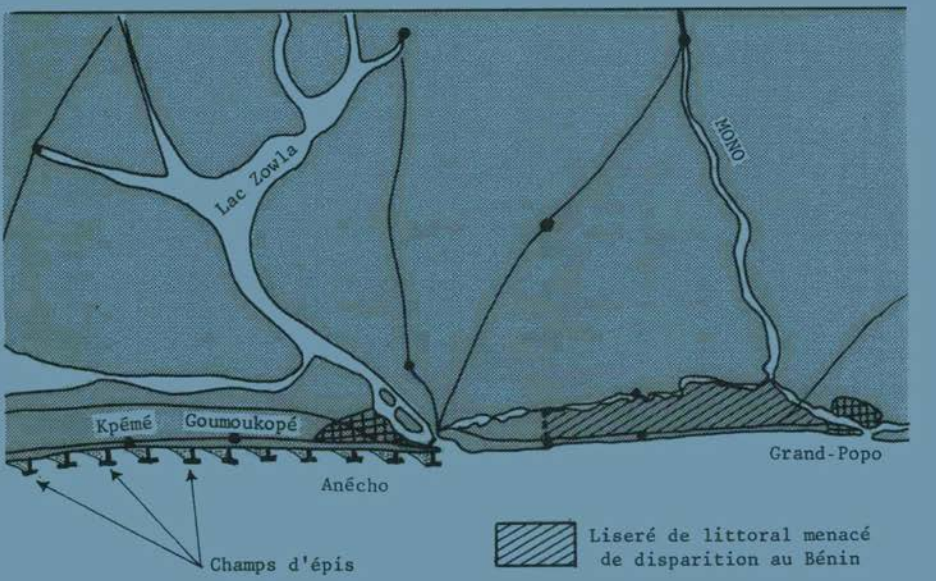
L'érosion côtière s'est manifestée d'abord près de Lagos, à Victoria Island, après la construction de deux brise-lames à l'entrée du port de Lagos entre 1907 et 1916. Les brise-lames avaient pour objet d'arrêter le transit littoral de sable qui avant cela allait combler l'entrée du port. La conséquence à long terme de ces constructions fut l'engraissement du port à l'ouest du brise-lames de Lighthouse Beach qui a gagné ainsi 400 m sur la mer. A l'est du port, toutefois, les mesures ont montré qu'une importante érosion s'est déclenchée près du brise-lames est à Victoria Beach; entre 1912 et 1970, le rivage a ainsi reculé de plus de 1 250 m.



Evolution du littoral à Lighthouse Victoria Beach (Lagos, Nigéria, option citée).

De récentes recherches conduites par E.J. Usoroh ont montré que l'érosion est maximale entre les mois de mars et de septembre de chaque année, lorsque les fortes tempêtes sont fréquentes sur la côte en raison des vents de sud-ouest. De plus, les sondages au large ont mis en évidence des profondeurs anormales près du brise-lames est, ce qui a pour effet d'intensifier l'énergie des vagues à Victoria Beach.

Malgré les nombreuses tentatives des autorités portuaires pour arrêter cette érosion, (prolongement du brise-lames vers l'ouest, apport de plus d'un million de tonnes de sable par an), l'érosion s'est poursuivie à Victoria Beach (le rivage a reculé de plus de 18 m entre 1967 et 1969). Plusieurs autres secteurs du littoral nigérian sont attaqués par l'érosion à une vitesse de près de 5 m par an; de tels secteurs, relativement peuplés et dotés d'importantes infrastructures socio-économiques et culturelles, comprennent des villes telles que Queen's Town, Iwopin (Lagos State), Forcados-Burrutu (Bendel State), Brass (Rivers State), James Town (Rivers State), Buguma, Abonnema (Rivers State), Opobo, Ibeno (Cross Rivers State).



Représentation schématique du projet de protection des villes de Kpémé et d'Anécho au Togo.

CHOIX TECHNOLOGIQUES ET ALTERNATIVES D'AMENAGEMENT

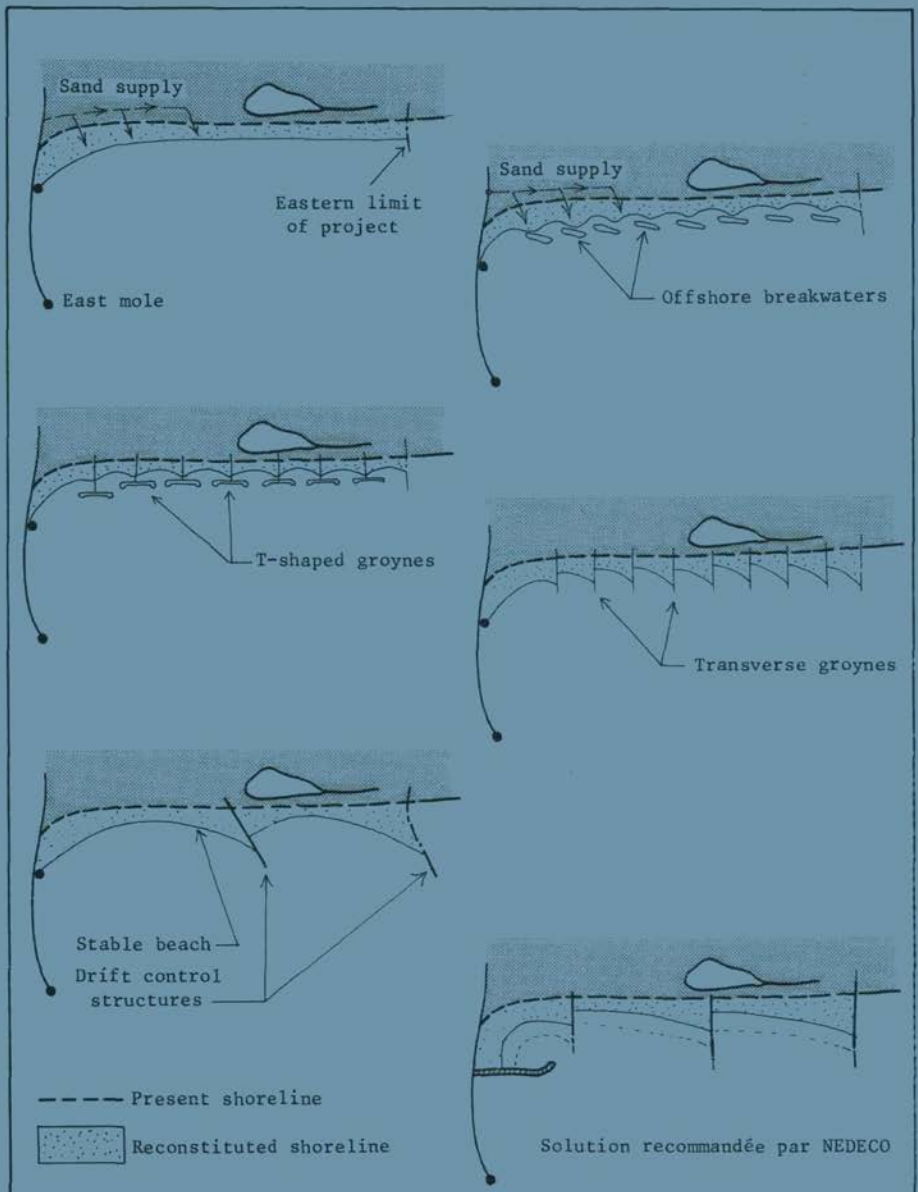
Mesures de lutte déjà envisagées

La gravité de la situation créée par l'érosion côtière dans certains cas n'a pas été perdue de vue, et, dans l'ensemble, les autorités des pays concernés sont en train de prendre des mesures devant permettre de mieux connaître le phénomène afin de le maîtriser. A cet égard, il faudrait signaler les efforts déjà déployés par le Comité directeur de l'environnement marin de l'Afrique de l'Ouest et du Centre qui, dans le cadre de la Convention et du Plan d'action d'Abidjan et grâce à l'appui du PNUE, a mis en oeuvre le projet WACAF 3 dont de nouvelles phases méritent d'être planifiées dès maintenant afin de répondre aux préoccupations des pays de la sous-région dans ce domaine. Ces préoccupations peuvent se résumer en deux points : une meilleure connaissance du phénomène de l'érosion côtière et sa maîtrise au moindre coût en tirant parti des initiatives locales.

En ce qui concerne le premier point, rappelons que les précédentes phases de WACAF 3 ont permis, grâce aux Séminaires de Lomé, de Lagos et de Dakar, de jeter les bases d'une organisation régionale de la recherche scientifique et technique sur ce phénomène, et il sera certainement intéressant d'envisager le développement de cette recherche dans le cadre d'expérimentation de technologies simples de lutte tant au plan national que sous-régional.

Pour ce qui est de la maîtrise du phénomène, soulignons qu'il existe plusieurs méthodes de lutte contre l'érosion côtière et que le choix d'une méthode adéquate n'est pas toujours aisé; il peut être parfois nécessaire de faire appel aux services d'un bureau d'études d'ingénieurs-conseils, ce qui, presque toujours, gonfle considérablement les coûts.

Ainsi en est-il des projets récemment initiés au Togo, au Bénin, et même au Nigéria, où quelques études ont été confiées à la firme néerlandaise NEDECO et à un bureau d'études français (le Laboratoire central d'hydraulique de France). Sur la base des études effectuées par ce dernier pour la protection des villes de Kpémé et d'Anécho au Togo, par exemple, on estime à plus de 3 milliards de francs CFA les coûts d'un projet que le Gouvernement togolais s'apprête à mettre en oeuvre grâce à l'aide de la Coopération française. La solution de protection envisagée par le LCHF est celle d'un champ d'épis courts transversaux. Ce dispositif aura pour objet de piéger tout ou partie du transit littoral actuel, de sorte que l'accumulation faite sur une des faces d'un épi assure de facto une protection du littoral. Comme on pourrait s'y attendre, cette solution ne sera pas sans inconvénient pour les secteurs adjacents, notamment en République populaire du Bénin assez proche des deux villes togolaises citées. Les études d'impact effectuées par le LCHF montrent que le liseré de littoral entre Anécho et Grand-Popo sera soumis à une importante érosion, et, d'ores et dejà, les deux pays sont en train d'examiner avec le Gouvernement français les modalités pratiques de mise en oeuvre d'un projet interétatique assurant la protection voulue et minimisant les impacts négatifs prévus du côté béninois.

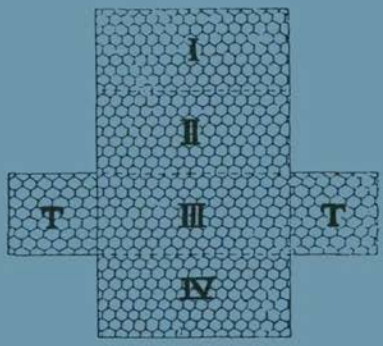


Divers schémas de protection de la plage de Victoria Island (Lagos, Nigéria).

Perspectives de développement de technologies appropriées

Que ce soit au Togo ou au Bénin comme au Nigéria, toutes les solutions envisagées ont comme caractéristique commune le fait qu'elles sont perpendiculaires à la ligne de rivage et feront donc obstacle à la dérive littorale. Si ces solutions permettent de résoudre le problème posé dans une certaine mesure, elles sont évidemment loin d'être les plus satisfaisantes; en effet, une plage idéale est celle qui est naturellement accessible et défendue contre l'érosion côtière au cas où celle-ci se manifeste par des ouvrages qui respectent les équilibres naturels.

En matière de génie côtier, la solution technique la plus appropriée sera celle qui permet d'assurer une défense du littoral sans détruire la beauté naturelle du site et dont le recours peut permettre d'amoindrir les coûts globaux en tirant avantageusement parti des possibilités existantes (matériaux locaux de construction, initiatives et main-d'oeuvre locales, etc.). Ainsi, n'est-il pas possible d'envisager l'amélioration de certaines technologies simples de défense contre l'érosion telles que celles qui ont été initiées par les populations Ibo elles-mêmes à Opobo au Nigéria, à l'aide d'ouvrages en gabions, dont la fiabilité moyennant quelques aménagements, est par ailleurs bien connue? Les ouvrages en gabions présentent entre autres l'avantage de constituer une structure perméable monolithique susceptible d'amortir par absorption l'énergie des vagues, notamment dans le mouvement de jet de rive ou de ressac, ce qui réduit considérablement le déferlement et, par voie de

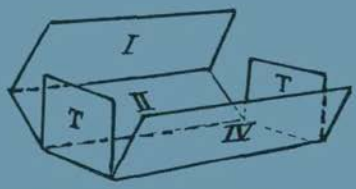


Gabion développé et étalé.

conséquence, les risques d'érosion et d'affouillement.

- Quelques données sur les gabions et les possibilités locales d'approvisionnement

Le gabion est une cage métallique ayant la forme d'une parallélépipède rectangle en grillage galvanisé que l'on remplit de cailloux de différents calibres; développé et étalé sur le terrain, il se présente sous l'aspect d'une grande toile métallique rectangulaire flanquée de deux autres toiles métalliques rectangulaires de dimensions plus modestes. Le rectangle I forme le couvercle du gabion; le rectangle III en forme la base et les deux rectangles II et IV



Formation du parallélépipède rectangle.

en forment les parois. Les dimensions de la cage, de la maille ainsi que d'autres spécifications techniques (par exemple, simple ou double torsion) permettent de distinguer les gabions cages et les gabions semelles ou matelas. Les dimensions standard sont données par le tableau suivant:

LONGUEUR	LARGEUR	HAUTEUR
5 m	1 m	1 m
4 m	1 m	1 m
3 m	1 m	1 m
2 m	1 m	1 m

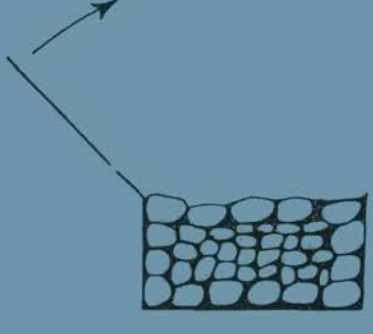
Lorsque la hauteur de la cage est de 0,5 m, le gabion est exactement désigné sous le nom de "gabion semelle ou matelas". Certains gabions semelles peuvent avoir jusqu'à 8 m de longueur et couramment 2, 3, 4, 5 et 6 m; les mailles, généralement de forme hexagonale, peuvent avoir des dimensions variables (100/120 mm, 80/110 mm etc.).

Dans les travaux de défense contre l'érosion côtière, on a généralement recours aux gabions semelles ou matelas adaptables aux revêtements; il s'agit d'un type de construction simple mais qui exige suffisamment de main-d'oeuvre. Le principe consiste à appliquer contre le talus de plage un revêtement rigide et inaffouillable. La pente est nivelée à l'angle nécessaire, la toile filtrante est posée sur la pente et les matelas sont posés et remplis à la main ou à l'aide de petites machines telles que les chargeuses. Les seuls problèmes qui se posent à ce type d'ouvrage sont :

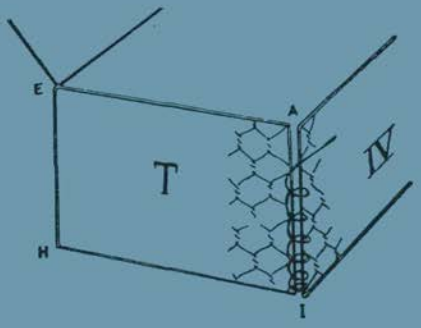
- les risques de corrosion par le sel;
- la disponibilité des matériaux de construction et de main-d'oeuvre dans les environs.

En ce qui concerne les risques de corrosion par le sel, la solution classiquement adoptée est l'enrobement en chlorure de polyvinyle (PVC) du fil de fer galvanisé. Certaines firmes spécialisées dans la production de gabions (MACCAFERI, SOGETRAM, etc.) peuvent fournir le matériau sous cette forme sur commande. Avec les autres spécifications techniques, cette exigence peut servir d'élément à l'établissement du cahier des charges.

L'intérêt principal de cet ouvrage réside dans son homogénéité, sa déformabilité et sa perméabilité; en ce qui concerne l'homogénéité, le gabion devient par consolidation naturelle en milieu aquatique un monolithe qui, de par ses dimensions, est un défi aux courants les plus violents; dans la pratique des revêtements, ils sont convenablement



Remplissage du gabion.

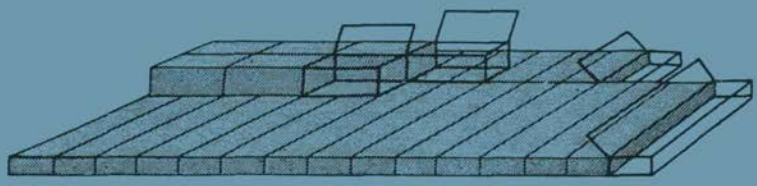


Ligatures des parois du gabion.

arrangés et reliés entre eux par de solides ligatures en fil de fer; en ce qui concerne la déformabilité, le gabion présente un caractère de souplesse qui autorise son utilisation en terrain affouillable, le matériau épouse ainsi la forme du terrain naturel et le suit dans ses affaissements ou tassements sans compromettre la stabilité de l'ouvrage; enfin, le gabion est essentiellement perméable, ce qui, loin d'être un inconvénient, permet à l'ouvrage d'absorber l'énergie des vagues au lieu de la réfléchir.

La pérennité de l'ouvrage est fonction de la qualité des treillis et du soin apporté à la mise en place des enrochements de remplissage. Ceux-ci comprennent diverses pierres ou ballast, moellons et galets. Dans les travaux de génie côtier, on a recours le plus souvent aux matériaux les plus durs (200 à 450 kg/cm^2 de résistance à la compression), non poreux et non friables: roches éruptives de type granite granitoïde, roches sédimentaires consolidées type grès ou latérite, etc.

L'approvisionnement en ces divers matériaux dans notre région d'étude pose plutôt un problème de carrière commun à toutes les côtes sableuses du monde où le littoral est essentiellement constitué de sédiments récents sur des centaines de kilomètres; mais, au Togo et au Bénin, il existe à moins de 50 km de la côte des carrières de leptynites et de gneiss en exploitation qui ont d'ailleurs servi à la construction des ouvrages portuaires de Lomé et de Cotonou (carrière de leptynites d'Agbelouvé au Togo), de granite de Dan (Bénin), carrière de grès de Gokoutou près de Sakété (Bénin).



Matelas de gabions semelles reliés sous forme de revêtements.

Certaines entreprises privées locales telles que Initiative Togolaise sont spécialisées dans la fourniture de ces matériaux à un coût relativement abordable.

- Autres solutions de technologie appropriée et perspectives de recherches

On sait d'une manière générale que les méthodes de durcissement de la ligne de rivage sont les plus appropriées pour assurer la protection des terres côtières. A cet égard, les revêtements en gabions pourraient permettre de défendre au moindre coût les infrastructures socio-économiques des petites villes littorales aujourd'hui menacées, mais ces structures ne sont pas particulièrement efficaces pour la lutte contre l'érosion de la plage devant elles et peuvent même l'accroître dans certains cas dans les secteurs en aval par réduction ou suppression de l'approvisionnement en matériaux sableux provenant de la terre ferme.

Pour remédier à ces inconvénients, les aménageurs préconisent le plus souvent, suivant les cas, des schémas d'aménagement associant plusieurs méthodes : lignée de repli, champs d'épis, alimentation des plages et contournement du sable, création et fixation de dunes par revégétalisation, gestion rationnelle des terres du littoral, etc.

Les inconvénients de ces diverses méthodes prises séparément sont bien connus et seule une expérimentation in situ pourrait permettre de dresser les schémas d'aménagement les plus appropriés en tenant compte des ressources locales en main-d'oeuvre, en matériaux et en capitaux.

Dans tous les cas, la nécessité d'une organisation de la recherche scientifique et technique sur l'érosion côtière et sa maîtrise se fait sentir avec acuité. Les participants au Séminaire de Dakar organisé par l'UNESCO et le PNUE en avril 1985 ont à juste titre insisté sur ce besoin et l'un des préalables sera, dans l'immédiat, la mise en place au sein de l'Unité régionale de coordination du Plan d'action d'Abidjan d'un centre de documentation couvrant largement ce domaine. L'étape suivante pourrait être la mise au point d'un programme de recherches sur le milieu naturel qui permettra d'obtenir les données de base nécessaires à l'établissement des projets:

- données océanographiques et hydrodynamiques: bathimétriques, houle, vagues;
- données sédimentologiques et géomorphologiques : granulométrie, beach rock, etc.;
- données climatologiques et hydrologiques: températures, vent, direction, etc.

En conclusion, et prenant en considération les observations des participants à la 4e réunion du Comité directeur de l'environnement marin de l'Afrique de l'Ouest et du Centre tenue à Abidjan du 15 au 17 avril 1985, il apparaît clairement que le phénomène de l'érosion côtière devient progressivement, au même titre que la sécheresse au nord, un fléau dans la sous-région, tendant par là même à enfermer l'Afrique occidentale dans un étau aux conséquences économiques difficiles à évaluer pour le moment. Seule l'étude scientifique du phénomène et une organisation de sa maîtrise dans un contexte de technologie appropriée permettront d'y apporter des solutions rapides et efficaces.

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Marine reserves in Italy:

NEW LAWS, NEW HOPE

by
Paolo Arata

Dr. Paolo Arata is a marine biologist and technological expert with international organisations. He has supervised courses at the Universities of Tunis and Algiers, has served on many Italian, EEC, and United Nations committees, and is currently giving courses on marine biotechnology at the Universities of Aquila and Urbino.

Since 1982 Dr. Arata has been director of the Central Institute for Scientific Research and Technology applied to Sea Fishing (ICRAP).

Protected marine areas have a particularly important role to play in the future of the Mediterranean basin, and a number of recent regulations -- as well as new applications of old regulations -- have begun to brighten what was a rather dismal outlook for Italian reserves.

The Mediterranean is virtually a closed sea with a very slow rate of water exchange and heavily populated and industrialised coasts. Its shipping density is high, especially for oil transport (35% of the "floating" oil in the world is in the Mediterranean, which accounts for only 0.7% of the area of the hydrosphere). Furthermore, it is a sea of low productivity, owing to its depth, the limited amount of river water entering it, and the still more limited extent of "upwelling". It is a unique sea, and its unique nature is a priceless heritage of Mediterranean peoples.

There are some protected marine areas in Italy. The only one which can properly be called a "Park" -- in the sense of being reasonably organised, with buoys to mark its limits and buildings on land to welcome visitors and permit a minimum of scientific research -- is that at Miramare (Trieste), where 40 hectares of publicly owned area have been

granted, under the Navigation Laws, to the World Wildlife Fund since 1973. The Fund manages the area with very limited resources.

THE LEGISLATIVE SITUATION

The Central Institute for Scientific Research and Technology Applied to Sea Fishing (ICRAP), set up by Law N.42 of 1982, has many important responsibilities. These can be summarised in the phrase "to provide for the systematic carrying out of research of all scientific and technological types" in the fields of aquaculture and sea fishing.

A subsequent law, N.979 of 1982, also made ICRAP responsible for water monitoring and the setting up of marine reserves.

In accordance with these responsibilities, the Institute has prepared and published a monograph entitled "Considerations on marine reserves in the context of coastal belt management" (in Italian). This monograph deals at length with the Italian and Mediterranean situation.

A Decree by the Minister of merchant shipping in 1979 created a protected belt of sea around the island of Montecristo, already an "Integral State Reserve". The protection of the coast is total, since all activities, from fishing to navigation to bathing, are forbidden for 500 metres from the coastline. In practice, however, the ban is not enforced and is disregarded.

Then there are two areas, one at Portoferraio, Elba, and the other at S. Maria de Castellabate, where "biological protection areas" have been set up (in 1971 and 1972 respectively) on the basis of Art. 15 of Law 963 of 1975 on fishing and Art. 98 of its implementing regulations. In these areas there are specific restrictions on fishing, to the point of total prohibition.

However, the absence of direct management and the occasional or non-existent nature of controls, (especially in the Castellabate area), means that not only can these areas not be considered protected, but also that the aim of biological protection is unfulfilled.

A decree of the Minister for merchant shipping on 24 September 1979 established the possibility of creating areas for the protection of biological resources on the open sea. This decree has been applied (by Ministerial decree of 25 September 1979) for the protection of an area to the south-west of Lampedusa.

A STEP FORWARD?

Legislatively, the situation was changed by the coming into effect of the law "for the defence of the sea" (N. 979 of 31 December 1982).

However, two and a half years from the time the law was passed, there has been no real change in the situation. Even the Ustica marine reserve, which has been in the planning stage for years, has not yet achieved any official status.

Since an attempt will now be made to make a critical analysis of the Law N. 979 of 1982 (provisions for the protection of the sea) on the basis of its recommendations for an organic approach to the conservation of marine reserves, we can say that Law 979 may be considered a step forward. For the first time an institutional structure is provided for marine reserves, and the master plan for the protection of the sea provides, at least potentially, an opportunity for planning development and conservation principles.

Law 979 goes as far as to list twenty locations for which the Council for protection of the sea should at once make the preliminary investigations required to determine the necessity and the feasibility of creating a similar number of marine reserves.

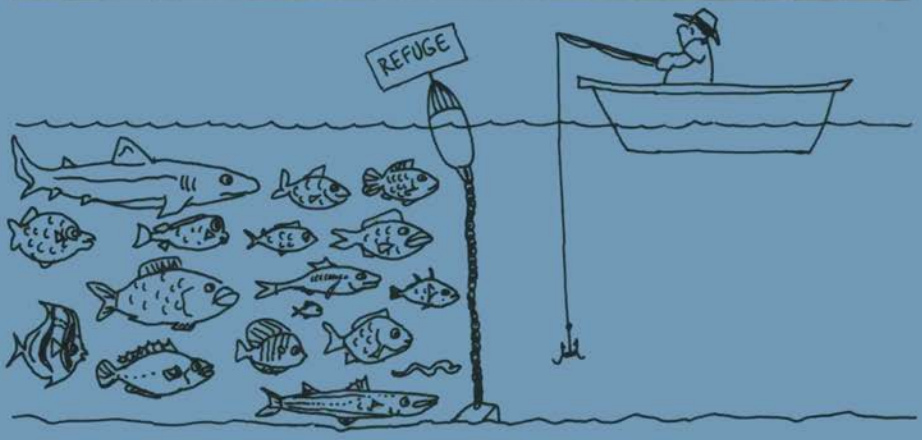
PROTECTION vs USE

It should be pointed out here that there is no conflict of principles between the protection of material resources and their rational use. The conflicts arise when the exploitation of resources is irrational; that is, when the functioning of the ecosystem is not taken into account.

There should, in principle, be no serious conflict between marine reserves and fishing activities. The protection regulations will obviously impose limits on fishing, to the point of forbidding it in some areas, but the protection of areas of particular ecological importance (such as fish breeding and growing areas) could lead to considerable benefits for the fishing industry. Among other things, the banning of fishing should be mainly concerned with those techniques, such as bottom trawling, which are particularly destructive to the economy of the fishing industry itself.

The need to create biological "rest areas" or refuges in some Italian seas has often been pointed out, but in practice nothing has been done. The value of such areas from the point of view of fisheries ecology and economics is undisputed and has recently been reaffirmed by Law 41 of 1982 on the rationalisation of the fishing industry. Marine reserves can also fulfil this function, especially if the plans for the setting up of a network of protected areas in our seas is based on a deeper knowledge of their ecological function.

Marine reserves can also produce other advantages for the improvement and demonstration of fishing techniques and for the development of mariculture. Marine reserves, through their multi-faceted activities, can plan an important role in providing added value for the fisherman's labour, whether in the old form of utilisation of the biological resources of the sea, encouraged by the new techniques of mariculture, or in the new form of management of new resources through the marine reserves, by means of which the fisherman can maintain the contact with the sea which industrial development might otherwise eliminate.



A BETTER ALTERNATIVE

The idea of integrated and rational management of the coastal belt is presented as an alternative to the present situation of increasing pollution, with the addition of the following measures: a reduction of the role of industrialisation in social and economic development, careful control of the discharge of pollutants, a form of tourism which is less destructive and of greater long-term validity from the purely human point of view than the present form, and the creating of alternative forms of fishing through regulation and mariculture.

Implementation of these ideas requires a careful study of appropriate technologies, but it also requires a transformation of the relationship between man and environment and the abandonment of the short-term profit motive which has dominated the economic scene from the industrial revolution to the present day. It is therefore necessary to understand the great ecological importance of the coastal belt as a whole and to adapt our requirements to those ecosystems on which we depend. The promotion of small-scale local fishing is certainly not motivated by nostalgia, but by the desire to rationalise the use of the sea's biological resources.

The multifaceted value of protected areas may play a very important role in achieving an integrated and rational management of the coastal belt, especially if these areas are seen as research and development centres for a new form of ecosystem management. The concept of protection should not be limited to the safeguarding of particular marine habitats, but as Doumenge points out, should be applied on various levels: on the biological level, by elimination of the principal sources of pollution; on the economic level, through employment planning for the coastal areas, sharing out the space available between the various forms of human activity and with priority for fishing and aquaculture; and at the social level, providing fishermen or "sea-farmers" with a status which allows young people to see these careers as ways of improving their standard of living.

To Doumenge's list one can add: a level of "cultural protection". In

an integrated and rational system for the management of the coastal belt, fishermen and coastal communities can rediscover a cultural identity which is not a nostalgic appeal to past tradition, but an ability to live in equilibrium with an environment which is known and in the quality of which they recognise the basic prerogatives of their lives.

The quality of the relationship between man and the environment and between man and man are at the centre of the attention of those who fight for nature conservation. These relationships are a product of our culture, and a cultural revolution is exactly what we need in order to start planning a future less dark than the one we see before us today.

Cleaning up oil spills

by

Anitra Thorhaug
and
Jeffry Marcus

The problem of oil spill pollution in the world's oceans is of increasing concern. Each year 3.5 metric tons of oil are spilled. In the United States, 15,000 spills are reported each year; estimates are that another 6,000 go unreported. Some countries, such as Egypt with the intense shipping lane of the Suez Canal, have large spills on a yearly basis. Other countries have had spills that have decimated tens of miles of shoreline resources.

The Caribbean Action Plan has formulated Oil Spill Contingency Plans, which have been a successful step forward in managing oil spills in the whole region.

The present plans in most parts of the world call for mechanical clean-up (booms, other containment devices, skimmers, etc.) to be used first, and for dispersants to be used only when other means have been avoided. Yet dispersants are an order or two of magnitude cheaper,

and can be used under a much greater variety of circumstances (for example, in high seas and winds).

Mechanical clean-up was done as an appropriate cautionary measure since most dispersant products (of which there are currently between 10 to 20 on the market) had only been laboratory tested on a salt-tolerant shrimp and a single fish, neither of which could be considered relevant to tropical and developing nations.

Just recently the oil producing industry has begun to manifest its corporate environmental responsibility and sponsor testing by objective scientific groups on oil spills and dispersants. Government regulatory agencies are interested in evaluating these data so that intelligent and factually-based management decisions can be implemented.

The major question that needs immediate attention is whether dispersants are toxic to near-shore ecosystems. In the tropics, where most developing nations occur, the major ecosystems (or habitats) are the fringing coral reefs, extensive seagrass meadows (between reefs and shorelines and in estuaries) and mangrove shores. Each ecosystem has a rich array of animals and plants associated with them, many of which are extremely sensitive to pollution.

We have conducted laboratory tests on the dominant nearshore species of seagrass lying between the reefs and mangrove forests in the Greater Caribbean Basin (defined by the Caribbean Action Plan as the major basin plus the Gulf of Mexico, Bahamas and part of South Florida). Various concentrations of dispersed oil were tested using different oil types and various exposure times.

The seagrasses had differing responses to the dispersed oil.

Anitra Thorhaug is professor of biological sciences at Florida International University in Miami. She obtained a PhD in chemical and biological oceanography from the University of Miami, followed by postdoctoral work in biophysics and chemical oceanography. Her special interests include thermal pollution, pollution by oil and oil dispersants, trace metal ecology, coastal resource management and Caribbean nearshore ecology.

Thalassia testudinum (turtle grass) was resistant in these laboratory studies to most levels of dispersed oil; dispersants would be least costly in a spill involving this species. The other two species, Syringodium filiforme (manatee grass) and Halodule wrightii (shoal grass), were more sensitive to dispersed oil;

After receiving his PhD in 1978 from the University of Lancaster and the Freshwater Biological Association in England, Jeffry Marcus began to research in Miami, Florida, how various forms of energy technology affect sensitive nearshore subtropical and tropical ecosystems including corals, mangroves and seagrasses. Dr. Marcus has a particular interest in oil spills and his recent research efforts have centred on determining the physiological impact of oil and dispersed oil on seagrasses. He is also actively involved in environmental management of the coastal zone and in restoration of impacted seagrass communities.

they died in laboratory tests within the upper feasible levels of dispersant applications (12 gallons per acre), at longer time periods (100 hours), and for two oils (Louisiana crude and Murban, a Middle Eastern oil). But this was not the case at low levels of application (1.2 to 2.0 gallons per acre) or short exposure periods (five to ten hours).

It is extremely important that these results be field tested prior to being used, because laboratory experiments sometimes significantly differ from field results for a number of reasons. The single field test of dispersants to date has been in Panama by the American Petroleum Institute on the most tolerant species of seagrass to dispersed oil (Thalassia). As yet unpublished results indicate that after a 24-hour exposure to a medium concentration of dispersed oil, there is no effect on Thalassia. This corroborates laboratory studies.

More tests for intermediate time periods and concentrations are now under way in the laboratory for all three seagrasses. Field testing is highly desirable prior to making any recommendations.

Extrapolation to other ocean basins is not possible from these data because all of the species differ so markedly within the Caribbean region. It would, therefore, be extremely difficult to extrapolate to other regions. It is also extremely important to have dispersant data on seagrasses for the Middle East and South-East Asia.

Preliminary laboratory data indicate that dispersants may be used at low levels on coastal oil spills without significantly impacting seagrasses. Field tests are necessary to verify these results. Further work is now being done to determine more finite levels at which seagrasses can survive the use of various dispersants and oils, at various concentrations and exposure times. These data will provide needed information for efficient and cost-effective oil spill management.

Environment in Papua New Guinea

ORE MINING? OR WHAT?

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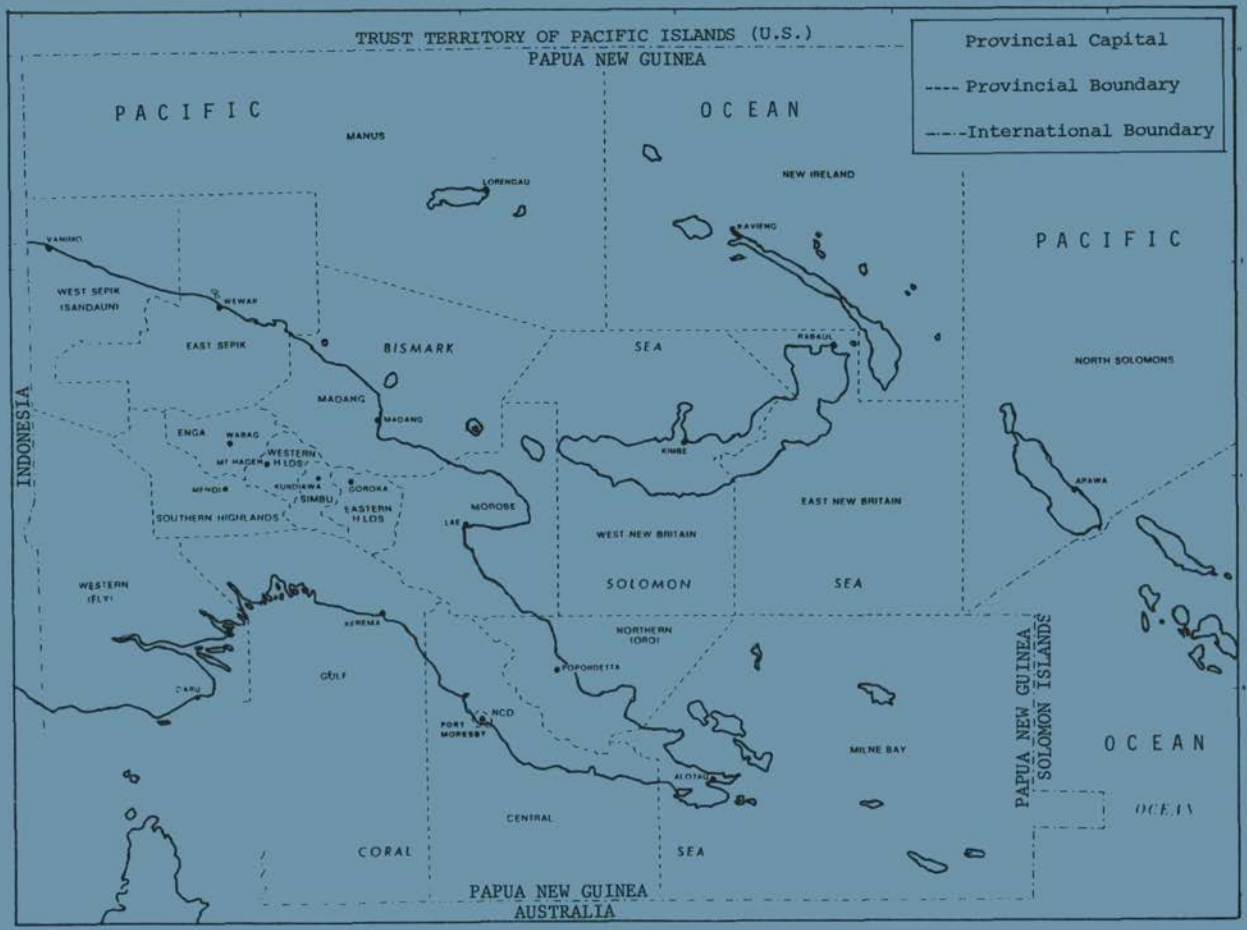
Mr. Pohei researches the biological effects of pollution and the accumulation of pollutants by fresh water and marine molluscs. He is a graduate of the University of Papua New Guinea.

The Environmental Protection Section is responsible for administering the Environmental Contaminants Act, and partly responsible for the Environmental Planning Act and for some sections of the Dumping of Wastes at Sea Act which gives effect to the provisions of the London Dumping Convention.

MINING WASTE DISPOSAL -- "Preferred options"

A commonly held notion is that Papua New Guinea has such abundant rainfall and large rivers that wastes may be dumped into them with impunity. The real situation is quite different. Large mining companies discharge wastes from milling operations and the overburden into streams. There are proposals to pipe milling and processed wastes directly into the sea, and even to dump overburden and hydraulic waste rock over a cliff directly into the sea inside fringing coral reefs.

Mining is not possible at the Earth's very surface. It is only in geologically anomalous areas where an economical concentration of an ore or ores occurs. Associated with ore that is to be mined there are usually high concentrations of other minerals


TRUST TERRITORY OF PACIFIC ISLANDS (U.S.)
PAPUA NEW GUINEA
Provincial Capital
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PACIFIC
OCEAN
MANUS
LORENGAU
NEW IRELAND
KAVIENG
VANIMO
WEST SEPIK (SANDAUN)
WEWAK
EAST SEPIK
BISMARK
SEA
RABAUL
NORTH SOLOMONS
INDONESIA
MADANG
ENGA
WABAG
MT HAGEN
WESTERN HLDS
MENDI
KUNDIAWA
SIMBU
GOROKA
EASTERN HLDS
SOUTHERN HIGHLANDS
MOROBE
LAE
KIMBE
EAST NEW BRITAIN
APAWA
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SOLOMON
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GULF
DARU
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PORT MORESBY
MILNE BAY
ALOTAU
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PAPUA NEW GUINEA
AUSTRALIA

which the mining company considers wastes. For example, when gold is present in economically feasible concentrations it is usually associated with high concentration of other naturally occurring compounds.

THE WAU MINE

A gold mine at Wau in the Morobe Province of Papua New Guinea will, in the nine-year lifetime of its operations, discharge as waste 281,000 tonnes of copper, 2,700 tonnes of lead, 14,000 tonnes of zinc, 162,000 tonnes of iron, 2,000 tonnes of arsenic, 38,000 kg of cadmium and 4,700 kg of mercury. The elements are present as compounds, but there exists downriver from the mine waste disposal site such a variety of environmental conditions that the metallic compounds may be deposited as banded sediments and consquently re-dissolved. Environmental problems in mining are compounded by extensive use of cyanide extraction and purification of gold by mining companies.

THE PANGUNA MINE

A much larger mine is the copper mine of Panguna in the north Solomons Province. In 12 years of the mine operations 600,000 tonnes of wastes have been produced. Approximately one third of these have been stored on land and the remainder dumped into the Jaba river.

It was the original theory of the mining company that the waste material dumped into the Jaba river would be carried to sea. However, the precipitation potential of electrolytes such as brackish water and sea water on dissolved ions, colloidal particles, and complexed species is so great that sedimented wastes extend as far as 6 km into Empress Augusta Bay. In addition, the company has created a new landscape of high benches of waste along the Jaba river and a new delta of its mouth. This currently has an area of 660 ha. Most of the copper has been removed from the mine tailings, but even so, re-solubilised copper has been released from the sedimented wastes.

In terms of elemental compositions the waste material also contains siginificant amounts of zinc, chromium, lead, cadmium, arsenic and smaller proportions of mercury. The fate of these is unknown and has been ignored. Clearly the high rainfall said to prevail over Papua New Guinea cannot move all mining wastes as the mining companies would have everyone believe. Furthermore, dilution factors have not always been effective in reducing concentrations of contaminating metals to acceptable

levels. This is another myth propagated by mining companies. The emphasis has now shifted to Misima, Lihir, and probably Manus where gold deposits have been found. It is therefore intended to use the largest waste disposal facility on Earth, namely the Pacific Ocean. This method of disposal cannot be applied to the proposed inland Porgera gold mine in Enga Province where the mining company wishes to dump 66 mt. of wastes into the Strickland River system. It is claimed that much of the wastes will stay in the river system but there is a possibility some of it will enter the Fly river and therefore add to the wastes discharged from the Ok Tedi mine. The latter is about 21,000 tonnes of slimes per day. The flow from the mouth of the Fly river is southeastward into the Coral Sea and partly southward into the Great Barrier reef down Australia's East Coast.

WASTES AND AMBIENT METAL LEVELS

The addition of heavy metals by whatever pathway may have a tendency to overload near-critical, naturally high background levels of many metals in localized areas of Papua New Guinea. The country rocks of the Cabelement of the Sepik , and Strickland Rivers contained high contents of mercury, and ambient levels of the metal are higher than elsewhere in Papua New Guinea.

Provided the rivers remain unpolluted and the people living in that region are not compelled by changes in circumstance to live largely on a fish diet there is little danger of mercury poisoning. In various local areas cadmium, manganese, zinc, nickel, cobalt, iron and lead have been detected in relatively high concentrations in waste but not above World Health Organization standards. This is not remarkable in Papua New Guinea, which

is seismically active and where deposits occur in fairly young (geologically-speaking) intrusions. Therefore, extensive weathering has not had time to occur, and obviously mining operations have released any compounds associated with an ore into the environment.

Clearly, the weathered materials in such geological anomalies is not typical. This would seem to be obvious despite the glossing over of the adverse effects of mining without proper control by certain interested parties. In this regard analysis of river water of the site of the gold mine at Wau, Morobe Province, showed increases of copper content by 400 times, lead 800 times and zinc 20,000 times from 1981, when very little mining activity had occurred, to 1984, when such activity substantially increased.

DILUTION OR PRECIPITATION?

The water quality improves downstream, but whether this is the result of dilution, as is maintained by mine operators, or whether the metal concentrations decrease because of other reasons is not yet clear. Those metallic ions which precipitate out in the pH range from 5 to near neutral are Cr^{+++} and Cu^{++} at 5.3, Fe^{++} at 5.5, Pb^{++} at 6.0., Cd^{++} at 6.7, Zn^{++} at 7.0 and Hg^{++} at 7.3.

The possibility exists therefore for deposition of metal last in bands with important environmental implications, when the metals are mobilised again either by a surge of acidic discharge water from the mine or by natural chemical and biological processes.

Not all metals in mine wastes are present as ions. Some are undoubtedly present as constituents of colloids while others are present in larger particles. For all of these a river estuary constitutes a waste sink, so most materials will deposit there rather than upstream. Brackish and soft waters certainly act as very efficient sedimentation agents for colloidal materials, while reduction in stream flow will cause many larger particles to settle at the river mouth. These contain heavy metals with a distinct potential to contaminate the environment, including mangrove swamps, fish and other marine resources. In addition, turbidity caused by mine wastes along a river has the effect of killing fish and molluscs which are valuable food resources.

ECONOMIC BACKGROUND

All of this can and does occur because the need is felt to derive short term economic gains from mining as a kind of bonus to top off the income from renewable resource industries. In 1984, in Papua New Guinea, the national revenue from the latter was twice that which comes from mining. This is despite expectations that large mines such as the Ok Tedi Gold/Copper mine and Bougainville Copper mine at Panguna would save the economy.

Publicity associated with these types of exotic projects has had much to do with raising unwarranted expectations. At the same time mining has the potential to sterilise for decades localised but extensive areas of land and water with actual or potential capability of sustaining renewable resource developments.

LEGISLATIVE REALITY

The problems as indicated are not necessarily unique to Papua New Guinea, but the large number of mineralized areas where mining is possible make them very pressing. In addition, the understandable aim of achieving development quickly has resulted in short cuts being taken to ensure that individual development projects are not environmentally assessed before government approval is given. Environmental concerns come well after approvals are given to a developer, often a multinational company, to proceed. Naturally, developers will take the path which gives them the highest profit for the least trouble and expense. Environmental legislation is then applied to an existing, more-or-less fixed set of conditions, and must be applied in such a mannner as to alleviate stress on the environment rather than propose or take measures to avoid any adverse effects.

A PERSPECTIVE

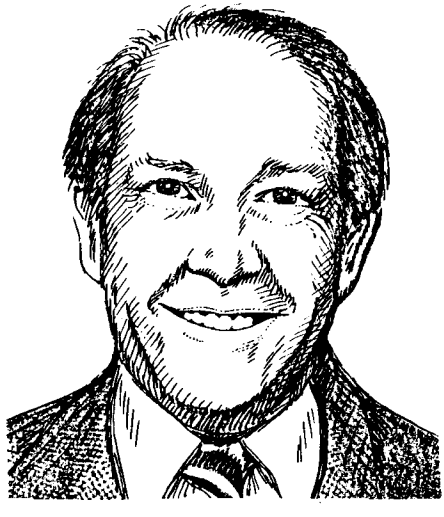
In the overall national context, mining developments either cause or have the potential to cause major environmental problems.

The present strategy is to contain these and to continually monitor the situation as far as is possible, in order to identify areas of concern. Nevertheless, there are other environmental problems which, if they are not dealt with now, will cause major problems in the future. Of these, urban pollution from industrial areas resulting from the population drift to the cities is already bad and will worsen unless measures are applied and planning carried out to combat them. It is only recently that the Department of Environment and Conservation made the first survey of urban waste and management in Port Moresby, the capital of Papua New Guinea. Currently, disposal methods are inadequate or non-existent in many urban centres yet Port Moresby's population will increase from 145,000 at present to about 300,000 by the year 2000. The same kind of increase will occur in all other urban centres. Sewage disposal is also a problem. In many towns raw sewage is disposed directly from buckets into the sea. Coral reefs are being killed. While the disposal of mine wastes is one special and increasing problem, it is localised. An emerging problem that is even more widespread is that caused by solid and liquid wastes from urban areas.

So what is pollution?

by

Alasdair McIntyre



Alasdair McIntyre is Director of Fishery Research Services at the Department of Agriculture and Fisheries for Scotland, and is a Research Professor at Aberdeen University. He is a former chairman of GESAMP and of the Advisory Committee on Marine Pollution of the International Council for the Exploration of the Sea (ICES).

One thing that all scientists have in common is the need for unambiguous communication about their professional activities. This is one reason why, some years ago, I welcomed the initiative of the Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP) in constructing a definition of "pollution".

The wording they developed is now well known: "The introduction by man, directly or indirectly, of substances or energy into the marine environment (including estuaries) resulting in such deleterious effects as harm to living resources, hazards to human health, hindrance to marine activities including fishing, impairment of quality for use of sea water and reduction of amenities".

This definition was formulated after extensive consultation and discussion, and it has been widely accepted throughout the world, even being built into the text of several international marine pollution conventions.

One reason why I particularly like the GESAMP definition is that, by including the concept of an adverse effect, it allows a distinction to be made between pollution, on the one hand, and the anomalous presence of a substance that does not appear to be detrimental, on the other, and which can be referred to as contamination.

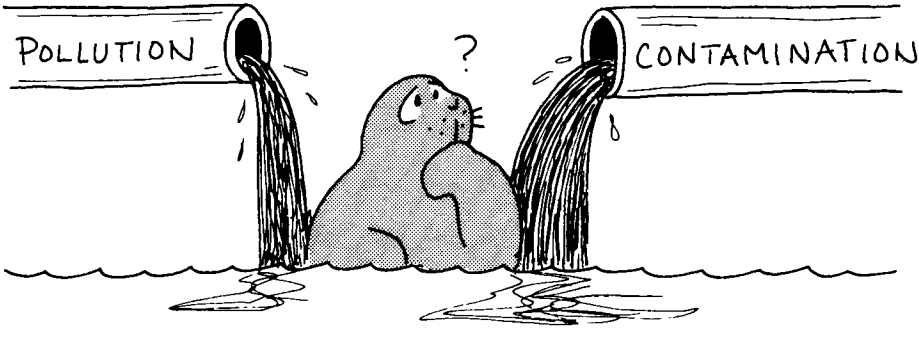
This distinction between pollution and contamination is commonly applied. It is one I frequently turn to and find most useful. However, I have to recognise that some of my colleagues consider this trivial and others point out that the word "contamination", far from occupying the neutral role I like to assign it, can have emotive overtones which are just as substantial as those associated with "pollution". In accepting this, I recognise that the distinction is not always clear-cut, but I contend that it is still worth making as long as the difficulties are recognised. It is thus worth examining the definition and considering where problems may arise.

The trouble is that the use of words like "deleterious" and "harm" introduces value judgements, so that even those who accept the definition of "pollution" may disagree on its application; that is, on whether a given situation represents an example of pollution in the field. The obvious solution of course is to produce a definition of "harm", but that poses additional difficulties.

It might be possible to find an unambiguous definition of harm in relation to public health. When we are dealing with human beings it is easier to agree on standards since the death or injury of an individual is not generally acceptable, and this criterion provides a baseline. Such extremes are fortunately rare in the context of marine pollution. More frequently we are faced with assessing harm to the marine ecosystem apart from man and on this it is much more difficult to reach agreement.

Apart from public health issues, the nearer one is to human interest the easier it is to develop a value judgement. Thus, if some amenity is threatened, its users are likely to be of one mind, and the death of a bird or furry mammal can arouse immediate concern. But the death of a single mud-burrowing polychaete worm is unlikely to cause a stir. In that situation "harm" would be looked at through different eyes and would be recognised in terms not of single individuals but rather of the destruction of a habitat or ecosystem.

Pollution in the environmental rather than the public health sense may be envisaged in two areas, the local and the global. On the local



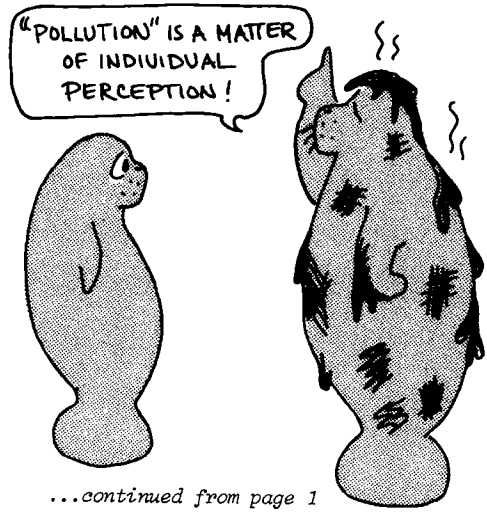
scale the target will often be clearly focused and of short-term duration and space -- at a discharge outfall, around an oil production platform or in the centre of a dumping ground. On the global scale the concern may be more general, about the overall state of the ocean, and have a long-term impact.

It is in these circumstances that agreement on what constitutes harm becomes more difficult to reach, and the difficulty increases with the time scale. At the local level where there are obvious effects, the advantages of permitting the input will be weighed against the disadvantage occasioned by stopping it, and strong views may be held on both sides -- one claiming pollution, the other disagreeing with the claim.

On the global scale the situation is usually more tenuous, because often it is not even clear that an effect can be measured, and in such circumstances the value judgement is a function of personality, the pessimists seeing pollution, the optimists expressing doubt.

The conclusion, of course, is that in accepting the definition of pollution we must recognise that it implies certain social, economic and political judgements, and that in making these judgements the scientists, including those who established the definition, are no better than anyone else.

Where the scientist does have a role, however, is in uncovering and establishing the relevant facts. This is why the activities of groups such as GESAMP in assessing and advising, and UNEP in the practical field application, play a vital role. It is only against the background of such activities that a strict definition of pollution is viable.



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"Naturally, this will be done as soon as possible, although, as you might expect, the recent radical changes in our staff structure and the setting up of new offices in Nairobi is causing a good deal of disruption. The programme's continuity is bound to suffer, at least temporarily."

As a result of the move to Nairobi, publication of The Siren is likely to be interrupted for some time.

We apologize for this unavoidable consequence of the move, and hope that publication will resume before too long.

In the meantime, our heartfelt thanks go to you, our readers, and to all those who have helped make this modest publication a success.

Please address all inquiries to:

Director
Programme Activity Centre for Oceans and Coastal Areas
UNEP Headquarters
P.O. Box 30552
Nairobi, KENYA

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The session noted that the review of hazard profiles for substances carried by ships and the work on guidelines for evaluating "threshold values" for fish tainting would be continued.

The first review on atmospheric transport of contaminants into the Mediterranean was considered as completed, and will be used as the scientific basis for action envisaged under the Barcelona Convention and the Mediterranean Action Plan.

Results on the land-sea boundary flux of pollutants which have been collected by correspondence were examined and made the subject of a detailed review at a special meeting held in Roscoff, France (July 1985).

The interim report on the guidelines for the assessment of the impact of potentially harmful substances released from land-based coastal sources was discussed in great detail. Their completion, including demonstration of their practical applicability, was requested for the next session of GESAMP.

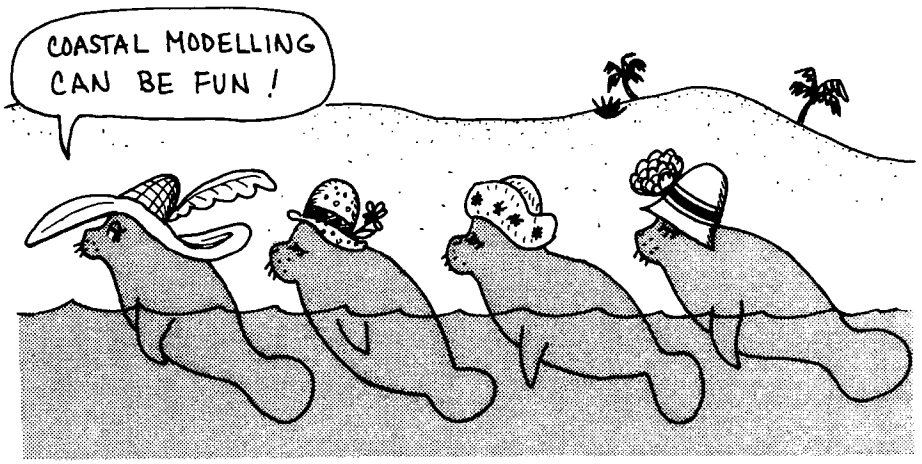
For technical reasons no progress has been made since the last session of GESAMP on the inquiry into the scientific justification for integrated global ocean monitoring related to marine pollution. A special meeting on that subject is planned for Riga, USSR, later this year.

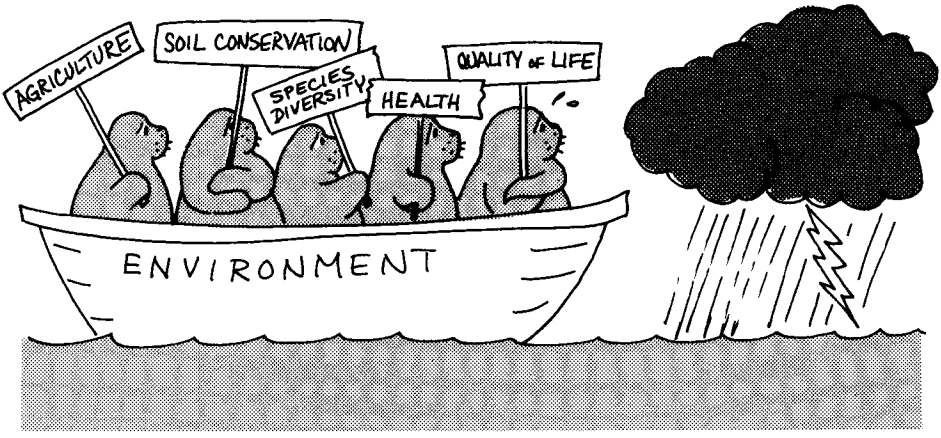
Two new activities were launched by the last session of GESAMP.

A working group was set up under the leadership of IAEA to evaluate the state of the art of coastal modelling relevant to waste disposal and to recommend models appropriate for specific coastal situations.

Another working group was established under UNEP's guidance to prepare the next overall evaluation of the state of the marine environment.

GESAMP is the IMO/FAO/UNESCO/WMO/WHO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Pollution.





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The east coast of Africa is beset by oil spills and discharges from tankers passing through one of the world's major maritime transportation routes for Middle East crude oil. The narrow channel between Mozambique and Madagascar is considered especially vulnerable. The Protocol concerning Co-operation in Combating Marine Pollution in Cases of Emergency will help to increase the region's capabilities to respond to spills of oil and other materials.

The area's coastal ecosystems are under severe threat from a number of human activities. Uncontrolled coastal development, sewage disposal from cities and ill-planned tourist establishments, and erosion are some of the factors threatening the region's coastal waters, coral reefs, grass beds and mangrove forests, and the rare and endangered marine animals which inhabit them including the dugong, the coconut crab, the giant clam, black coral, the Seychelles fish eagle, the Mascarene black petrel, and the blue whale.

According to the Protocol concerning Protected Areas and Wild Fauna and Flora in the Eastern African Region, the Contracting Parties "shall take all appropriate measures to maintain essential ecological processes and life support systems, to preserve genetic diversity, and to ensure the sustainable utilization of harvested natural resources...," as well as to "protect and preserve rare or fragile ecosystems as well as rare, depleted, threatened or endangered species of wild fauna and flora and their habitats...."

"Adoption of these legal instruments and the action plan at this time shows a special resolve on the part of Eastern African countries to protect their environment," notes Patricia Bliss-Guest, the UNEP programme officer who co-ordinated the development of the Eastern African Action Plan. "Moreover, it demonstrates to the world their understanding of the importance of environmental protection in efforts to solve some of the problems currently facing the region."

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seas clean and safe. We believe strongly that prevention is always better than enforcement; a helping hand is more persuasive than a threat."

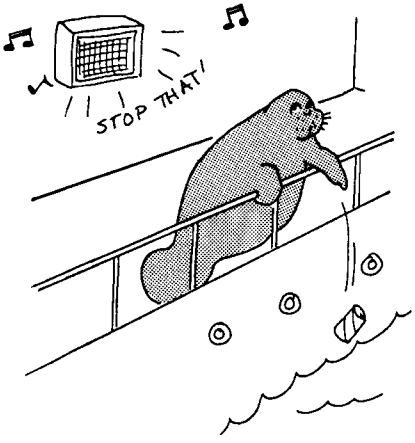
In practical terms, this has meant:

- Within a two-year period, 1,800 ships' officers and company officials participated in HELMEPA's technical and educational seminars.

- Check-lists of precautionary procedures to be followed during bunkering operations were printed on wall plaques for ships and on plasticized cards for individual seamen, allowing easy on-the-spot reference.

- Each member was given an I.D. card to help stimulate a feeling of solidarity with HELMEPA'S goals.

The public awareness campaign has been directed primarily at children, and it is estimated that every child who becomes aware of HELMEPA'S efforts will influence at least five other children and adults.



As part of the campaign, two television stations donated free air time to show a cartoon featuring the HELMEPA seagull. Mobile and permanent exhibits, stickers, seagull posters, and Christmas cards were produced, and a poster contest was held which attracted entries from school children all over Greece.

"We were pleased to find that our approach to the public is reinforced and interrelated with that to the shipping industry itself," comments Mitsatsos. After all, the people who live near the sea in coastal villages are often involved directly or indirectly in shipping. Seamen can see quite clearly how their own facilities are affected by pollution of the sea, beaches and seafood."

HELMEPA is still expanding its efforts. It has recently begun to approach owners of small craft to enlist their help in keeping the shoreline free of litter. And a cassette tape of music alternating with anti-pollution messages in three languages has been produced for passengers of coastal and cruise vessels.

HELMEPA staff feel their campaigns are working, not only to clean up the sea but to create a new sense of responsibility and unity on the part of the shipping community and the public.

"Although ship-generated pollution accounts for only a small percentage of all marine pollution, it happens to be both visible and dramatic when it occurs," explains Mitsatsos. "This is why we are bending over backwards to prevent pollution from our ships, and may explain why the response to our campaigns has been so overwhelming."

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Schools in the SPREP region require environmental resource material of a special nature, and most of what is available from developed countries is of only limited relevance. A joint effort between the SPC Library and SPREP will produce an annotated catalogue of environmental content in school syllabi and general resource material, with emphasis on coral reefs, traditional conservation practices, and small-scale technology.

In another educational activity, SPREP has produced four new fact sheets on soils, pesticides, conservation and forests for school children to encourage environmental awareness.

In an attempt to encourage the setting up of parks and nature reserves in the South Pacific, representatives of most of the region's 22 island countries and territories, plus Australia, New Zealand, the U.S. and several international conservation organizations, met from 24 June to 3 July at the Third South Pacific National Parks and Reserves Conference in Western Samoa. Each country reviewed its potential for park establishment, and described in detail any existing parks. The meeting resulted in material for a directory of protected natural areas in the South Pacific, a regional strategy for the identification, establishment and management of a network of protected areas, and a clear directive on the future of the Convention on Conservation of Nature in the South Pacific.

On a more practical level, a five-day training course was conducted for 20 protected area managers on park administration and interpretation following the Conference.

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Since the last ROPME meeting, implementation of the region's Action Plan has considerably slowed, especially its marine pollution monitoring activities. The military operations in the region are not the major reason, according to meeting participants, but rather lack of trained personnel to carry out implementation of Action Plan projects, and the fact that full use has not been made of the help offered by UNEP and other United Nations bodies.

A number of steps are to be taken to improve the situation. The meeting recommended that attendance at training workshops and symposia be improved, that the ROPME Secretariat and the Marine Emergency Mutual Aid Centre (MEMAC) be strengthened with additional qualified staff, that relations be improved with United Nations agencies, and that steps be taken toward the adoption of the protocol on land-based sources now in preparation.

The meeting also agreed that co-operation between ROPME and UNEP, including present Trust Fund arrangements, should be extended through June 1987. Marine pollution research and monitoring activities were extended through 1986.

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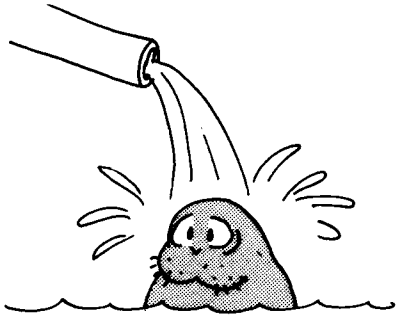
have any -- but by intelligent and scrupulous attention to a thousand important, seemingly small details.

Q: If you were starting over today, what would you do differently?

A: You cannot start anything twice in the same way. Therefore your question is too hypothetical and it would be easy to be wise with hindsight. We undoubtedly learned as we were "doing it", making mistakes and benefiting from them. Each case was, however, different and in most cases only common sense saved us from repeating our mistakes. I hope there were not too many of them or, at least, that they were not too obvious.

Q: Reversing a trend -- such as deterioration of the marine environment -- is a very long process. Are there any regional seas where there has already been a noticeable effect, where the sea is actually cleaner or safer because of the programme?



YOU MEAN IT COULD HAVE BEEN WORSE?

A: Probably none of the regions covered by our programme is "cleaner and safer" than it was 10 years ago. But many of them are cleaner and safer than they would have been had we not been around. The deterioration of the marine environment didn't begin yesterday, and more time is needed to reach a point when you can say that it is cleaner than it was yesterday.

Q: Where do you expect to see the best results in, say, 20 years, if all goes according to plan?

A: The Mediterranean is my candidate, although lately we have seen that the Governments are reluctant to assume their formally-accepted responsibilities whenever it costs money. Some of us are still not ready to admit that a cure requires medicine, and medicine is frequently unpleasant and costly.

Q: Today many more Mediterranean labs, with UNEP's support, are better able to produce valid, comparable scientific results than they were in 1974. But the Mediterranean is a special region, and it had a certain scientific infrastructure in place even then. Are there possibilities for similar successes in other regions? Where?

A: Everywhere. We don't need to be impatient. Science was born on Mediterranean shores some 2,500 years ago but, as history shows, nobody has a monopoly on science.

Q: Africa is a continent with almost unbelievable human, social and political problems, yet there are two very active programmes (four, counting the Mediterranean and the

Red Sea) under way there. Eastern Africa, during these difficult times, has just adopted three legal agreements and an action plan. West and Central Africa has had an action plan since 1981. How do you account for this surprising support in the face of so much trouble?

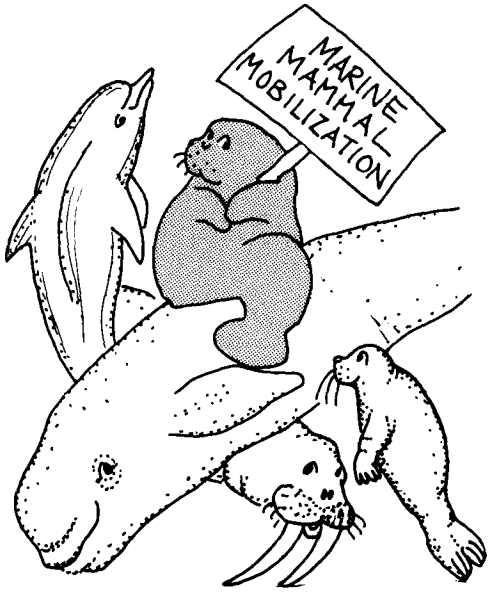
A: We have succeeded in mobilizing the most unlikely partners around environmental issues at a time when one would think they had more important things to worry about. It just shows that our approach was correct and that the solution of environmental problems, if properly approached, is recognized as a high priority. In spite of everything, nobody can avoid feeling that by degrading the environment we are degrading a part of ourselves.

Q: Only recently has the global action plan for marine mammals come under OCA/PAC auspices. The first step was to get the NGOs involved (see cover story, Siren 28). What is the next step? Given UNEP's mandate, what is its best course of action?

A: With its meager resources UNEP alone cannot do much. As in the case of the Regional Seas Programme, the key to success is the mobilization of all those who care for marine mammals. Naturally, for that you need imagination, courage, freedom of action -- and some money.

Q: How important are OCA/PAC's scientific "connections" (GESAMP, etc.)? What has been their role so far, and how would you like to see it develop?

A: We have always tried to use science as the most rational approach

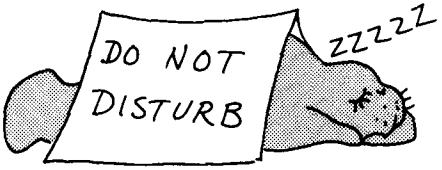


to the solution of practical problems. Our links with the scientific community provided the basis for action, even in fields which virtually were not subject to scientific analysis. The future of the programme we started is going to depend to a large extent on the will and ability of those who take over from us to use science as their indispensable and most powerful tool.

Q: Some scientists say they don't find "pollution" research intellectually challenging. Do you agree?

A: I don't agree with that at all. Some of the best minds in the field of oceanography are active "pollution researchers". For those who believe in the social responsibility of scientists, environmental research is an intellectual challenge par excellence.

Q: Why did you get into it in the first place?



A: Since the early 1960s, when it was neither fashionable nor profitable, I have been a convinced and active environmentalist. Why? Because I felt that as a scientist this was the field in which I could combine my curiosity, energy and skill with the desire to express myself.

Q: Is there really any hope that there is time enough left to head off environmental disaster?

A: I am a born optimist, in spite of the evidence which is, apparently, against me. I believe that the world has enough resources -- technical, scientific and material -- to eliminate poverty, disease, hunger and early death, for the whole human race. I must admit, though, to being haunted by the idea that man is simply too hilariously stupid to survive.

Q: The Executive Director of UNEP decided to transfer the offices of OCA/PAC from Geneva to Nairobi. In your view, how will the transfer influence OCA/PAC's work?

A: Although the past achievements of OCA/PAC were primarily the result of the quality of its staff, these achievements were due also to favourable conditions under which OCA/PAC has operated in Geneva. I doubt that these conditions can be recreated, or even closely matched, in Nairobi.

Therefore I fear the transfer to Nairobi will, at least in the short and medium terms, negatively influence OCA/PAC's efficiency and output.

Q: What is your personal reaction to the transfer of OCA/PAC in Nairobi?

A: I feel a great sadness and regret that a promising United Nations initiative has been hurt, unnecessarily, when it was in full swing. This would be a bitter and painful experience for anyone who had his heart in the job.

Q: You resigned as Director of OCA/PAC. Why?

A: The entire staff of OCA/PAC has resigned, some of them after working together for 10 years. The staff, on whose experience, skill and devotion the success of the programme so much depended, are irretrievably lost. Like a good ship's captain I stayed and worked until the last moment. I simply can't see myself responsible for starting all over again from scratch to rebuild a programme which above all needed continuity.

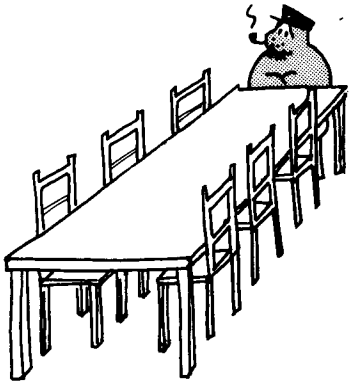
Q: What is going to happen to The Siren?

A: Since the editor of The Siren, Nikki Meith, has been forced by these circumstances to abandon her, our Siren has become an orphan. It's sad to think that such a charming creature will disappear forever, so all we can do is hope that she is only going into hibernation.

farewell

The previous issue of The Siren announced the departure of Francisco Szekely and Dan Elder from the UNEP Oceans and Coastal Areas Programme Activity Centre. The former has taken a job lecturing at the Massachusetts Institute of Technology (MIT) in Boston, the latter joined the International Union for Conservation of Nature and Natural Resources (IUCN) to co-ordinate their marine programmes.

The Siren is sorry to announce further departures from OCA/PAC: Patricia Bliss-Guest has enrolled in the Harvard Law School in Cambridge, Massachusetts; Mel Gajraj joined UNEP's Industry and Environment Office in Paris; Mohamed Tangi is soon to become Director of International Relations, Training and Legal Affairs in the Ministry of Marine Fisheries and Merchant Navy of Morocco; Nooriya Koshen has gone to work for IUCN's Operations Division, and Stjepan Keckes is departing for an as-yet-unspecified destination.



dedication

The word "dedication" is most appropriate for the tribute which the entire staff of OCA/PAC wishes to pay to their "boss", Stjepan Keckes. His dedication to the programme, and to each of his colleagues individually, has made working with him the high point of our professional careers. He has always encouraged (and allowed!) us to work at our maximum capacity, giving us opportunities to learn from experience, with his invaluable guidance, and to try our hands at new, often unexpected tasks. In this way he has helped us to shape our careers to suit our talents and capabilities, sometimes in ways we could not have predicted, while his own ambitions have been expressed entirely through and for the benefit of the programme and his team of colleagues.

We would therefore like to acknowledge these outstanding personal qualities of Stjepan Keckes, since his professional accomplishments speak for themselves.

Admiral, we'll miss you!

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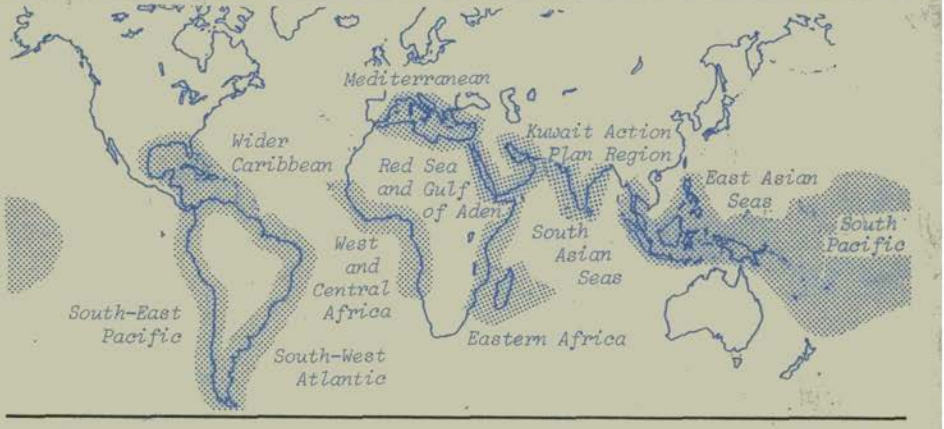
the regional seas



The Siren is issued four times a year in English, French and Spanish. It is intended as an informal presentation of the news from the Regional Seas Programme of the United Nations Environment Programme (UNEP), and does not necessarily reflect the official opinions of UNEP or its staff.