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**Coherence of Conservation and Development Policies of Coastal and Marine
Protected Areas in West Africa**

**Cohérence des politiques de conservation et de développement des aires
protégées marines et côtières en Afrique de l'Ouest**

**Coerência das políticas de conservação e de desenvolvimento das áreas
protegidas marinhas e costeiras na Africa Ocidental**

BIBLIOGRAPHY ON MARINE PROTECTED AREAS

General and West African references

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24. POLLUTION

Sheppard, C., & Bellamy, D. (1974). Pollution of the Mediterranean around Naples. *In: Marine Pollution Bulletin*, 5(3), 42-44. Notes: 1974 yearbook - summary of activities carried out (by the Parco Marino di Miramare)

Abstract: This report compares the heavy metal content of 2 dominant benthic organisms in the newly-declared marine park of Castellabate, with those from the Bay of Naples. The urchins *Arbacia lixula* and *Paracentrotus lividus* were selected, and the gonad and gut were analysed for the heavy metals Pb, Zn, Cu, Ni, and Mn. Except for Mn, they showed 1.2-to 2.8-fold increases in the Bay of Naples. The dry wt of the urchins from the Bay of Naples was much smaller (0.5 and 0.3) than those from Castellabate, either because of restricted growth or they were dying before reaching adult size. Ageing was not carried out. Data is presented for heavy metal levels in *Mytilus* from Naples, and the authors note that Italian law does not state maximum levels for these toxicoids in foods. Lead, for example, in the Naples mussels, has a conc of 56.7 +-8.1 ppm, whereas mussels from the Bristol Channel have a level of 2.0-9.5 ppm. The UK maximum permitted level is 2.0 ppm. The writers note that the Bay of Naples is itself an old volcano crater, and water mixing between the Bay and the Mediterranean is restricted, which might be an increasing factor in heavy metal level. The authors also suggest that volcanic activity or other geological phenomena may contribute to the high levels of toxicoids in the area.

Augier, H., Gille, G., & Ramonda, G. (1976). Recherches sur la pollution mercurielle en rade d'Hyères et dans l'archipel des Stoechades (Méditerranée, France), 1. Teneur en mercure des eaux, des sédiments et des phanérogames marines de milieu lagunaire dans l'anse de Port-Cros (Parc National). *In: Travaux Scientifiques Du Parc National De Port-Cros*, (2), 23-28.

Abstract: The utilization of atomic absorption spectrophotometry without flame had permitted the determination of the mercury in water, sediments and tissues of marine phaeogams in the lagoon of Port-Cros bay. Results show that *Zostera noltii* and *Cymodocea nodosa* concentrate the mercury into their tissues, even when the amount of the metal in the water is very low. There are also differences between leaves, rhizomes and roots of the two studied species. Precise dosings show that mercury pollution is not important in Port-Cros at least in this place and time

Beden, P. de. & Bussani, M. (1976). The marine park of Miramare, near Trieste within the project 'Man and the Biosphere' (MAB) of Unesco. Protection of the Mediterranean coast. Part 1. 3rd study session on marine pollution (Split, 22-23 October 1976). Monaco: Commission Internationale pour l'Exploration Scientifique de la Mer Méditerranée

Catalfamo, E. (1976). Present state of pollution in the Gulf of Trieste. 1975 Yearbook. Annuario 1975. Trieste (Italy): Parco Marino di Miramare.

Commission Internationale pour l'Exploration Scientifique de la Mer Méditerranée, M. & Gruppo Ricerche Scientifiche Tecniche Subacquee, F. I. (1976). Proposal for a natural reserve at the Island Pianosa (Tyrrhenian Sea). Protection of the Mediterranean coast. Part 1. 3rd study session on marine pollution (Split, 22-23 October 1976). Monaco: Commission Internationale pour l'Exploration Scientifique de la Mer Méditerranée

Guillaud, J. F. & Sylvant, B. (1976). Working group: Parks and reserves in marine environment. Place studies the 'Baie des Veys'. (p. 138). [s. l.]: [s. n.].

Abstract: After a detailed study of the natural setting (climate, hydrology, sedimentology, benthic and algal population) the authors consider all the economic activities of the region in order to show the suitability of the bay for creation of a marine park. Fishing, hunting, aquaculture, tourism, agriculture and pollution require a system of regulations and the eventual creation of a 'marine park' would allow measures necessary for the protection of the site, to be taken.

IUCN. (1976). Promotion of the establishment of marine parks and reserves in the northern Indian Ocean including the Red Sea and Persian Gulf: papers and proceedings of the regional meeting, Tehran, Iran, 6 to 10 March 1975. (pp. 169, 13 tab., 1 map). [s. l.]: International Union for Conservation of Nature and Natural Resources.

Abstract: This presents the papers and proceedings of the regional meeting on marine parks and reserves in the Northern Indian Ocean, including the Red Sea and the Persian Gulf, convened in Tehran in March 1975. Bahrain, Ethiopia, Egypt, Iran, Kenya, Kuwait, Pakistan, Saudi Arabia, Somalia and Sudan were represented, and this publication includes the country reports. There are also reports on existing and potential marine parks, and on pollution, and the recommendations of the various working groups are presented in summary form.

Lacaze, J. C., Pemp, X. L. E., & Villedon de Naide, O. (1976). Hydrobiological studies in connection with the carrying out of large scale experimental pollution in the Rance estuary. Primary production in relation to certain physico-chemical parameters. *In: Bull. Mus. Natl. Hist. Nat.*, (3. Ser.), Ecol. Gen.(386), 71-105.

[Anon.]. (1977). Addition to the annual review of significant legislative, administrative and judicial activities [in the USA] during 1976: Water Quality Committee. *In: Nat. Resour. Lawyer*, 10(2), 297-403.

Abstract: In 1976 no significant or substantive changes were made in the Federal Water Pollution Control Act (FWPCA), Safe Drinking Water Act, or the Marine Protection, Research and Sanctuaries Act. The Environmental Protection Agency which administers these acts, promulgated a broad body of important regulations in 1976. In addition, a large number of significant judicial decisions interpreting the requirements of the FWPCA were rendered in 1976. These administrative and judicial decisions are discussed in the article

Augier, H., & Maudinas, B. (1977). Variations de la croissance et de la teneur en pigments de la phanérogame marine *Posidonia oceanica* dans le Parc national de Port-Cros en fonction de la profondeur. Étude préliminaire des paramètres physiologiques et biochimiques susceptibles de caractériser le degré d'impact de la pollution sur l'herbier de posidonies. *In: Travaux Scientifiques Du Parc National De Port-Cros*, (3), 39-55. Notes: Incl. Bibliogr.: 85 ref.

Abstract: The quantitative distribution of the chlorophylls, carotenoids and xanthophylls, and the growth rate of leaves were studied in *P. oceanica* from different places in Port-Cros National Park. The growth rate and the pigment composition of this marine phanerogam appears as a function of the depth and of the degree of pollution. The results obtained afford a method, to evaluate the influence of the pollution on Posidonies, which can be used in other places of the French Mediterranean coast

Boudouresque, C. F., Belsher, T., & Marcot-Coqueugniot, J. (1977). Végétation marine de l'île de Port-Cros (Parc National). 17: Phytobenthos du port de Port-Cros. *In: Travaux Scientifiques Du Parc National De Port-Cros*, (3), 89-120, Incl. bibliogr.: 42 ref.

Abstract: 124 taxa of Bryopsidophyceae, Chlorophyceae, Phaeophyceae and Rhodophyceae are listed. Vertical faces of piers are dominated by a mixed association of algae growing under conditions of low light and slight pollution, namely *Platythamnio-Compsothamnetum*

thuyoidis- ass. nov. *A Zostera noltii*- meadow (Giraudyo-Zosteretum noltii)- is well developed on the horizontal bottoms; occasionally, the *Ulvetum rigidae*- phytocoenosis is seen on stones; scattered shoots of *Posidonia oceanica*- are the only vestige of *Posidonia*- beds (*Posidonietum oceanicae*)- which have now disappeared from the studied area. Estimates are given of the coverage or abundance of algae within these phytocoenoses.

Brown, D., Bawden, C. A., Chatel, K. W., & Parsons, T. R. (1977). The wildlife community of Iona Island jetty, Vancouver, B.C., and heavy-metal pollution effects. *In: Environmental Conservation*, 4(3), 213-216.

Abstract: Marine and terrestrial animals have been shown to be particularly abundant in a wildlife community associated with a marine sewer outfall from the City of Vancouver. These same animals are contaminated with high levels of heavy-metals but are apparently protected from their poisonous effects by the production of a protein known as metallothionein. The amount of metallothionein and heavy-metal loading appears to depend primarily on the degree of pollution and secondly on the species of animal and its position in the food-web.

Nelson, H., Larsen, B. R., Jenne, E. A., & Sorg, D. H. (1977). Mercury dispersal from lode sources in the Kuskokwim River drainage, Alaska. *In: Science Washington*, 198(4319), 820-824.

Abstract: The Kuskokwim R. is not industrially polluted, but it does have an anomalous mercury content due to cinnabar particles in bottom sediments near natural mineralized sources; the mercury content is rapidly diluted downstream by physical mixing with other sediments. Mercury anomalies extend the greatest distance downstream in the tributaries, the finest size fraction of bottom sediment, the riverbank deposits, the suspended sediment, and water; the last two of these categories contribute the bulk of the mercury to the marine environment.

Olsen, A. (1977). Exploitation and conservation of renewable resources of the gulfs and coastal lagoons. *In: Aust. Mar. Sci. Bull.*, (60), 7.

Abstract: Spencer Gulf and St. Vincent Gulf were designated State waters in the South Australian Colonization Act 1834 and this provision was upheld in a recent High Court Decision (1977). Within the hypersaline (to 50%) high temperature (to 26-degree-C) aquatic environments in the upper peripheral sections of the two Gulfs are dominant white mangrove (*Avicennia*) - seagrass (*Posidonia*) communities grading upwards through mud and sand flats to subtidal seagrass - *Pinna* (razor shells) zones before reaching the deeper *Pinna*-sponge infauna associations in the channels. Aquatic reserves have been proclaimed to conserve these ecosystems and three new large reserves are in final stages of proclamation. Commercial catches of scale fish (whiting, schnapper and garfish) total 1.-.5 million kg and account for 46% of the total S.A. scale fish landings. Aquaculture of the Pacific oyster (*Crassostrea gigas*) is practised in the open waters and in man-made lagoons. A prawn culture centre has also been established. Pollution of the marine environment is localised to main population centres, sewage contributing the largest volume of fresh water to the system. Industry is mostly of the 'dry' type with minimum freshwater discharges due basically to lack of fresh water in the semi-arid environment of South Australia. Iron-, zinc- and lead-concentrate dusts constitute the basis of heavy metal pollutants at industrial ports. In this overview of the exploitation and conservation of the renewable aquatic resources of the two Gulfs, the responsibility of the resource manager for the proper use of the common property resources of these waters for the benefit of the whole community is necessary.

Tont, S. A., & Delistraty, D. A. (1977). Food resources of the oceans: an outline of status and potentials. *In: Environmental Conservation*, 4(4), 243-252.

Abstract: Knowledge of the present status and future potential of the world's marine food resources is a key prerequisite to their ecological exploitation. Rationales for the exploitation of these resources are twofold. Most important is the expectation that more time to reduce human population growth - the ultimate goal - could be made available. Secondly, because fish and shellfish are typically high in their content of protein and low in fat, nutritional quality in the human diet can be improved through their increased use. Fundamental to marine biological production are the phytoplankton populations which comprise the basis of the oceanic food-structure. This production involves the photosynthesis of organic matter by phytoplankton and the subsequent flow of this matter through the food-web. Spatial and temporal discontinuities in marine production are related to the patchy distributional pattern of phytoplankton and to natural fluctuations in oceanic populations due to geographically and temporally varying conditions. A review of past estimates of the potential marine yield suggests that there has been significant variation in the methodology employed to arrive at these estimates. Much-improved management of the oceanic food resources is urgently needed. Present mismanagement of these resources includes chemical pollution and the overexploitation of several important fish-stocks, which together threaten the viability of marine life. On the positive side, the future potential of the overall marine food-resources appears to be considerably larger than the present yield. The current harvest can be augmented by further development of aquaculture and by the exploitation of unconventional species, both of which could offer a relatively untapped source of valuable protein. Thus, Man must quickly establish and implement a rational, global management plan for the world's oceans and control his own population numbers to ensure conservation of the marine food-resources.

Anderson, A. W. (1978). Major marine legislative actions in the 95th Congress. *In: Marine Technology Society Journal*, 12(5), 32-34.

Abstract: The author reports on significant marine-oriented laws enacted in the 95th Congress, concerning the protection of marine mammals and sanctuaries, water pollution control, dredging, and fishing industry marketing. Pending legislation at the time of writing is also summarised, the seabed mining legislation being the most important and controversial

Cabioch, L., Dauvin, J. C., & Gentil, F. (1978). Preliminary observations on pollution of the sea bed and disturbance of sub-littoral communities in northern Brittany by oil from the Amoco Cadiz. *In: Marine Pollution Bulletin*, 9(11), 303-307.

Abstract: One of the peculiarities of the Amoco Cadiz oil spill, compared to that of the Torrey Canyon, has been the rapid penetration of a considerable amount of oil into the sea bed. This paper presents preliminary observations on this phenomena. The main factors investigated were as follows: sea bed morphology, currents and sediments; benthic communities; hydrocarbon pollution-penetration at depth; and effects of pollution on benthic communities. It is concluded that the final development of the disruption produced by hydrocarbons in sublittoral benthic communities is going to depend largely on two general conditions: (1) the natural capacity of the various types of habitat present to speed up or hinder their own cleansing; and (2) the proximity of more or less large reserves for recolonisation. The peculiar benthic structure of northern Brittany, characterised by the presence of coarse, pebbly substrates continually exposed to strong tidal currents, has resulted in the harmful consequences of pollution being felt primarily by and even being concentrated in communities in fine sediment, isolated from each other in bays and estuaries.

Hyedorn, A. E. F. (1978). Coastal zone management and conservation. *In: Ocean Management*, 4(2-4), 303-317. **Notes:** Presented at: Oceanology International '78; Brighton (UK); Mar 1978

Abstract: Improved understanding of the inter-relationship between physical and biological

parameters in the functioning of ecosystems, resulted in close interdisciplinary collaboration in the planning and development of Richards Bay Harbour on the coast of Zululand, southern east Africa. In its pristine state the lagoon utilized for this purpose had an area of about 3,000 ha, an average depth of 1 m, a narrow connection with the sea (resulting in considerable lag in tidal water exchange), river inflows through extensive filtering swamps and marginal vegetation fulfilling a vital stabilizing function. Because of the high biological productivity of the system every effort was made to retain its ecological viability in spite of harbour development. Collaboration between engineers, ecologists and planners resulted in a scheme whereby the lagoon was divided into a northern harbour area and a southern sanctuary area. The sanctuary receives a major proportion of river inflow and has been provided with its own opening to the sea. Water level and pollution control is aided by the provision of tidal gates in the berm wall. Apart from its biological function, the aesthetic and recreational asset of the sanctuary area to the growing city of Richards Bay is substantial. This paper discusses the success and failure of this scheme. The latter was caused by canalisation of a filtering swamp (i.e. flood-plain), by poor agricultural practices in the catchment and exceptional floods in 1976/77 resulting in massive silt deposition in the sanctuary area. Future management of the area is again heavily dependent upon interdisciplinary collaboration and the final outcome may yet be a significant ecological and aesthetic asset.

Ress, P. E. (1978). International pollution treaties in the Mediterranean. *In: Environmental Conservation*, 5(2), 100.

Abstract: Three agreements on Mediterranean pollution that were signed in Barcelona two years ago became international law on 12 February 1978. One commits Mediterranean countries to protecting the sea, their common heritage, from pollution 'for the benefit and enjoyment of present and future generations', another outlaws the dumping of certain dangerous substances from the land by ships at sea, and strictly controls dumping of less toxic wastes, while the third calls for cooperation in combating massive oil-spills. These three accords required the formal ratification of at least six of the 18 Mediterranean coastal states to enter into force. The first six states to ratify the Barcelona agreements were Spain, Tunisia, Monaco, Lebanon, Malta, and Yugoslavia - followed by France and Israel, while several other Mediterranean governments have indicated their intention to deposit their instruments of ratification in the coming months. Other treaties will be drawn up on special protection areas, such as marine parks, and on pollution that results from exploration and exploitation of the continental shelf and its 'subsoil'. Meanwhile, hundreds of the basin's leading marine scientists from some 80 laboratories in 16 of the Mediterranean countries have been monitoring pollution and carrying out special research for more than two years. In concrete terms they are counting tarballs on beaches, studying oil-slicks, measuring the concentration of mercury in tuna fish, examining the effects of DDT and PCBs on mullets, mussels, shrimps, studying the effects of pollutants on ecosystems, and mapping coastal currents.

Barnes, P., & Minkler, P. (1980). Bathymetric Changes in the Vicinity of the West Dock, Prudhoe Bay, Alaska. *Environmental Assessment Of The Alaskan Continental Shelf. Annual Reports Of Principal Investigators For The Year Ending March 1980. Volume 4: Hazards.* Boulder, CO (USA): Office of Marine Pollution Assessment, Pp. - pp. 313-317

Abstract: The marine environment in the vicinity of the causeway, which constitutes most of the West Dock facility at Prudhoe Bay has been the subject of considerable discussion with regard to the impact that such a feature may have on the environment. Two extensive earlier surveys (1950, 1976) are assessed along with a more areal restricted survey taken in the summer of 1979. The West Dock and causeway appear to have formed an effective break in the sediment transport regime, causing an increase in sedimentation in association with this feature. Sedimentation is most pronounced on the west side, although there is some shoaling on the east

side as well. The increased sedimentation rates in the bight southwest of the causeway are the result of decreased wave and current activity. Future plans to extend the existing causeway and to build new causeways should take account of the fact that sedimentation will be enhanced, at least in the immediate vicinity of such structures.>

Barnes, P., & Reimnitz, E. (1980). Geologic Processes and Hazards of the Beaufort Sea Shelf and Coastal Regions. Environmental Assessment Of The Alaskan Continental Shelf. Annual Reports Of Principal Investigators For The Year Ending March 1980. Volume 4: Hazards. Boulder: Office of Marine Pollution Assessment, Pp. 257-275

Abstract: This investigation is an expansion and intensification of earlier studies on the marine geology and modern sedimentary environment off arctic Alaska with emphasis on rates and processes and in particular the phenomena involving ice and its unique influence on the shelf and inshore environment. The marine environment of the arctic shelf poses special problems to offshore development. Faulting, tectonic activity, and sea floor instability are environmentally of lower concern in the Beaufort Sea, when compared to processes and low temperatures involving sea ice. Seven years of study have provided a basic understanding of this unique marine geologic environment. Oil drilling and production during the next several years will probably not extend into the stamukhi zone seaward of the seasonal fast-ice zone. Of critical concern are the ice gouge and strudel scour effects of structures and pipelines.>

Barnes, P., Ross, R., & Reimnitz, E. (1980). Break in Gouge Character Related to Ice Ridge. Environmental Assessment Of The Alaskan Continental Shelf. Annual Reports Of Principal Investigators For The Year Ending March 1980. Volume 4: Hazards. Boulder: Office of Marine Pollution Assessment, Pp. .- p. 333-343

Abstract: During the summer of 1979 a series of three precisely navigated side-scan sonar and bathymetry lines were run along well-located ice ridges observed in the spring of the same year. No obvious set of gouges lead up to the location of the ridge nor were gouges associated with the existing remnants of the ice ridges observed in summer. However, the innermost ice ridge of the stamukhi zone appears to correlate with a marked change in gouge character and to an abrupt change in bottom slope. The gouge orientation is essentially similar on both sides of the change. Diver observations coupled with vibracore sample data indicate that there is a decrease in the compactness of the surficial gravelly mud sediments on the seaward side of the slope and gouge change. Although the sediment textures are similar, there is a significant change in seabed character associated with the stamukhi zone. The cause and effect relationship between the ice zonation and the seabed character is well established; however the mechanisms for the abrupt nature of the break are unsure.>

Boucher, G., Reimnitz, E., & Kempema, E. (1980). New Seismic Evidence for a Widespread Occurrence of Gas in Submarine Sediments at Shallow Depths, Prudhoe Bay, Alaska. Environmental Assessment Of The Alaskan Continental Shelf. Annual Reports Of Principal Investigators For The Year Ending March 1980. Volume 4: Hazards. Boulder: Office of Marine Pollution Assessment, Pp. .- 276-283

Abstract: During August, 1979, high-resolution seismic data was collected in the vicinity of Prudhoe Bay, Alaska, for analysis by digital seismic techniques. An interface was identified at a depth of 20 to 35 m beneath the seafloor that appears to represent a rather widespread occurrence of free gas in the pore space of the sediments. This experiment is part of a more general study on uses of acoustical techniques to measure physical properties of seafloor sediments in situ. The presence of free gas in sediments is potentially hazardous in drilling operations and construction activities, as shown by the driller's abortion of hole 11 when gas was encountered. Thus areas characterized by strong negative reflectors on high resolution seismic records should be approached with the necessary precautionary measures by

developers.>

Browers, E. M. (1980). Ostracodes From 1977 Offshore Boreholes in the Beaufort Sea. Environmental Assessment Of The Alaskan Continental Shelf. Annual Reports Of Principal Investigators For The Year Ending March 1980. Volume 4: Hazards. Boulder: Office of Marine Pollution Assessment, Pp. .- 221-229 p.

Abstract: This report concerns 85 samples from offshore boreholes drilled in March-May, 1977. The holes were drilled in shorefast ice over the continental shelf in Prudhoe Bay. Identifications of ostracodes are listed in tables and interpretations are given>

Curlin, J. W. (1980). Ocean policy comes of age: the end of the beginning or the beginning of the end? *In: Sea Technology*, 21(1)(11), 24-28.

Abstract: The author takes stock of progress in US ocean policy during the decade 1970-1980. Several features of the decade stand out, namely (1) a strong environmental protection and conservation emphasis; (2) new legislative framework; (3) the role of the coastal states in matters affecting the coastal waters and the Outer Continental Shelf. 1973 was significant for the beginning of international negotiations in the U.N. Conference on Law of the Sea, and US public attitudes trended toward a stronger nationalistic philosophy in favor of increased energy and mineral development to reduce foreign dependency. A small measure of environmental protection may have to be sacrificed to achieve these ends and though progress in fisheries development, pollution control, coastal zone management and marine sanctuary development is reported, it is clear that energy and economics are the underlying forces driving ocean policy at the present time.

Harmelin, J. G., Bouchon, C., Duval, C., & Hong, J. S. (1980). Les Echinodermes des Substrats durs de l'Île de Port-Cros, Parc National (Méditerranée Nord-Occidentale). Éléments Pour un Inventaire Quantitatif. *In: Travaux Scientifiques Du Parc National De Port-Cros*, (6), 25-38.

Abstract: In situ survey concerning the quantitative distribution of 13 species of rocky-bottom macro-echinoderms (Echinoidea, Asteroidea, Ophiuroidea, Holothuroidea) has been carried out in the Port-Cros Is. National Marine Park (French Mediterranean coast). Densities were estimated in 33 stations from 1,5 m to 35 m. Some other echinoderm species were recorded. Quantitative results were compared to similar data obtained in different areas influenced by urban or industrial pollution

Hartz, R. W., & Hopkins, D. M. (1980). A Review of Offshore Permafrost Studies, Beaufort Sea, Alaska, 1976 to 1980. Environmental Assessment Of The Alaskan Continental Shelf. Annual Reports Of Principal Investigators For The Year Ending March 1980. Volume 4: Hazards. Boulder: Office of Marine Pollution Assessment, Pp. .- 167-177 p.

Abstract: The continental shelf of the Beaufort Sea is believed to contain as much as 50% of the estimated oil and gas reserves of the North Slope of Alaska. Preliminary exploration has shown that most of the petroleum reserves of the continental shelf are exploitable only from offshore drilling sites. The engineering problems associated with offshore drilling are further complicated by the occurrence of shallow sub-sea permafrost and its thermal vulnerability to engineering disruption. The 1979 USGS Conservation Division boreholes seemed to verify the predictive model which is based on the assumption that thick unbonded permafrost occupies paleovalleys. With one exception, all areas of deep thaw do, indeed, coincide with areas in which boreholes have encountered thick sandy and gravelly alluvium and outwash beneath Holocene marine deposits. Utilizing this assumption and all available borehole and seismic data, an interpretive contour map was constructed of the thickness of unbonded sediments in the Beaufort Sea lease area.>

Hopkins, D. M., & Carter, L. D. (1980). Discrepancy in Correlation of Transgressive Marine Deposits of Alaska and the Eastern Arctic. Environmental Assessment Of The Alaskan Continental Shelf. Annual Reports Of Principal Investigators For The Year Ending March 1980. Volume 4: Hazards. Boulder: Office of Marine Pollution Assessment, Pp. .- 250-251 p.

Abstract: Comparison of the results of amino-acid racemization studies of Alaskan and eastern Arctic fossil mollusks reveals a large discrepancy in age assignments of apparently synchronous deposits in the two regions and leads to the belief that the ages of interglacial and interstadial deposits on Baffin and Ellesmere Islands may have been considerably underestimated. Although results of amino-acid racemization studies have resulted in significant revisions in correlation and age assignments among some of the older Quaternary marine deposits of western and northern Alaska, analyses of shells from Pelukian deposits have been supportive of the intra-Alaskan correlations and not in conflict with the extensive evidence that the Pelukian transgression took place during the last interglacial interval.>

Hopkins, D. M., & Hartz, R. W. (1980). Coastal Morphology, Coastal Erosion, and Barrier Islands of the Beaufort Sea Coast. Environmental Assessment Of The Alaskan Continental Shelf. Annual Reports Of Principal Investigators For The Year Ending March 1980. Volume 4: Hazards. Boulder: Office of Marine Pollution Assessment, Pp. .- 178-186 p.

Abstract: To assess the potential impact of petroleum exploration and development within the coastal zone of the Beaufort Sea it is necessary to define the relationship of coastal geologic and geomorphic processes to shoreline history and the occurrence of subsea permafrost. In spite of the short ice-free period and relatively low wave energy environment, the coast of the Beaufort Sea is retreating at a spectacular rate. This rapid rate of coastal erosion is mainly the result of two distinctly arctic processes; thermokarst collapse and thermal erosion. The discontinuous chains of offshore islands extending from Point Barrow to Brownlow Point greatly affect water circulation and sediment transport on the inner shelf of the Beaufort Sea. Long-term comparisons seem to indicate that the islands are migrating with little loss of area and mass. Because many of the islands in the Beaufort Sea island chains are mostly lag deposits derived from sand and gravel sources that have now disappeared, they must be regarded as irreplaceable. If they are quarried and removed, they would not be replaced by natural processes, and the local oceanographic and biologic regime would be irreversible altered>

Hopkins, D. M., & Marincovich, L. (1980). Extinct and Extra-Limital Mollusks in Pelukian Deposits of Kogro River and Eskimo Islands. Environmental Assessment Of The Alaskan Continental Shelf. Annual Reports Of Principal Investigators For The Year Ending March 1980. Volume 4: Hazards. Boulder: Office of Marine Pollution Assessment, Pp. .- 240-245 p.

Abstract: All the information available on the living mollusk faunas from the Beaufort Sea were compiled and compared with the fossil faunas from the ancient Pelukian barrier chain extending from Dease Inlet eastward to Harrison Bay to determine the number and abundance of extra-limital (warm-water) mollusks in the Pelukian faunas of western Beaufort Sea. Evidence on Seward Peninsula indicates clearly that the Pelukian shoreline was formed during the last interglacial interval. The presence in Beaufort Sea Pelukian faunas of mollusks now reaching northern limits in Bering of Chukchi Sea and of mollusks, ostracodes, and foraminifers now limited to the North Atlantic Ocean probably indicates that when Pelukian sea level was at its highest (some 7 m above present sea level), shelf waters in the Beaufort Sea were probably more effectively warmed during the summer open-season and that the open-water season was longer during Pelukian time than at present.>

Hopkins, D. M., Robinson, S. W., & Buckley, J. (1980). Radiocarbon Dates From the Beaufort and Chukchi Sea Coasts (1979-1980). Environmental Assessment Of The Alaskan

Continental Shelf. Annual Reports Of Principal Investigators For The Year Ending March 1980. Volume 4: Hazards. Boulder: Office of Marine Pollution Assessment, Pp. .- 203-220 p.

Abstract:The results of radiocarbon dating of 24 samples from coastal areas of the Chukchi and Beaufort Seas and continental shelf of the Beaufort Sea are reported. The report supplements and in a few cases amends information given in a previous list of 22 dates. Locality data, stratigraphic notes, and some discussion are given and localities are shown on figures. Additional discussion is given for some of the conclusions that can be drawn from the two date lists. The confirmation that wood in alluvium and thaw-lake deposits may be centuries of even millenia older than the enclosing sediments should be kept in mind in detailed studies of palynological sequences and alluvial history in Arctic Alaska>

Le-Gal, Y. (1980). Le Milieu Marin : Valeur Biologique et Économique. *In: Penn. Ar. Bed.*, (102), 317-327.

Abstract: With "marine environment", the author also means the coastal zone (salt marshes, estuaries, cliffs and dunes). The biological wealth of the sea can be threatened by pollution, and we have now to think in terms of environment management (nature reserves, fisheries management, aquaculture).

Matthews, J. B. (1980). Characterization of the Nearshore Hydrodynamics of an Arctic Barrier Island-Lagoon System. Environmental Assessment Of The Alaskan Continental Shelf. Annual Reports Of The Principal Investigators. Volume 6: Transport. Boulder: Office of Marine Pollution Assessment, Pp. .- 577-601 p.

Abstract:Data are presented for under-ice water quality and current both for a site in a protected lagoon and in the shear zone beyond the barrier islands in the Beaufort Sea. For Stefansson Sound a regime is shown in which brine is formed in early winter and travels consistently seaward, at peaks velocities of 10 cmsec. in November falling to 5.8 cmsec in January. The seaward current in the bottom 2 m showed strong semi-diurnal tidal influence. The salinity increased steadily from similar to 32.5 ppt in early November to > 34.5 ppt by mid January. Temperatures are always close to the freezing point for that salinity. The current's flow is always offshore in the lower layers and it is suggested that a return shoreward flow must exist in the upper water layers, just beneath the ice canopy. For the site off Brownlow Point the same temperature and salinity characteristics were observed as at the lagoon site. However, the current regime was dominated by a longshore flow with superimposed tidal ellipses. The net flow was towards the east between November and March. Sea level changes were observed in early November. Surges in winter, especially when ice growth decreases the water volume in lagoons, can be major influences in reversing the restricted lagoon waters>

Molnia, B. F. (1980). Erosion, Deposition, Faulting, and Instability of Shelf Sediments; Eastern Gulf of Alaska. Environmental Assessment Of The Alaskan Continental Shelf. Annual Reports Of Principal Investigators For The Year Ending March 1980. Volume 4: Hazards. Boulder: Office of Marine Pollution Assessment, Pp. .- 397-426 p.

Abstract:The goal was to collect a sufficiently large number of samples to characterize the nature of the sea floor in and adjacent to lease area 55, the eastern Gulf of Alaska from west of Yakutat to Cross Sound. All of the 225 pre-selected sampling sites except for five in water depths too great for the ship's which were sampled. In addition another 45 locations in the near shore and a second additional group in Glacier Bay were also sampled. A total of 406 sediment and water samples were collected and the position, type, depth, and important characteristics of the sediment sampled is summarized.>

Olsen, H. W., Clukey, E. C., & Nelson, C. H. (1980). Geotechnical Characteristics of Bottom Sediment in the Northern Bering Sea. Environmental Assessment Of The Alaskan Continental

Shelf. Annual Reports Of Principal Investigators For The Year Ending March 1980. Volume 5: Hazards. Boulder: Office of Marine Pollution Assessment

Abstract: Yukon sediment of Holocene age, consisting dominantly of silty fine sand and sandy silt, covers the bottom of central and western Norton Sound, which is a high energy environment involving extensive ice loading, high waves, and strong bottom currents. The sediment contains significant amounts of sand in some areas and a generally minor amount of clay-size material ranging from 0 to 20%. Moreover, it is generally dense although loose and weak zones occur at the surface and also at depth between relatively dense layers. These characteristics, evidence of storm sand layers and scour depressions, and the results of preliminary analytical studies indicate this sediment is susceptible to liquefaction during major storms. Pleistocene peaty deposits underlie the Holocene and late Pleistocene deposits in both Norton Sound and Chirikov Basin and are somewhat overconsolidated, probably because of subaerial desiccation during low sea level stands in the late Pleistocene. These materials have a higher clay content than the overlying deposits and they contain substantial amounts of organic carbon and gas. The presence of gas suggests that in situ pore pressures may be high. If so, the strength of the material could be low even though the material is generally overconsolidated.>

Pratt Johnson, B. (1980). The verdict: 'people want parks'. Underwater preserve poll results. *In: Park News*, 16(4), 9-11, 5 pl., tab.

Abstract: A poll was conducted in 1977 and 1978 as a direct appeal to divers. 99% of respondents wanted underwater parks. Favourable response also came from non-divers and interested organizations. In particular protection was asked for 14 sites. Government policy since the poll is reviewed. Complete protection of all fauna, flora and artifacts from destruction or removal by sport or commercial divers and from pollution by industry is urgently required before any marine park, including the recently established one at Porteau Cove, British Columbia, can be truly effective.

Rearic, D., & Barnes, P. (1980). Reassessment of Ice Gouging on the Inner Shelf of the Beaufort Sea, Alaska - a Progress Report. Environmental Assessment Of The Alaskan Continental Shelf. Annual Reports Of Principal Investigators For The Year Ending March 1980. Volume 4: Hazards. Boulder: Office of Marine Pollution Assessment, Pp. - 318-332 p.

Abstract: Interaction of ice with the seabed on high-latitude shelves is an important geologic process. Ice incising the seafloor as ice gouges threatens seafloor and subseafloor structures such as pipelines. Since 1972 morphologic data on the ice-gouged continental shelf of the Beaufort Sea has been recorded using side-scan sonar and bathymetric profiling. A correlation and analysis of these records was begun in January 1979, to redefine and reassess ice gouging in the north slope lease area. The primary objective was to assemble quantitative data on ice-gouge characteristics and processes and to analyze this data for characteristic trends in ice-gouge processes. A summary of the work that has been completed, some preliminary results and projected plans are presented.>

Reimnitz, E., & Kempema, E. (1980). Super Sea-Ice Kettles in the Arctic Nearshore Zone- Reindeer Island. Environmental Assessment Of The Alaskan Continental Shelf. Annual Reports Of Principal Investigators For The Year Ending March 1980. Volume 4: Hazards. Boulder: Office of Marine Pollution Assessment, Pp. - 344-355 p.

Abstract: Broad, undulating, non-linear relief forms of the arctic nearshore environment have presented problems in drawing depth contours for coastal charts. The origin of these relief forms, which differ greatly from typical ice-gouged relief, has remained obscure for many years. Recently, detailed, repetitive bathymetric surveys using accurate navigational controls have been used in a small area off Reindeer Island to delineate major closed depressions and isolated knolls. These detailed surveys reveal major changes in relief over a period of three

years. It is now certain that the major bedforms are produced by current-and wave-erosion and deposition around grounded ice during high-energy events in the nearshore zone. The findings presented are of importance to design of pipelines connecting offshore wells with onshore transportation systems, where similar environments must be crossed.>

Reimnitz, E., Kempema, E., Ross, R., & Minkler, P. (1980). Overconsolidated Surficial Deposits on the Beaufort Sea Shelf. Environmental Assessment Of The Alaskan Continental Shelf. Annual Reports Of Principal Investigators For The Year Ending March 1980. Volume 4: Hazards. Boulder: Office of Marine Pollution Assessment, Pp. - 284-312 p.

Abstract: Silty clay, which is apparently overconsolidated, has been reported in connection with studies of ice-gouging processes on the surface of the Beaufort Sea shelf. Slabs of this concrete-like material are ripped off to form highly angular ledges and blocky outcrops. Overconsolidation defines consolidated sedimentary material which is more highly consolidated than is normal for the existing overburden. At this time in the offshore development of the lease sale area, a knowledge of the distribution of such overconsolidated materials is of extreme interest to the developer. Such materials overlying sand and gravel needed for island construction offshore could make mining these deposits extremely difficult and perhaps impractical. The shape and overall appearance of the overconsolidated silty clay outcrops on the seafloor and their relation to nearby migrating deposits of granular surface materials indicate very violent water movement which occurs sporadically, and should serve as a warning to developers.>

Adriano, A. H. (1981). Creation of the rules and regulations of the fishery laws of the Philippines. Proceedings. First International Colloquium On Fishery legislation. (pp. 133-147).

Abstract: The Philippines fishery laws include: 1) administration and use of deep water fishery resources rules; 2) laws on the commercial fishery operation; 3) importation and exportation of live and processed fish; 4) conservation measures that include prohibition on importation and exportation of certain fish species, fishing with fine mesh nets, use of certain fishing tools in some marine areas and the prevention and control of marine pollution. Also the establishment of marine reserves and sanctuaries, closed season zones and mariculture; 5) laws on the operations in the public fishing ponds; 6) laws and regulations that include the foreign participation in the exploration, development, exploitation and use of the fishery resources; 7) problems that affect the fishery industry and 8) adopted measures to fight the problems that arise in the fishery resources area. 1981

Hampton, M. A. (1981). Shallow Faulting, Bottom Instability and Movement of Sediment in Lower Cook Inlet and Western Gulf of Alaska. Environmental Assessment Of The Alaskan Continental Shelf. Annual Reports Of Principal Investigators For The Year Ending March 1980. Volume 5: Hazards. Boulder: Office of Marine Pollution Assessment, Pp. - 45-180 p.

Abstract: This study identifies active surface faults, areas of sediment instability, the relation of sediment types to bottom morphology and circulation patterns, and study of types and movement of bedforms. Data were collected during cruises in 1976-1979, aboard the R.V. Sea Sounder. A synthesis of data collected over the past four years on the Kodiak shelf shows several environmental conditions of concern to resource development. This area of tectonism poses problems of fault movement, strong seismic ground shaking and seafloor deformation. The shelf-break area shows evidence of tectonic segmentation (areal concentration of epicenters and structural deformation), implying areal variation in the severity of tectonic hazards. Sedimentological studies conducted in lower Cook Inlet since 1976 have delineated six major depositional environments. Sea level rise since the last major glacial advance has led to the modern high-energy tidal environment of lower Cook Inlet. Two attachments concerning geology and sedimentation of the area are included with this report.>

Hayes, J. B. (1981). Review and Forecast: Ocean Principals Resolve Problems. *In: Sea Technology*, 22(1), 12.

Abstract: In the evolution of a national ocean policy there has been a great deal of activity over the years to bring us to a certain understanding of national priorities. Many times Congress has expressed the will of the people by passing into law provisions which reflect our national will to use the ocean to our advantage. We have programs now for coastal zone management, ocean dumping, marine sanctuaries, pollution prevention and control, ocean mining and more. Taken together we thus have a comprehensive national ocean policy of a sort; one developed in a characteristically American way by debate, compromise and action.

Holmes, M. L., & Thor, D. R. (1981). Distribution of Gas-Charged Sediments in Norton Basin, Northern Bering Sea. Environmental Assessment Of The Alaskan Continental Shelf. Annual Reports Of Principal Investigators For The Year Ending March 1980. Volume 5: Hazards. Boulder: Office of Marine Pollution Assessment, Pp. .- 261-285 p.

Abstract: Seismic reflection records from Norton sound and Chirikov basin contain numerous zones of anomalous acoustic responses caused by gas in the subsurface sediment layers. These acoustic anomalies have been detected using sound sources ranging in size and power from 3.5 kHz transducers to 1326 cubic inch air gun arrays. The frequency and distribution of these zones suggest that up to 7,000 sq km of the Northern Bering Sea (Norton basin) may be underlain by gas-charged sediment. Much of the gas is of shallow biogenic origin, having been generated in buried peat deposits. Compressional velocity is about 1.5 kmsec in these layers, or 7% below the velocity in gas free areas as determined from seismic refraction studies. Seismic velocity beneath a large gas seep south of Nome decreases to about 1.2 kmsec in the interval from 250-440 m below the sea floor. Here, thermogenic gases of deeper origin are migrating upwards along a system of basin margin faults.>

Hunter, R. E., Thor, D. R., & Swisher, M. L. (1981). Depositional and Erosional Features of the Inner Shelf, Northeastern Bering Sea. Environmental Assessment Of The Alaskan Continental Shelf. Annual Reports Of Principal Investigators For The Year Ending March 1980. Volume 5: Hazards. Boulder: Office of Marine Pollution Assessment, Pp. .- 332-367 p.

Abstract: Sonographs and bathymetric profiles from water depths less than 15 m in the Nome-Solomon, Port Clarence, and Yukon delta areas of the Alaskan Bering Sea coast show features generated by waves, currents, and drifting ice. A rich assemblage of wave- and current-produced features visible on sonographs is present in shallow water close to the southern shore of Seward Peninsula. The richness of the assemblage is dependent on the textural variability and general coarseness of the sediment. Few features were seen on sonographs from the fine sand and silt areas of the Yukon delta except in channels subject to river discharge. In general, features known or thought to be produced by waves are more common than current-formed features. Where current-formed features do occur, they tend to be restricted to deeper parts of the shallow depth zone investigated here. Although the current-formed features are not common, some of them imply considerable sediment transport by strong currents. In the Nome-Solomon area, the current-formed features indicate westward sediment transport, opposite from the wave-induced net sediment transport along the beaches.>

Jackson, L., Bidleman, T., & Vernberg, W. (1981). Influence of Reproductive Activity on Toxicity of Petroleum Hydrocarbons to Ghost Crabs. *In: Marine Pollution Bulletin*, 12(2), 63-65.

Abstract: Reproductively active ghost crabs (*Ocypode quadrata*) appear to be more susceptible to oil pollution than non-active individuals, probably as a consequence of lowered energy reserves. Uptake of hydrocarbons over the 96-h exposure periods was more or less limited to the gill tissue. A relative measure - the "aromatic ratio" - is suggested as a possible

means of assessing bioaccumulation.

Kvenvolden, K. A., Redden, G. D., Thor, D. R., & Nelson, C. H. (1981). Hydrocarbon Gases in Near-Surface Sediment of Northern Bering Sea (Norton Sound and Chirikov Basin). Environmental Assessment Of The Alaskan Continental Shelf. Annual Reports Of Principal Investigators For The Year Ending March 1980. Volume 5: Hazards. Boulder: Office of Marine Pollution Assessment, Pp. .- 215-260 p.

Abstract: Methane, ethane, ethene, propane, propene, n-butane, and isobutane are common in bottom sediment of the northern Bering Sea. At eight sites the content of methane rapidly increases downward within the first four meters of sediment. These concentration gradients, and absolute methane concentrations, indicate that the interstitial water of the near-surface sediment at these sites may be gas saturated. These gas-charged sediments may be unstable, creating potential geologic hazards and, in certain areas, causing the formation of seafloor craters.>

Nelson, C. H. (1981). Graded Storm Sand Layers Offshore from the Yukon Delta, Alaska. Environmental Assessment Of The Alaskan Continental Shelf. Annual Reports Of Principal Investigators For The Year Ending March 1980. Volume 5: Hazards. Boulder: Office of Marine Pollution Assessment, Pp. .- 368-386 p.

Abstract: There are extremely large amounts of suspended sediment moving rapidly in the coastal waters along Alaska, often in intermittent large concentrations generated by storms and the early summer seasonal runoff. The fall storm season consequently could cause extremely wide dispersal of any oil spill material residing on the sea floor. Recent data suggest sediment resuspension may also be vigorous, even during the season of ice cover, because of greater constriction of currents in the delta region where the most rapid deposition occurs. Thus, any pollutants residing on the sea floor face extremely wide dispersal from northern Bering Sea to distances as far as a thousand kilometers to the north into the Arctic Ocean. Storm surges generally dominate the mass movements of suspended sediment and also can be seen to move large amounts of rapidly prograding sand in bedload transport for distances of up to 60 km offshore. This intensive transport and deposition could affect offshore facilities, especially pipelines. Storm sand layers deposited by such events could be impeded in their transport by any structures that protrude on the sea floor. These protruding structures could act as a dam, holding back the sediment transport and would be put under severe stress if the sediment piled up rapidly against any feature such as a pipeline on the sea floor.>

Nelson, H., Field, M. E., Cacchione, D. A., & Drake, D. E. (1981). Areas of Active, Large Scale Sand Wave and Ripple Fields With Scour Potential on the Norton Basin Sea Floor. Environmental Assessment Of The Alaskan Continental Shelf. Annual Reports Of Principal Investigators For The Year Ending March 1980. Volume 4: Hazards. Boulder: Office of Marine Pollution Assessment, Pp. .- PP. 315-331

Abstract: Strong dynamic currents are present throughout much of the northern Bering Sea, particularly where westward land projections interject into the northward flow, such as in the eastern Bering Strait area. In such regions large bedforms develop and migrate to form an unstable sea floor that can be a potential hazard to platform foundations and pipelines. Such potentially hazardous areas must be identified, their history assessed, and magnitude of future problems predicted. This paper outlines regions of mobile bedforms and presently known aspects of their dynamic activity>

Soegiarto, A. (1981). The development of a marine park system in Indonesia. Proceedings of the 4th International Coral Reef Symposium. (pp. 288-291).

Abstract: For centuries the Indonesian people have used the marine environment for many

purposes: transportation, trade and communication, recreation, sources of food and minerals. Unfortunately, however, the Indonesian marine environment is under heavy stress due to pollution and other destructive forces. In order to ensure the quality of the marine environment as a whole, a master plan for a marine park system is being developed in Indonesia. This master plan is an integrated part of the Nature Conservation Program in Indonesia. Basic criteria to develop marine parks and conservation areas have been established. Currently, more than 40 potential sites are under study to evaluate the feasibility of establishing them as marine parks and conservation areas. A national commission on Marine Park Systems has been formed for this purpose. International organizations and UN specialized agencies, such as World Wildlife Fund, Food and Agriculture Organization, UNESCO, and UNDP, cooperate and assist with this program. This paper briefly reviews the plan, the implementation and constraints of the marine park development in Indonesia.

Thor, D. R., & Nelson, C. H. (1981). Ice Gouging on the Subarctic Bering Shelf. Environmental Assessment Of The Alaskan Continental Shelf. Annual Reports Of Principal Investigators For The Year Ending March 1980. Volume 5: Hazards. Boulder: Office of Marine Pollution Assessment, Pp. - 286-314 p.

Abstract: Ice impacting the sea floor gouges surficial sediment of the shallow, Bering epicontinental shelf, Alaska. Ice gouges trend parallel to pack ice movement, which in turn generally moves parallel to isobaths and coastline configuration. Mean gouge trend in Norton Sound is west-east, in northeastern Bering Sea north-south. Southward-moving pack ice in northeastern Bering Sea and westward-moving pack ice in Norton Sound converge with, and shear past, a 10-30-km wide shorefast ice zone that covers the shallow water offshore of the Yukon Delta. The intensity of ice deformation in this zone causes the highest gouge density in the study area. In contrast, northeastern Norton Sound is an area of ice divergence and only minimal ice gouging. The rest of Norton Sound and northeastern Bering Sea is either in ice-divergence areas or water depths are too great for ice to touch bottom, thus ice gouge density in these places is low. Gouging is extremely rare inshore of the shear zone, because shorefast ice is relatively static and protects inshore areas from the dynamics of the shear or compression zone and consequent ice gouging.>

Walsh, J. P. (1981). U.S. Policy on Marine Pollution: Changes Ahead. *In: Oceanus*, 24(1), 18-24 .

Abstract: The United States has long been a leader in establishing laws to protect the marine environment. U.S. laws are perhaps the strictest of any industrialized nation in the world. A policy prohibiting waste discharge into the marine environment was first set forth in federal law in 1899, when the Rivers and Harbors Act was enacted. In straightforward language, Section 13 of that act prohibits the discharge of "any refuse matter of any kind" into the navigable waters of the United States. The federal law of ocean pollution control evolved into a long list of statutes that address various sources of pollution. There are two major statutes that shape U.S. policy on marine pollution. One is the Marine Protection, Research, and Sanctuaries Act, commonly called the Ocean Dumping Act, enacted in 1972.

Busch, W. S. (1982). Marine science laboratories move into the sea. *In: Miller, J. W. (Ed.), Proceedings Of The Sixth Meeting Of The United States Japan Cooperative Program In Natural Resources Ujnr. Panel On Diving Physiology And Technology, Menlo Park And Catalina Island, California, October 20-26, 1981. (pp. 241-251).*

Abstract: Research opportunities in tropical island waters, on a mid-Pacific archipelago, amidst temperate water kelp forests, and on the Atlantic continental shelf have been opened up with the aid of the National Oceanic and Atmospheric Administration's Undersea Research Program. The facilities are as diverse as the marine ecosystems they serve - a submersible

which will allow two scientists to explore the depths to 1200 feet....a habitat sitting on the seafloor within a giant kelp forest and functioning as a home and laboratory for six aquanauts....a habitat in tropical waters allowing four scientists to monitor the life of a coral reef....a research ship supporting scientific divers tethered to a depth of 120 feet along the U.S. continental shelf. Research areas include studying the effects of pollution and ocean dumping, devising methods of extracting energy from the oceans, protecting marine mammals, answering questions about marine geology and the composition of the continental shelf, and using bioactive substances in drug development. One habitat, the HYDROLAB, located in St. Croix, U.S. Virgin Islands has supported over 152 scientists from 35 universities and institutions

Miller, J. W. (1982). The use of recreational divers for the collection of marine resource data. *In: Miller, J. W. (Ed.), Proceedings Of The Sixth Meeting Of The United States Japan Cooperative Program In Natural Resources Ujnr. Panel On Diving Physiology And Technology, Menlo Park And Catalina Island, California, October 20-26, 1981. (pp. . 267-273).*

Abstract: The Florida Institute of Oceanography (FIO) has developed a program (SEAWATCH) that will utilize supervised volunteer recreational divers, trained by qualified marine scientists, to collect data on the aquatic environment. The SEAWATCH Program will offer the opportunity for public agencies, local administrations, private enterprises, and research institutions to obtain, in a cost-effective manner, data essential for making informed administrative and technical decisions affecting marine resources. Examples of the data that can be acquired by recreational divers include: (1) early detection of environmental changes and trends, (2) stock assessment of finfish and shell fish, (3) surveys of plants and animals, (4) monitoring of natural and artificial reefs, (5) water samples, (6) measurements of water clarity, (7) assessment of the effects of pollution on the marine environment.

Smith, G. (1982). Aquaculture and fish 2. Chap. F28, (pp. 302, Annot. Bibliogr. Incl. 1168 refs.). Commonwealth Agric. Bur.

Abstract: The bibliography is presented under the following main section headings: General, Freshwater, Marine, Nutrition, Diets and feeds, Genetics and breeding, Diseases and disorders, Installations and equipment, Pollution, Control of weeds by fish, Control of mosquitoes by fish, Economic, Management of freshwater and sport fisheries, Marketing and consumption of the products of aquaculture.

Chabert, D., Vicente, N., & Huang, W. (1983). La pollution par les métaux lourds dans les rades du Parc National de Port-Cros. 2. Contrôle pluriannuel. *In: Travaux Scientifiques Du Parc National De Port-Cros, (9), 17-34.*

Abstract: Contamination study by heavy metals begun in 1977 in the coves of the Port-Cros National Park (Var-France) is followed. This study concerns marine phanerogams (*Cymodocea nodosa*, *Posidonia oceanica*) gastropods (*Monodonta turbinata*) and sediments.

Ridout, L. M. (comp.). (1983). Aquaculture and fish. 3. Chap. F34, (pp. 397, Annot. Bibliogr. Incl. 1,490 ref.). [s. l.]: Commonwealth Agric. Bur.

Abstract: The bibliography is a spinoff of the Commonwealth Agricultural Bureau (CAB) database dealing only with aquaculture and fish references. The bibliography is divided into the following sections: general; freshwater; marine; nutrition; diets and feeds; genetics and breeding; diseases; pollution; control by fish of weeds and insects; economics, technology, installations and equipment; management; products, marketing and consumption. Each reference contains full bibliographic information plus an English abstract. There is an author and species index.

Baccar, H. (1984). A regional approach to marine and coastal protected areas: The

Mediterranean Sea. *In*: J. McNeely, & K. R. Miller National Parks, Conservation, And Development. The Role Of Protected Areas In Sustaining Society. Proceedings Of The World Congress On National Parks, Bali, Indonesia, 11-22 October 1982. (pp. 438-441). [s. 1.]: [s. n.].

Abstract: This case study demonstrates the importance of the regional approach to protected areas in the Mediterranean region. In the field of marine protection, the United Nations Environment Programme has adopted the regional approach to environmental issues, believing that in this way, efforts could be concentrated on the special problems of each area and all concerned governments would gradually become involved in the safeguarding of their marine environment. Problems of balanced management in the Mediterranean imply that development and implementation of measures to control pollution and monitor protected ecosystems require coordination and intervention at the regional level. The different measures and interventions would cover a series of activities concerning protection of the Mediterranean environment, particularly along the coastal fringe. Among these measures, management of protected areas can only be considered in the context of coordinated action

Black, J. J. (1984). Environmental implications of neoplasia in Great Lakes fish. *In*: J. J. Stegeman (ed.), Responses of marine organisms to pollutants. Vol. 14, Chap. 1-4, (pp. 529-534). [s. 1.]: [s. n.]. **Notes:** Summary only.

Abstract: Marine resources that interface with large urban centers are frequently heavily polluted by industrial and municipal wastes. Although pollution may affect species diversity and abundance of aquatic animals through habitat destruction, alteration and/or toxicity, sublethal effects resulting from chronic exposure to pollutants may also occur. Among potential sublethal effects, aquatic animal neoplasia has been proposed as a most promising pathobiological response for detecting waterborne carcinogens. Spontaneous neoplasms have been observed in a wide variety of fish species from both freshwater and marine environments. Although some studies have shown or suggested that increased frequencies of some kinds of neoplasia are associated with aquatic areas that are heavily polluted with organic chemicals, there has been little direct evidence to support this hypothesis. That pollutant chemicals could act as causal agents of tumors in wild fish populations is supported mainly by laboratory experiments.

Cuddeback, J. E. & Al-Qatari, K. (1984). ARAMCO oil spill prevention and response programme. Combating Oil Pollution In The Kuwait Action Plan Region. Chap. 44, (pp. 339-363). London: IMO; ROPME; UNEP.

Abstract: ARAMCO has stressed the prevention of oil spills since it first began producing and exporting oil in 1938. Spill prevention has taken two forms: 1) application of the best practical engineering technology and 2) stringent operating controls and training. The prevention of oil spills begins with drilling operations and continues right through to the departure of the laden tanker from the terminal. ARAMCO has had only two blow-outs in 30 years of offshore operations. Pipelines and flowlines in offshore areas are all cathodically protected and undergo regular visual inspection by divers. As a result of such measures, there have been only three offshore pipeline ruptures in 30 years. Producing platforms are designed to limit operational discharges. Terminal facilities are operated in a way that minimizes the possibility of small or large oil releases. In addition to preventive measures, ARAMCO has developed a contingency oil spill plan, a full-time pollution response unit and an inventory of specialized equipment.

Habibullah-Khan, M. (1984). Marine intensive tourism in ASEAN countries. Proceedings Of The Pacific Congress On Marine Technology, Honolulu, Hawaii, April 24-27, 1984. Chap. 10, (p. MRM5). Manoa, HI USA. Hawaii: Marine Technology Society. **Notes:** Summary only.

Abstract: This study intends to make a survey of the various tourist resorts in the coastal areas of ASEAN countries with particular attention to Sentosa and St. John's islands in Singapore,

Phuket, Samui and Pattaya in Thailand, Penang in Malaysia, Sombrero Park in the Philippines, and Bali in Indonesia. Demand for marine-based tourism in this region depends on a number of factors. These include tourist's income, volume of sea-borne trade in relation to total trade, cost of travel by sea in relation to airfare, relative prices in different countries, degree of marine pollution, etc., as well as various other social, political and demographic factors. A marine intensive tourist industry depends on a well-preserved environment and is therefore often in conflict with other marine resource users. The introduction of pollutants into seas by petroleum hydrocarbons and other sources is disastrous for water-based tourist resorts. The recreational activities (sports diving, collection of aquarium fish, shells, corals, etc., dumping of non-biodegradable rubbish) of tourists have caused ecological damage in many countries. Expanding tourist centers in coastal belts have had adverse effects on fisheries, aquaculture, mariculture and mangroves as well. The proposed study will attempt to uncover these conflicting uses of marine resources with special reference to ASEAN countries.

Kennington, R. A. & Salvat, B. (1984). Man's threat to coral reefs. *In*: R. A. Kennington, & B. E. T. Hudson Coral Reef Management Handbook. (pp. 23-28). [s. l.]: [s. n.].

Abstract: The impact of man's exploitation of coral reefs is discussed, considering fishing and collecting, pollution and other commercial and recreational activities.

Poizat, C. (1984). Seasonal variations of Mediterranean interstitial opisthobranch assemblages. *In*: C. Heip (ed.), Biology Of Meiofauna. Chap. 1, (pp. 83-94). [s. l.]: [s. n.].

Abstract: Characteristic seasonal cycles have been found for interstitial opisthobranchs living in various sandy biotopes of different exposure in the Gulf of Marseilles (Mediterranean coast of France). Abnormal progressive degradation of the environment caused by increased pollution and a striking decrease of regional wind frequency throughout a seven-year period changed these cycles. The sensitivity of these interstitial opisthobranchs to the degradation of their habitat makes them valuable biological indicators which could be used to identify clean sublittoral sandy bottoms which need to be protected.

Sindiyo, D. M., & Pertet, F. N. (1984). Tourism and its impact on wildlife conservation in Kenya. *In*: *Industry and Environment*, 7(1), 14-19, tab., pl., ref.

Abstract: Tourism brings both blessings and curses to Kenya. Tourism earns the country a good proportion of its foreign revenue, second only to coffee and tea. National parks and reserves have benefited directly from receipts of gate and guide fees. The publicity associated with tourism has also benefited the parks as well as the country. Some parks/reserves owe their origin to touristic demand, but tourism has had some adverse effects on wildlife conservation and in particular in national parks and reserves. Certain tourist activities have brought negative effects such as crushing of vegetation by vehicles and harassment of predators. Meanwhile uncontrolled shell and coral collection coupled with physical damage to coral reefs is contributing to the decay of marine parks on Kenya's coast. Furthermore the agricultural and industrial sectors which are interlocked with tourism have a certain negative impact on conservation. For instance, the desire for more land for agricultural production to sustain tourism is posing a threat to park and reserve land. Fertilizers and insecticides used to improve agricultural production end up in rivers, contributing to water pollution. The majority of the rivers traverse important national parks and reserves while two, the Tana and the Sabaki, empty into the Indian Ocean close to the marine parks. Hydropower dams pose a different kind of problem to wildlife conservation.

Sybesma, J. (1984). Nature conservation is business. Proc. 18. Meet. of the Association of Island Marine Laboratories of the Caribbean, St. James (Trinidad), 13 Aug 1984. Vol. 18 (p. 4).
Notes: Summary only.

Abstract: Coral reefs are threatened by the development of countries and islands they surround. They are misused by overfishing, coral mining, anchor damage, spearfishing, collecting for ornament trade, and domestic, industrial and agricultural pollution. Guidelines with step by step information for the establishment of legislation and sound management procedures have been made to protect coral reefs, but knowledge, money and the country's support are not considered. Biologists living in developing countries must focus attention on nature conservation and attempt to preserve coral reefs. A business approach only considers money making projects, therefore coral reefs must be re-examined as money making propositions. Coral reefs can be a great source of income as recreational and tourist developments. Legislation established in this way will become the base for management strategies. Consequently coral reefs will be protected as a new source of income. Biologists do not have to become or to act like businessmen but must achieve their goals by thinking like businessmen. The Curacao Underwater Park is an example.

Valere, R. (1984). Contribution à l'étude de la pollution saturnique du littoral provençal et de ses conséquences sur la flore et la faune marines benthiques. Univ. Aix Marseille 2, Marseille France., - 153 p. **Notes:** Thesis. 3e cycle. Oceanologie

Abstract: The sediments and marine benthic species, plants and animals were used to evaluate the degree of lead pollution on two different sites, the one (Port-Cros Natural Park) giving the degree of pollution of a site relatively "unpolluted", the other one (Marseille area) being very polluted by industrial and urban sewage. Experimental accidental contaminations were conducted in the laboratory with Pb NO sub(3) on 2 test species--Codium fragile) (Algae) and Paracentrotus lividus (sea urchin). The sublethal and lethal conditions have been determined. The consequences of lead pollution on the seashore on marine organisms are discussed and the eventual risks for human health are considered.

White, A. (1984). Vulnerable marine resources, coastal reserves, and pollution: A Southeast Asian perspective. In: J. McNeely, & K. R. Miller (eds), National Parks, Conservation, And Development. The Role Of Protected Areas In Sustaining Society. Proceedings Of The World Congress On National Parks, Bali, Indonesia, 11-22 October 1982. (pp. 170-174). [s. l.]: [s. n.].

Abstract: The distribution of vulnerable marine resources, coastal reserves and pollution sites in Southeast Asia as compiled for the Marine Policy Atlas of Southeast Asian Seas (Morgan and Valencia, eds. in press) are presented by brief description to accompany the display of maps of scale 1:16,000,000. The vulnerable marine resource distributions include estuaries, beaches, mangroves, coral reefs, sea turtles, crocodiles, seabird colonies, dugong, whales and dolphins. Coastal reserves included all the various designations of marine reserves in the region which border on the coast or have jurisdiction over marine areas. Priority sites for management of marine resources are determined by particularly strong aggregations of vulnerable marine resources, productive fisheries and the presence of marine reserves. This paper focuses on geographical distribution and aggregations which have implications for national and regional marine reserve selection and management programmes.

White, H. H. (1984). Concepts in marine pollution measurements. Tech. Rep. Maryland Univ. Sea Grant Coll. Program. (p. 757). Maryland: Maryland Univ., College Park (USA). Sea Grant Coll. Program.

Abstract: Problems of the environment have received considerable attention over the past decade. Concern over pollution of the marine environment has been particularly strong and has been the focus of innumerable conferences and publications. Unfortunately, the strategies and techniques used to measure marine pollution and its effects have not always been based on solid scientific methods, and many studies have thereby cast some doubt on the results of pollution effects measurements in general. This book examines a range of techniques for

measuring marine pollution and its effects on the environment.

Williams, S. (1984). Hydrolab: NOAA's Undersea Research Program at West Indies Laboratory. Proc. 18. Meet. of the Association of Island Marine Laboratories of the Caribbean, St. James (Trinidad), 13 Aug 1984. Vol. 18 (p. 2). [s. l.]: [s. n.]. Notes: Summary only.

Abstract: Hydrolab is the world's only operating scientific saturation diving habitat. This undersea laboratory is located at the apex of a submarine canyon on St. Croix's north shore at a depth of 15 m. Salt River submarine canyon affords both soft and hard bottom environments for investigation. By utilizing saturation diving, teams of 4 aquanauts/scientists can spend up to 2 weeks living and working on the bottom. The advantage of saturation diving is the dramatic increase in allowable bottom time. For example, at 28 m, a scientist can spend up to 6 hr working in situ. Proposals are considered in NOAA's research priorities: primary productivity and nutrient cycling; fisheries; marine pollution; sea floor properties and processes; ocean services (diving medicine, instrumentation, marine sanctuary monitoring). Proposals from foreign investigators are encouraged

Winter, J. A. (1984). Reference materials for water and wastewater analyses in USEPA (U.S. Environmental Protection Agency). (p. 24). Cincinnati, OH (USA): Environmental Protection Agency, Environ. Monit. Lab.

Abstract: The Environmental Monitoring and Support Laboratory at Cincinnati provides quality assurance support for EPA's water-related programs in response to the Clean Water Act, the Safe Drinking Water Act, the Marine Protection, Research and Sanctuaries Act, the Resources Conservation and Recovery Act, the Comprehensive Environmental Response Compensation and Liability Act, and the Toxic Substances Control Act. An important segment of this support is the Quality Control (QC) Sample Program which provides samples of known concentrations for use as independent Hazardous Materials which provides calibration standards for trace organic analyses of interest to the Agency.

Goldberg, E. D., Giam, C. S., & Dou, H. (1985). La capacité d'assimilation des océans pour les rejets. In: *Stratégies Et Techniques Avancées Pour L' Étude Des Pollutions Marines En Méditerranée.*, (6), 14. Notes: Summary only.

Abstract: The role of the oceans in waste management has been considered for at least three decades. The recognition that artificial radionuclides generated in energy facilities could jeopardize the environment, if released promiscuously, resulted in the formulation of models to determine what amounts of a given radioisotope could be accommodated in seawater such that public health was protected. Subsequent involvements with catastrophes in marine pollution further improved our abilities to ascertain what amounts of toxic materials the oceans could carry without impacts upon humans or other life forms utilizing the oceans. These instances provide a background to consider what levels of wastes a specific marine site can accommodate. The information needed to make such an assessment, will form the basis of this presentation.

Kay, D. (1985). The national plan to combat pollution of the sea by oil. In: Craik, G. J. S. (ed), Workshop on Response to Hazardous Chemical Spills in the Great Barrier Reef Region, Townsville (Australia), 3 Aug 1984. Townsville-Australia: Great Barrier Reef Marine Park Authority

Abstract: An outline is given of the Australian National Plan to combat pollution of the sea by oil, which represents a combined effort by Commonwealth and State governments. Some data are presented regarding hazardous chemicals, indicating the nature of chemicals travelling around Australia. A definition is made as to the various authorities responsible for combating the pollution. Funding, legislation and training activities are described.

Lowe, D. M. & Pipe, R. K. (1985). Cellular responses in the mussel *Mytilus edulis* following exposure to diesel oil emulsions: Reproductive and nutrient storage cells. *In: M. N. Moore (ed), Responses Of Marine Organisms To Pollutants. Vol. 17, Chap. 2-4, (pp. 234-237). [s. l.]: [s. n.]*.

Abstract: The effects of exposure to hydrocarbons on the reproductive and nutrient storage cell systems in the marine mussel, *Mytilus edulis* were examined and quantified with the aid of stereological techniques. The capacity for recovery of these cell systems was also quantified following a period of hydrocarbon depuration. The significance of nutritional reserves at the time of exposure to hydrocarbons and how this may influence the animal's ability to survive the insult was also examined. Hydrocarbons were found to have a deleterious effect on the nutritional storage cells leading to reduced fecundity and oocyte atresia (degeneration). Given a period of depuration, however, there were indications of a recovery in both the reproductive and storage cell systems. The ability of mussels to survive hydrocarbon exposure was found to be dependent upon the nutrient reserves at the onset of exposure.

Merifield, P. M., Dritschilo, W., Thomas, T. R. & Wilson, J. (1985). Environmental constraints on disposal of coal wastes off the coast of Southern California. *In: I. W. Duedall, D. R. Kester, P. K. Park, & B. H. Ketchum (eds), Wastes In The Ocean. Volume 4. Energy Wastes In The Ocean. (pp. 499-513). [s. l.]: [s. n.]*.

Abstract: Environmental and legal constraints on the use of alternatives presented in four scenarios for coal-waste disposal were examined, assuming that the disposal sites were located in Ormond Beach, California, and subject to the Federal Water Pollution Control Act and to the Marine Protection, Research and Sanctuaries Act (MPRSA). The four scenarios are as follows: (1) sulfate salts, fly ash, and bottom ash are combined into a slurry and discharged through outfall pipes at the shelf break at a depth of similar to 100 m; (2) fly ash and bottom ash are combined into a solid form and dumped by boat into the ocean; (3) loose slag is dumped by boat, and fly ash is made into a slurry and discharged onto the seafloor through an outfall pipe at a depth of similar to 100 m; and (4) loose slag and agglomerated fly ash are combined for dumping from boats. The environmental effects of these methods of disposal are poorly understood. Legal impediments based on the Federal Water Pollution Control and Marine Protection, Research and Sanctuaries Acts and costly monitoring requirements may be of greater importance to evaluating the feasibility of the alternative scenarios than are the technical considerations.

Pertet, F. (1985). Kenya's experience in establishing coastal and marine protected areas. *In: McNeely, J. and KR Miller, K. R. National parks, conservation, and development. The role of protected areas in sustaining society. Proceedings of the World Congress on National Parks, Bali, Indonesia, 11-12 October 1982.*

Abstract: Kenya has long been a leader in nature conservation, and this holds true on the marine side as well as the terrestrial. The country has two marine national parks and two marine national reserves, with the first marine park in tropical Africa established at Malindi-Watamu in 1968. A series of other areas is also proposed for establishment in the future. These areas have a number of attractions and benefits to local people, including tourism and protection of breeding grounds of important species. In addition, the country has also instituted measures to control fishing, regulate shell collection and control pollution.

Stegeman, J. J., Woodin, B. R., Park, S. S., Kloepper-Sams, P. J. & Gelboin, H. V. (1985). Microsomal cytochrome P-450 function in fish evaluated with polyclonal and monoclonal antibodies to cytochrome P-450E from scup (*Stenotomus chrysops*). *In: M. N. Moore (ed.), Responses Of Marine Organisms To Pollutants. Vol. 17, Chap. 2-4, (pp. 83-86).*

Abstract: Monooxygenase reactions catalyzed by cytochromes P-450 are paramount in the

oxidative metabolism of many xenobiotics, determining both the persistence and effects of numerous types of compounds. Immunological probes are proving useful in evaluating the functions of P-450 isozymes in microsomal preparations from many species. The regulation of specific isozymes by endogenous and exogenous factors can also be evaluated with such probes. Here the authors describe studies on the activities apparently catalyzed by induced P-450 in fish, evaluated with both polyclonal and monoclonal antibodies to cytochrome P-450E, the apparent major beta-naphthoflavone (BNF) or methylcholanthrene (MC)-inducible isozyme purified from scup (*S. chrysops*) liver.

Yap, H. T., & Gomez, E. D. (1985). Coral reef degradation and pollution in the East Asian Seas Region. *In: Environment And Resources In The Pacific*, (69), 185-207.

Abstract: This paper updates knowledge on the status of coral reef resources and the causes of reef damage in South-East Asian waters. It summarizes recent data on the condition of coral reefs in each ASEAN country. Natural causes of reef degradation include water movement, geological dynamics, and biological interactions such as recently reported destruction by *Acanthaster* and *Drupella*. Among human activities causing destruction, siltation and damaging fishing techniques are still the most important, although extraction of building materials, tourism, collecting of reef invertebrates, and pollution are becoming increasingly significant. The establishment of marine reserves is one concrete response to these threats.

Bonner, W. N. (1986). Seals in the human environment. *In: Ambio*, 15(3), 173-176.

Abstract: Seals have a long association with man. They provide subsistence products for primitive communities and commercial harvest for industrialized societies. Seals have generally been perceived as damaging to fisheries; fisheries also have adverse effects on seals by possible competition with them for food and through by-catch. Entanglement with "ghost-nets" and other debris is a significant but unquantifiable cause of seal mortality. Pollutants in the marine environment are also damaging to seals and habitat destruction and disturbance can be locally significant. However, in general prospects for seals are good. Research is adding to the information base needed for scientific management of seal populations.

Bussani, M. (1986). Some fish species in the area of the Marine Park Miramare, observed during 1968-77. *In: Hydrores Information*, (3), 94. **Notes:** Annual report 1985-86

Abstract: The Miramare Marine Park situated near Trieste was founded on the 31st of May 1973. This place of the North Adriatic is particularly favourable for the development of marine fauna and flora due to the many sea currents flowing along the Istrian coast which protect the environment from pollution caused by the nearby city of Trieste. A list is given of the fish species observed during the period 1968-77

Colwell, R. R., & Greer, J. R. (1986). Biotechnology and the sea. *In: Ocean Development & International Law*, 17(1-3), 163-189.

Abstract: The application of recent discoveries in genetic engineering to marine plants and animals offers enormous potential for harvesting more food, pharmaceuticals, and industrial compounds from the sea. Using biotechnology's ability to excise and replace genetic material selected for specific functions, such efforts would allow manifold increases in production of substances conventionally reliant on the capture of often rare marine species. This article reviews the status of marine biotechnology with particular attention to its current and prospective uses for medicine, industrial chemicals, pollution control, and aquaculture. It concludes with some observations about the relationship of marine biotechnology to broader economic, legal, and ethical concerns about genetic manipulation.

Cumberland, J. H. & Cronin, L. E. (1986). A bioeconomic approach to improved fisheries

management and pollution control for the Chesapeake Bay. *In:* M. E. Jacoby The Economics Of Chesapeake Bay Management. (pp. 10-14). Maryland: College Park USA. Sea Grant Coll. Program . Notes: Abstract only.

Abstract: The authors, one an economist and the other a biologist, begin with the premise that over harvesting and environmental degradation are the two major causes of decline of Chesapeake biological resources. Reasoning that these problems remain unsolved, in part because biological and social scientists have not worked together to produce a coherent set of policy recommendations, they offer a strategy for integrating the applied research of marine biology and economics in the fields of fisheries management and pollution abatement.

Hennig, H. F. (1986). Metal-binding proteins as metal pollution indicators. *In: Environ. Health Perspect.*, 65, 175-187.

Abstract: In this study metal-binding proteins were isolated and characterized from five different marine animals (rock lobster, *Jasus lalandii* ; hermit crab, *Diogenes brevis*; sandshrimp, *Palaemon pacificus* ; black mussel, *Choromytilus meridionalis* ; and limpet, *Patella granularis*). These animals were kept under identical metal-enriched conditions, hence eliminating differences in method and seasons. The study animals belonged to different phyla; varied in size, mass, age, behavior, food requirements and life stages; and accumulated metals at different rates. It is possible to link unseasonal moulting in crustacea, a known physiological effect due to a metal-enriched environment, to the production of the metal-binding protein without evidence of obvious metal body burden. Thus a new concept of pollution is defined: the presence of metal-binding proteins confirms toxic metal pollution. This concept was then tested under field conditions in the whelk *Bullia digitalis* and in metal-enriched grass.

Kashmanian, R., Downing, D., Jaksch, J. & Podar, M. (1986). Managing point/nonpoint-source loading: A cost-effective approach to nutrient reduction in the Chesapeake Bay. *In:* M. E. Jacoby The Economics Of Chesapeake Bay Management. (pp. 28-32). Maryland: Maryland Univ., College Park (USA). Sea Grant Coll. Program . Notes: Abstract only.

Abstract: Rather than focus on a individual source of pollution and its reduction, the authors focus on the total flow of pollutants and look toward their overall reductions. The authors recommend such an approach in the conceptual construct of the water bubble. Think of all the potential sources of a pollutant affecting the same water body as residing within a single bubble and representing a single source. Within that bubble are pollutants discharged from point sources, such as municipal wastewater treatment plants or industrial facilities, and from nonpoint sources, such as nutrient runoff from agricultural or urban lands. The goal is to reduce the pollutant loadings from the bubble to a target level equivalent to the total loadings under the conventional practice of individual controls. Less concern is placed on the specific loadings from individual sources as long as the same or better water quality is produced and existing controls required by current regulations are maintained as the treatment floor.

Tibbetts, P. J. C. & Large, R. (1986). Degradation of low-toxicity oil-based drilling mud in benthic sediments around the Beatrice Oilfield. *The Marine Environment Of The Moray Firth.* (pp. 349-356).

Abstract: Hydrocarbon analyses, using gas-liquid chromatography (GLC), have been conducted on benthic sediments from around the Beatrice A platform immediately after completion of the first well using low-toxicity oil-based drilling mud. These analyses, as expected, showed the major organic contaminant in the sediments to be fresh base oil from the drilling mud. It could be detected to a distance of 3 km from the platform in the direction of the prevailing currents. A year later, after the completion of five additional wells using low-toxicity oil-based mud, a repeat survey showed the drilling mud base-oil could be detected in similar concentrations (by gravimetry) over the same spatial area. GLC analysis, however, showed that

the base-oil had been severely biodegraded at many stations. The degree to which the n-alkanes had been biodegraded varied considerable between stations but appeared to be related to the distance from the platform and/or the total concentration of oil in the sediments.

Brothers, N. P., & Brown, M. (1987). The potential use of fairy prions (*Pachyptila turtur*) as monitors of heavy metal levels in Tasmanian waters. *In: Marine Pollution Bulletin*, 18(3), 132-134.

Abstract: The purpose of the present study was to examine the potential use of the fairy prion (*P. turtur*) to monitor contamination in the marine food chain following ocean dumping of industrial waste in S.E. Tasmania. Factors considered that can complicate interpretation of heavy metal levels detected include age, sex, seasonal, and other ecological aspects of the indicator species chosen. Unlike some other species of seabirds, the influence of sex and season on metal levels was unimportant. Copper, zinc, cadmium, and lead were tested in the liver and muscle tissue of fairy prions. In this preliminary study, cadmium levels were found to be significantly higher statistically in fairy prions closest to a potential source of pollution compared to levels from distant locations. This trend was not found in other metals investigated. It is suggested that this species would provide a useful future means of monitoring heavy metal levels.

Dicks, B. (1987). FSC Oil Pollution Research Unit--The 1980s and Beyond. *In: Biological Journal of the Linnean Society*, 32(1), 111-126, 2 tab, 53 ref.

Hunnam, P. (1987). Management of anchorages in marine parks. *In: Baldwin, C. Fringing Reef Workshop. Science, Industry And Management. Proceedings Of A Workshop Held At Arcadia Resort, Magnetic Island, Australia, October 23 25 1986. Townsville Australia: Great Barrier Reef Marine Park Authority*

Abstract: Anchorages are the aquatic equivalent to car parks, showing problems associated with the concentration of activities conflict between users, overcrowding, pollution, habitat destruction and wildlife disturbance yet at the same time providing managers with positive opportunities for contacting users, monitoring and regulating impacts, and supplying facilities and services to enhance the site's use and enjoyment. A preliminary analysis is given of anchoring and mooring within the Cairns Section of the Great Barrier Reef Marine Park. The concluding sections outline a strategy for the management of anchorages in the Marine Park, including the active promotion of CARE, a Code for Anchoring on the Reef, and propose a set of guidelines for Low Impact Moorings.

Moore, G. (1987). The revision of the fisheries legislation in Solomon Islands. Draft provincial fisheries ordinance Guadalcanal Province. (p. 31). Rome: FAO. Notes: FAO FL/WPSCS/87/14-suppl-2.

Abstract: A draft is given of the 1987 Guadal Canal Province Fisheries Ordinance. It contains the following 18 sections: 1) Short title and commencement; 2) Interpretation; 3) Development of Provincial fisheries; 4) Procedures for the approval of fisheries research and development projects; 5) Agreements with customary fishing right owners; 6) Development leases over customary rights areas; 7) Limits of customary fishing rights; 8) Recording of customary fishing rights; 9) Applications to local courts; 10) Management measures; 11) Endorsement of licences; 12) Fish aggregating devices; 13) Marine reserves; 14) Mangroves; 15) Live fish; 16) Pollution of Provincial waters; 17) Enforcement; and 18) Delegation of powers

Moore, G. (1987). The revision of the fisheries legislation in Solomon Islands. Draft provincial fisheries ordinance Isabel Province. (p. 31). Rome: FAO. Notes: FAO FL/WPSCS/87/14-suppl-3.

Abstract: A draft is given of the 1987 Isabel Province Fisheries Ordinance. It contains the following 20 sections: 1) Short title and commencement; 2) Interpretation; 3) Development of Provincial fisheries; 4) Procedures for the approval of fisheries research and development projects; 5) Agreements with customary fishing right owners; 6) Development leases over customary rights areas; 7) Limits of customary fishing rights; 8) Recording of customary fishing rights; 9) Applications to local courts; (10) Management measures; 11) Endorsements of licences; 12) Fish aggregating devices; 13) Marine reserves; 14) Mangroves; 15) Powers of Area Councils; 16) Live fish; 17) Pollution of Provincial waters; 18) Provincial Fisheries Advisory Committee; 19) Enforcement; and 20) delegation of powers

Moore, G. (1987). The revision of the fisheries legislation in Solomon Islands. Draft provincial fisheries ordinance Temotu Province. (p. 32). Rome: FAO. Notes: FAO FL/WPSCS/87/14-suppl-6.

Abstract: A draft is given of the 1987 Temotu Province Fisheries Ordinance. It contains the following 19 sections; 1) Short title and commencement; 2) Interpretation; 3) Development of Provincial fisheries; 4) Procedures for the approval of fisheries research and development projects; 5) Agreements with customary fishing right owners; 6) Development leases over customary rights areas; 7) Limits of customary fishing rights; 8) Recording of customary fishing rights; 9) Applications to local courts; 10) Management measures; 11) Endorsement of licences; 12) Fish aggregating devices; 13) Marine reserves; 14) Mangroves; 15) Powers of Area Councils; 16) Live fish; 17) Pollution of Provincial waters; 18) Enforcement; and 19) Delegation of powers

Meinesz, A., Boudouresque, C. F., & Lefevre, J. R. (1988). A map of the *Posidonia oceanica* beds of Marina d'Elbu (Corsica, Mediterranean). *In: P.S.Z.N. I: Mar. Ecol.*, 9(3), 243-252.

Abstract: A large-scale map of the *Posidonia oceanica* seagrass beds as well as other benthic substrata and communities was compiled for a cove of a marine reserve free from pollution and man-made disturbance. An extensive diving survey of the cove and the interpretation of aerial colour photographs were used. The greater part of the cove is occupied by the *P. oceanica* meadow. Patches of dead "matte" were observed at a depth of between 7 and 14 m. They may be the result of a natural hydrodynamic equilibrium between building and erosion.

Dutton, I. M. (1989). Workshop on the Role of Scientific Support Coordinator (SSC) in Oil Spill Response. Proceedings of National Workshop Mackay, Australia, November 22-25, 1988. Workshop on the Role of Scientific Support Co ordinator (SSC) in Oil Spill Response, Mackay (Australia), 22-25 Nov 1988. Townsville Australia: Great Barrier Reef Marine Park Authority *Workshop Ser. Great Barrier Reef Mar. Park Auth.:* Vol. 12. Notes: ISSN 0156 5842. ISBN 0 642 14672 1.

Abstract: Under the Australian National Plan to Combat Pollution of the Sea by Oil and various State and regional supplements, an extensive framework for oil spill response has been established. The role of the Scientific Support Coordinator is identified as a major element of the overall response organization; the workshop sought to provide for the exchange of information. This report gives a summary of the proceedings of the workshop which also reviewed the current status of scientific preparation in the context of contingency plans. Major recommendations of the workshop included: information be prepared on oil and dispersant toxicity and guidelines developed for their use under a range of conditions; a need to clarify and evaluate the role of monitoring in spill response; coastal resources atlases are an important tool and could be improved by the transfer of information to field usable micro computer based systems.

Carter, J. (1990). A Delicate Balance. *In: Wildlife Conservation*, 93(1), 56-61, 64-66.

Abstract: The country of Belize, just south of Mexico and on the western shore of the Caribbean Sea, claims a part of the second longest barrier reef in the world and has taken action to establish marine reserves intended to preserve the reef's intrinsic as well as economic value. The Belizeans have made clear their wish to achieve greater economic benefit from the reef while maintaining its integrity in the face of rapidly expanding tourism, fishing, and agriculture. Not surprisingly, there is growing conflict between the various users of the reef and the conservationists who wish to see it maintained in its pristine state. Commercial fishing has already reached the need for careful management, and the impacts of water pollution from mainland agriculture and industry are a growing concern. Although the Belizeans are responding to the problems of natural resource management, progress is often complicated by overlap in the administration of marine and terrestrial resources. Wildlife Conservation International has offered to help the government set up a Belize Barrier Reef Authority whose goal it would be to provide for the protection, sustainable use, and recreational enjoyment of the reef and waters through public zoning and careful management of all marine resources. The zoning would take into account and separate the conflicting activities of the reef. Certain areas would be designated as suitable for specific activities, such as commercial fishing or scientific research, and some regions would be strictly protected from any use so that genetic diversity and essential ecological processes can be maintained. Belize's barrier reef ecosystems truly a global treasure; it is one of the few places on Earth where vast resources remain underdeveloped and relatively undisturbed, where people are aware of the dangers of development, and where the government wants to avoid environmental mistakes. The success of Belize in protecting this ecosystem will depend on the country's ability to make long-term moral and financial commitment to its fledgling conservation programs.

Cole, C. A., Kumer, J. P., Manski, D. A., & Richards, D. V. (1990). Annual report of National Park Marine Debris Monitoring Program: 1989 Marine debris survey. 34.

Abstract: In an effort to learn more about the amounts and types of debris littering our beaches and to evaluate the long-term trend in ocean pollution, the National Park Service (NPS) and the National Marine Fisheries Service are cooperating in the five-year National Park Marine Debris Monitoring Program. Using survey methods developed by the National Marine Fisheries Service, eight national parks, selected by geographical coastal regions, are participating in the study. The primary objectives of the program are to provide national and seasonal trends in marine debris abundance, composition, and accumulation. Information on beach debris will also provide insight on the amounts and types of debris that are hazardous to wildlife. The annual report summarizes the results from the first year's marine debris surveys at the eight national parks.

Gombert, B. (1990). Algae Attack Florida Keys Reef System. *In: Underwater*, 7(2), 31.

Abstract: Parts of the reef system in the Florida Keys are being threatened by hair like algae that biologists believe is feeding on pollution and smothering the reef. The algae was first noticed around the middle of August last year and appears to be affecting the soft coral, the gorgonians, and sea fans. It attaches itself to the colonies and envelops them, shutting off the light. According to Brian E. Lapointe, who recently completed an independent comprehensive water quality survey for 15 different sites in the middle and lower Florida Keys, the near-shore sites are subject to a number of impacts from septic tanks to sewage entering the marine environment. Sites near developed residential homes as well as the Florida Bays area showed very significant nutrient enrichment--elevated concentrations of nitrogen and phosphorus--and lower dissolved oxygen in the water. The algae is apparently a result of cultural eutrophication, or an increased nutrient loading to the waters that results in a series of symptomatic changes. Other changes include a trend toward increased turbidity, decreased dissolved oxygen, noxious odors, and an overall increase in biological diversities. The previously low-nutrient and coral-

dependent aquatic environment is now able to support new life forms. Lapointe hypothesizes that the process has been accelerated by a large groundwater discharge that occurred during a heavy rainfall last August. Immediate actions which Lapointe says are needed include better waste water treatment, a review of agricultural practices, and the development of what he calls BMPs, or best management practices, that will deal with the non-point source pollution emanating from South Florida agricultural areas as well as other land uses. These are long-term solutions the effects of which may not be seen for the next 5-10 yr. Lapointe is seeking funding from the National Marine Sanctuary Program to further pinpoint the source of pollution in the Keys, but other pressing problems have kept such money very scarce.

Gombert, B. (1990). Algae Problem Continues. *In: Underwater*, 7(6), 19a.

Abstract: Hair like algae still cover a section of elongated reef near the inshore boundary of the Key Largo National Marine Sanctuary, threatening an entire reef-dependent marine life community. The algae do not appear to be spreading to other reefs and may even be decreasing in quantity. Biologists believe that the cause of the algae bloom is a higher than normal level of nutrients in the water, a result of pollution such as sewage runoff and septic tanks. The algae was first observed in August 1989 as it attached to soft coral, sea fans, and gorgonians and blocked these organisms from the light they require. Algae thrive on high nutrient levels, but the reefs are adapted to low nutrient conditions. If left unchecked, the algae will eventually kill the entire reef. Researchers have begun investigating the algae problem to determine if nutrient levels are unusually high. Rather than testing the water itself, which can change rapidly, they are testing plants which pick up nutrients in proportion to the nutrient concentration in the water. If the high nutrient theory is correct, these plants should have higher than normal levels of nitrogen. Other tests should determine the source of the excess nutrients. An expensive measuring device owned by the University of Virginia has the capability of detecting a "signature" possessed by nitrogen from sewage but not by marine nitrogen.

Hughes, J. (1990). St. Andrews State Park Aquatic Preserve management plan. (p. 83).

Tallahassee (USA): Florida Dep. of Natural Resources, Bur. of Submerged Lands and Preserves.

Abstract: St. Andrews Bay Aquatic Preserve, located in Bay County, covers 25,000 acres along the entrance to St. Andrews Bay and extends some 3 miles offshore into Gulf waters. The preserve consist largely of high energy zone areas, e.g. gulf sandy beaches, a strong tidal inlet with jetties and sandy bay bottoms. A moderate amount of shallow grassbed communities occur along the bayside of Shell Island. Marine fishes, shorebirds and various invertebrate marine life are predominant. The preserve lies adjacent to St. Andrews Bay State Park which receives heavy recreational use. Portions of the preserve adjoin exclusive residential development and military facilities. Water quality in and around the St. Andrews Bay area has deteriorated in recent years from sewage discharge and stormwater runoff. The inlet area, the Gulf and the inner bay area also support some of the heaviest boating traffic in northern Florida. The high recreational use, the increases in water pollution, and the continued development of adjoining uplands threaten the long term maintenance of the preserve and necessitate resource planning for the area. (Contract NA89AA-D-CZ-228 Sponsored by National Oceanic and Atmospheric Administration, Washington, DC. Office of Ocean and Coastal Resource Management, and Florida State Dept. of Environmental Regulation, Tallahassee. Office of Coastal Management.)

Lipsky, L. (1990). Problems Persist Among the Reefs of the Florida Keys. *In: Underwater*, 7(7), 22-23.

Abstract: North America's only living coral reef in the Florida Keys is being threatened to the point where its future existence may be in doubt. Several factors are contributing to the reef's demise: boat groundings, anchor damage, spear-fishing, over-collecting, deteriorating water quality, pollution. Researchers have found that the ocean is being saturated with excessive

amounts of nutrients from septic tank excrements, fertilizers from the agricultural industry, and the disposal of human waste offshore. These nutrients disrupt the natural balance of the coral's symbiotic relationship with the algae, causing algae overgrowth. This in turn has caused black band disease and coral suffocation. Excessive nutrients resulting from man's influence is also responsible for the deteriorating water visibility and the pea-green cast becoming more common on some of the reefs. Algae, suspended within the water along with a higher chlorophyll content, are partially to blame due to increasingly high amounts of nutrients entering the water. Silt from dredging and land-based construction in the Keys has clouded the water and in some areas smothered the corals. With an increasing amount of silt and other particulate matter in these waters, the coral and other marine life obtain less light which is essential for continued growth. Mooring buoys at most of the more popular dive sites has helped eliminate most of the anchor damage at reefs with buoys in place. But boat groundings, mostly within the shallow-water reef areas of Key Largo National Marine Sanctuary, have become a considerable threat, where 1990's total may easily double the 36 recorded incidents of only a couple of years ago. When a boat runs aground and the offender is caught, heavy fines are usually levied against the vessel's owner. Recently changed policy makes fines collected available to help benefit and repair damaged reef areas. All efforts to save the reefs themselves from pollution, anchor damage, and boat groundings are of little consequence if spearfishing, tropical fish collecting, and other destructive activities continue to deplete the underwater resources. Other dive destinations around the world protect their reefs by restricting spear fishing and other means of collecting. Discussions and studies are underway to extend the boundaries of Key Largo National Marine Sanctuary further south towards Islamorada. The ideal solution would be some type of state or federal legislation that would designate the entire Keys as a marine sanctuary. This would provide a significant and positive impact on the reefs with numerous benefits.

Peet, G. & Gubbay, S. (1990). Marine protected areas in the North Sea. *In: D. Freestone, & T. Ijlstra (eds), The North Sea: Perspectives On Regional Environmental Co Operation. Vol. 5, Chap. 1, (pp. 241-251). [s. l.]: [s. n.].*

Abstract: The North Sea environmental debate is dominated by the attention given to the pollution of the North Sea. Relatively little attention is given to the protection of species and the protection of specific areas in the North Sea. This chapter will focus its attention on the protection of specific areas, on the designation of marine protected areas in the North Sea.

99. **Vicente, N.** (1990). La protection des espèces dans les parcs et réserves marines en Méditerranée: Les invertébrés. *In: Cossu, A., Gazale, V., and Milella, I. (Eds.), Marine Parks In The Mediterranean. Biological And Management Aspects. (pp. 209-223). San Teodoro: Istituto Delle Civiltà Del Mare*

Abstract: Many studies on marine biology have covered the legal aspects of the protection of species which have become rare during the last few years, mainly due to excessive sampling, habitat destruction and pollution effects. Details are given of some marine invertebrates of the Mediterranean, providing biological and ecological characteristics and describing the causes of their rarity.

Zhirmunsky, A. V., & Tarasov, V. G. (1990). Unusual marine ecosystem in the flooded crater of Ushisher volcano. *In: Marine Ecology Progress Series, 65(1), 95-102. Notes: Bibliogr.: 22 ref.*

Abstract: This paper reviews investigations of a marine ecosystem in Kraternya Bight (Yankich Island, Kuril Islands) which has arisen and is functioning under the influence of gaso-hydrothermal vents of the Ushishir volcano. The concentrations of reduced sulphur compounds and a number of metals in the vents are 2 to 3 orders of magnitude higher than in seawater

around the island. Together with photosynthesis of algae, chemosynthetic bacteria play an essential part in primary production. Extreme chemical conditions in the outlets of vents have left a mark on the composition of communities and in peculiarities of certain species. Concentrations of some metals are so high that ecosystems of Kraternaya Bight can be considered as a model of sea territory with a high degree of industrial pollution. At the request of the Institute of Marine Biology, Kraternaya Bight has been created a preserve.

Abou Seida, M. M., & Al Sarawi, M. A. (1991). Utilization and Management of Coastal Areas in Kuwait. *In: Coastal Management*, 18(4), 385-401, 9 fig., 18 ref.

Abstract: Kuwait's coastal area is considered to have special importance because most urban, industrial, commercial and recreational activities are concentrated in this zone. It also represents the main source of freshwater and electricity in the country. Besides, the coastal zone has a unique ecosystem and is a significant nursing ground for fish and shrimp. Coastal characteristics include variations of tides, currents, and waves acting on: a soft, muddy, intertidal flat; a sandy-rocky tidal flat; artificial, man-made sandy beaches; sandy beaches found in the open coastline; oolitic limestone beaches; and coral reefs. Utilization of the Kuwait coastal zone includes: power desalination plants and industrial discharges; harbors and marinas; and recreational and other coastal activities. Plans touse the coastal area initially included proposals for the recreational development of the coastline, a major onshore coastal motorway, recommended growth of urban areas and establishment of several marine park areas. Government authority in Kuwait is structured on national and local authorities. The agencies that have a particular impact on the coast are in the areas of planning, water and power, city physical planning, human health, transport and trade. Management problems associated with planning may be divided into two distinct categories: technical (conflict between coastal zone users; environmental pollution; destruction of coastal habitats by dredging and filling; and residential and industrial demands) and organizational (poor coordination among coastal users and management agencies; lack of information; absence of a planning, coordinating, regulatory body; and lack of public awareness). The essential elements for managing the Kuwait coast are: clearly articulated policies; designation of a leading agency; ensuring the availability of baseline data, analysis, and trained manpower; and power to achieve coordination and follow-up.(Fish-PTT)

[Anon.]. (1991). Convention internationale de 1990 sur la préparation, la lutte et la coopération en matière de pollution par les hydrocarbures. (p. 32). Londres: Organisation Maritime Internationale.

Beckett, J. (1991). The Eastern Islands of Torres Strait. *In: Lawrence, D. and Cansfield Smith, T. (eds), Sustainable Development For Traditional Inhabitants Of The Torres Strait Region. Torres Strait Baseline Study Conference, Cairns, Qld. (Australia), 19 Nov 1990. Townsville, Qld Australia: Great Barrier Reef Marine Park Authority Workshop Ser. Great Barrier Reef Mar. Park Auth.: Notes: 5 ref.*

Abstract: The Eastern Islands of the Torres Strait region are of recent volcanic origin, set within coral reefs and surrounded by beaches from which they rise sharply. They lie within sight of one another, and therefore constitute a distinct anthropological unit. The culture of the peoples of the Eastern Islands is described, the circumstances and effects of contact and colonization, wholesale migration to Queensland in the post war period, and more recent population stabilisation. A deterioration in the supply of marine foods such as might follow from pollution of the sea, would impoverish the Islanders' diet as well as placing further strain on their meagre cash income. It would also terminate activities which people value as part of their cultural heritage.

Eid, E.-M. E. & Fawzi, M. A. (1991). Egyptian approach towards appropriate use of coastal zones on the Red Sea. *In*: T. Goda, & al. (eds), Int. Conf. on the Environmental Management of Enclosed Coastal Seas '90: EMECS '90, Kobe, Hyogo Prefect. (Japan), 3-6 Aug 1990. Vol. 23 (pp. 331-337). [s. l.]: [s. n.].

Abstract: Environmental management and appropriate use of coastal zones in Egypt is one of the major challenges facing Egypt. This is a natural outcome of its strategic geographical location straddling both the Mediterranean and the Red Sea which constitute two of the major enclosed coastal seas in the world. Therefore, the problem of the protection of the marine environment in the Egyptian coastal zones has received an early and serious concern by the Egyptian authorities. Due to the repeated and lasting occurrence of oil pollution on the shoreline of the gulf which endanger both the high coral diversity and mangroves which are equally valuable and in need of protection, oil pollution combating arrangements are being established at the entrance to the Gulf of Aqaba. This paper aims to illustrate the Egyptian approach in the coastal zone management, with special emphasis on the coastal zones of South Sinai adjacent to the Gulf of Aqaba.

GESAMP. (1991). The state of the marine environment. Oxford, UK: Blackwell Science.

Lawrence, D., & Dight, I. J. (1991). Torres Strait Baseline Study. Environmental protection of a tropical marine environment in northern Australia. *In: Coastal Zone*, 2, 1125-1139.

Abstract: This paper discusses the potential impacts of mining in the Fly River catchment area of Papua New Guinea on the Torres Strait marine environment and the customary ways of life of the Torres Strait Islander and coastal Papuan peoples, perceptions of concerns among environmentalists and commercial fishermen in Australia, as well as the nature and operation of the Torres Strait Baseline Study scientific programme. The baseline study will determine levels of trace metals in selected marine organisms, sediments, and seawater in the Torres Strait region which separates Australia and Papua New Guinea. The programme has been funded by the Commonwealth of Australia, and is being coordinated by the Great Barrier Reef Marine Park Authority in Townsville, in response to possible trace metal pollution from the Ok Tedi copper mine located nearly 1200 km from the study site. Besides being a major commercial fisheries area, the Torres Straits the traditional home to Australia's only Melanesian minority group, the Torres Strait Islanders, whose customary rights are protected by an international treaty.

McLaughlin, R. & Howorth, L. S. (1991). Mississippi ocean policy study. (p. 117). Ocean Springs (USA): Mississippi-Alabama Sea Grant Consort.

Abstract: Contents: Physical and Cultural Setting; Government Structure; State Submerged Lands Jurisdiction; Coastal Zone Management Act and Federal Consistency; Marine Pollution; Offshore Mineral Resources; Oil and Hazardous Substance Spills; Living Resources Management; Marine Recreation; Marine Education and Research; Marine Salvage and Finds; Protected Marine Areas; Management Frameworks for Improved Interstate, Interagency, and Citizen Participation; Model Legislation for Mississippi Ocean Resources Management Planning Act; Mississippi Ocean Policy Survey Results. (DBO)

Schmidt, T. (1991). Scientific studies in the coastal and estuarine areas of Everglades National Park: An annotated bibliography. *In: Res. Resour. Manage. Rep. U.S. Natl. Park Serv.*, 208.

Abstract: A total of 493 references (published and unpublished) on scientific studies in the coastal and estuarine areas of Everglades National Park (ENP) were annotated and subsequently indexed and arranged according to major scientific topics including zoology, geology, botany, hydrometeorology, water quality, and pollution. The geographic focus was three major estuaries located within the boundaries of ENP. Studies from a wider area were

included if they also sampled in park estuaries. The report was developed to provide researchers and resource managers with access to the rapidly accumulating body of information on the park's marine resources. It may be considered current through December 1989. Many references listed were completed during the last decade. (Prepared in cooperation with Everglades National Park, Homestead, FL. South Florida Research Center.)

Swofford, D. (1991). Rx For a Sick Reef. *In: Sea Frontiers*, 37(6), 38-43, 62.

Abstract: The coral reefs of the Florida Keys have suffered from pollution, overfishing, shipping accidents, and all the resulting problems from an abundance of tourism. In an attempt to save the major living reef off the continental U.S., the Federal government has designated the water surrounding the Keys archipelago (group of islands) a national marine sanctuary. The establishment of the sanctuary, which includes 3,500 sq. statute mi. from just south of Miami to the Dry Tortugas almost 100 mi. past Key West, goes much further than local laws did to preserve the ecologically fragile coral reefs. The National Oceanic and Atmospheric Administration (NOAA) is in charge of developing a management plan and locating alternative sources for funding, a factor that has many local business people worried. Dive and snorkel operators, charter fishermen, and tropical fish collectors believe that fees and taxes imposed on them would put them out of business. They claim that the reasons for the reef's decline had little to do with local business practices and more to do with pollution from southern Florida, agricultural run off from central Florida, and shipping accidents which could occur regardless of regulations. Most environmentalists believe, however, that the establishment of the Florida Keys National Marine Sanctuary is the most important step in preserving the area, although many suggest that more must be done to address the problem of pollution drifting from other areas down to the Keys. Over development in the Keys is also considered problematic for the reef, so another law, the Coastal Barrier Improvement Act, adds 67,000 acres of undeveloped land to the Coastal Barrier Resources System, making that land ineligible for federal development assistance and therefore severely limiting the possibility of its development

Craik, W. (1992). The Great Barrier Reef Marine Park: Its establishment, development and current status. *In: Marine Pollution Bulletin*, 25(5-8), 122-123. Notes: Spec. Iss.: Mar. Environ. and Manage. in Australia.

Abstract: The paper reviews the development of and current status of management within the Great Barrier Reef Marine Park and the major issues facing the Marine Park: tourism, fishing, water quality, oil pollution, and the crown-of-thorns starfish. The current status of these issues and proposed strategies for addressing them are outlined.

Saldanha, L. (1992). Marine fishes, habitats and conservation. *In: Neth. J. Zool.*, 42(2-3), 190-199. Notes: 7. Int. Ichthyology Conf. of the European Ichthyological Union, The Hague (Netherlands), 26-30 Aug 1991

Abstract: Marine fishes and their habitats, from coastal waters to the deep sea, are imperilled by numerous threats, such as overexploitation, pollution, and habitat destruction. Spearfishing mainly threatens sedentary coastal fishes. One problem when studying threatened fish species is generally the shortage of quantitative data, for instance about population size and life cycles. Marine reserves can be the solution to problems of preservation of some species and habitats. Existing laws on conservation must be enforced by strong control and inspection measures; new regulations must be created; international agencies can provide advice and expertise.

Barley, G. (1993). Integrated coastal management. The Florida Keys example from an activist citizen's point of view. *In: Oceanus*, 36(3), 15-18.

Abstract: The Florida Keys, a series of islands connected to each other and the mainland by bridges and a freshwater line, were developed haphazardly. For example, 30,000 septic tanks

and cesspits, along with uncontrolled, untreated storm-water runoff, constitute an unmonitored, potentially serious inshore pollution problem. On the Atlantic side, a magnificent coral reef system exhibits serious symptoms of stress, while on the Gulf of Mexico side the Florida Bay ecosystem is in collapse. The multitude of authorities with jurisdiction in the keys include two federal fishery management councils, National Marine Sanctuary and Monroe County officials, several state agencies, and federal fish and wildlife and state undersea park management agencies. Fishery pressure from large recreational and commercial groups is increasing. Jet skiers, divers, fishermen, ocean freighter operators, treasure salvors, and boaters all exert pressure on Florida Keys marine resources. Following Congress's 1990 designation of the Florida Keys National Marine Sanctuary, the National Oceanic and Atmospheric Administration (NOAA) brought representatives of user groups and the public together with federal and state agency officials to assemble an integrated coastal management plan. How has it worked, and what has been learned from the process?

Cousteau, J. M. (1993). Galapagos Islands Under Eco-Pressures. *In: Underwater*, 10(8), 20.
Abstract: Marine iguanas, giant tortoises, and a breath taking diversity of fishes exist on and around the Galapagos Islands. But tourism, and the expansion of the resident human population have brought pollution and overfishing, disturbing the island's unique ecological balance. In 1986, after many scientists, activists, and political leaders had repeatedly expressed their concern for the integrity of the Galapagos ecosystem, the Ecuadorian government established the Galapagos Marine Reserve (GMR). At least on paper, activities such as commercial fishing and coral harvesting are prohibited within the 15-mi. ring around the archipelago. Encompassing 42,000 square mi., the GMR is surpassed only by Australia's Great Barrier Reef in terms of actual territory under protection. But this protection has in the past proved illusory, because Ecuador has been unable to commit sufficient resources to enforce its progressive environmental legislation. In 1989 and 1991, foreign fleets ravaged the local shark population taking only what they needed to make shark-fin soup and dumping the carcasses overboard. Today, spear guns and harpoons once again terrorize the clear waters of the Galapagos, and a fish-processing plant openly exports products from the islands. In 1992, poachers took and processed an estimated 30 million sea cucumbers. In response to the subsequent international outcry, former President Rodrigo Borja issued a decree banning commercial sea cucumber fishing in the archipelago. But fishing interests have brought considerable pressure to bear upon the government of President Sixto Duran. They argue that opening the Galapagos to commercial exploitation will create jobs and save the traditional fishing industry. But experience has shown that the sea cucumber industry upsets the balance between local fishermen and their environment in the interest of a lucrative export market, whose benefits the locals rarely share in. The World Conservation Union (IUCN) reported earlier this year that sea cucumber populations in the Pacific have been exploited to below the minimum numbers necessary for regeneration. Many heavily exploited areas in Micronesia are still devastated 50 yr. after the fact, according to the Charles Darwin Foundation. The immediate challenge is to protect the remarkable laboratory that the Galapagos Archipelago offers. With an extraordinary 25% of its species found nowhere else, the Galapagos are an amazing treasure trove of as yet untapped information on biodiversity. What makes this ecosystem important renders it extremely fragile, vulnerable both to outright destruction and the disruption that results from introduced species. Protecting the Galapagos involves seriously implementing the existing management plan, and nurturing alternative industries such as eco-tourism, that incorporate the idea of conservation

Craik, W. (1993). Bioremediation in the Great Barrier Reef Marine Park. *In: Lash, J. and Raaymakers, S. Workshop on the Use of Bioremediation for Oil Spill Response in the Great Barrier Reef Region, Townsville, Qld (Australia), 25 Feb 1991. Townsville, Qld (Australia):*

Great Barrier Reef Marine Park Authority *Workshop Series Great Barrier Reef Marine Park Authority*:

Abstract: Some 2000 vessels travel through the Great Barrier Reef region each year, of which 200 are tankers. Since 1970 there have been about 175 recorded 'incidents' including collisions and groundings amongst others. The Great Barrier Reef Marine Park Authority has had a policy plan since the early 1980s to provide guidance for pollution responses and for intergovernmental cooperation in the response. The major difficulties in coping with a serious pollution incident include the distance of reefs and islands from the shore, the inhospitable weather for much of the year, and the remoteness from population centres of most of the Park. Bioremediation involves the application of bacteria and fertilisers to stimulate bacterial production. Apart from questions of its effectiveness in tropical waters, there are others about the need to introduce new organisms to the biota, and to add nutrients when there is already concern about potential eutrophication.

Dedah, S. O. (1993). Wind, surface water temperature, surface salinity and pollution in the area of the Banc d'Arguin, Mauritanie. *In: Hydrobiologia*, 258, 9-19 + Bibliographie.

Diaw, A. T., Thiam, M. D., Bouland, P., Diouf, P. S., Lake, L. A., Mbow, M. A., Ndiaye, P. & Thiam, M. D. (1993). Gestion des ressources côtières et littorales du Sénégal: Actes de l'Atelier de Gorée du 27-29 Juillet 1992. Gland; Switzerland: IUCN

Abstract: This publication presents the proceedings of a workshop held at the Island of Goree, Senegal, in July 1992 reviewing the most recent research findings and management issues on the utilization of the coastal resources of Senegal. Topics discussed include development, management, conservation and health aspects

Dumanoski, D. (1993). Stellwagen Bank to Receive National Marine Sanctuary Status. *In: Underwater*, 9(9), 11.

Abstract: Stellwagen Bank, the rich whale-watching and fishing ground off the tip of Cape Cod, is set to become the nation's first marinesanctuary in temperate waters. President Bush was expected to sign into law the designation, which was approved by the Senate. The move will protect the submerged arc of sand and gravel from mining or development and provide new legal powers to help protect it from pollution originating outside its boundaries. Environmentalists are especially concerned about the new out fallpipe under construction as part of the Boston Harbor cleanup and a proposal to dump contaminated dredge material near by. The designation would not affect commercial or recreational fishing in the area. The bank is most famous for the humpback whales that come to feed at its edge. The rich marine habitat also supports a commercial fishery as well as six other endangered species: three whales and three sea turtles. The richness of Stellwagen stems from its unique glacial geology that created deep canyons next to shallow flat-topped sand and gravel bars. This juxtaposition causes currents that drag water from deep in the canyon bottoms upward along the sides of the bank. The water carries many nutrients that would otherwise remain in the bottom waters. These nutrients feed the small organisms at the bottom of the food chain, and these in turn feed the rest of Stellwagen's rich marine life, including the small fish called sand lance which lure the migrating humpback whales back from the Caribbean each spring

Edyvane, K. (1993). An ecosystem based approach to marine fisheries management. *In: Hancock, D. A. Proceedings. Sustainable Fisheries Through Sustaining Fish Habitat. Australian Society For Fish Biology Workshop. Victor Harbour, SA, 12-13 August 1992. Canberra Australia : Australian Government Publishing Service*

Abstract: Large scale, multiple use management is an ideal vehicle to implement and develop a holistic, integrated, ecosystem based approach to fisheries management. Because of the

"connected" nature of the marine environment, marine ecosystem management must address both system oriented strategies, to prevent harm from pollution and overuse, and site based strategies to protect habitats or to allocate and separate conflicting use. Large scale, multiple use managed areas, such as marine protected areas (MPAs), provide an ideal tool for implementing such an ecosystem approach to fisheries management. The role of the "fisheries manager" should be to provide input into: (i) the broad strategic approach to ecologically sustainable management; and (ii) tactical habitat management. The goal of the "fisheries manager" should be to ensure the sustainable utilization of species and ecosystems. Inevitably, this will be linked with the maintenance of essential ecological processes and life support systems, and also, the establishment of research and monitoring programs to monitor the effectiveness of management strategies. The challenge for "fisheries managers" will be to redefine and broaden their role as "habitat managers" within a new, integrated, ecosystem approach to management.

Everaarts, J. M., Heesters, R., & Fischer, C. V. (1993). Heavy metals (Cu, Zn, Pb, Cd) in sediment, zooplankton and epibenthic invertebrates from the area of the continental slope of the Banc d'Arguin (Mauritania). *In: Hydrobiologia*, (258), 41-58 + Bibliographie.

Fall, C. (1993). Environnement côtier et santé : le cas des villes de Dakar et Mbour. *In: A. T. Diaw, M. D. Thiam, P. Bouland, P. S. Diouf, L. A. Lake, M. A. Mbow, P. Ndiaye, & M. D. Thiam (Coord.), Gestion des ressources côtières et littorales du Sénégal: Actes de l'Atelier de Gorée du 27-29 Juillet 1992.* (pp. 269-274). Gland, Suisse: UICN.

Niang, S. (1993). Le rejet des eaux usées à Dakar : Analyses chimiques et bactériologiques, problèmes d'épuration. *In: A. T. Diaw, M. D. Thiam, P. Bouland, P. S. Diouf, L. A. Lake, M. A. Mbow, P. Ndiaye, & M. D. Thiam (Coord.), Gestion des ressources côtières et littorales du Sénégal: Actes de l'Atelier de Gorée du 27-29 Juillet 1992.* (pp. 245-260). Gland, Suisse: UICN.

Salazar-Vallejo, S. I., Zurita, J. C., Gonzalez, N. E., Perez-Castillo, F. & Gamboa, H. C. (1993). Areas costeras protegidas de Quintana Roo. *In: S. I. Salazar-Vallejo, & N. E. Gonzalez Coastal And Marine Biodiversity Of Mexico.* (pp. 687-708).

Abstract: Quintana Roo is the only Mexican state in the Caribbean Sea; it has 12 areas legally protected and 9 include or were established because of its coastal attractions. Most coastal areas are in northern Quintana Roo; they have been affected by tourism, organic pollution, deforestation and landfilling of wetlands, physical stress by divers and boats and were impacted by hurricane Gilbert in 1988. We suggest modifications in the limits of Punta Cancun, P. Izuc, in the marine reserve of Cozumel island mainly to cover coral reefs, and buffer zones between urban areas and natural sites in Cozumel island. Tulum National Park has serious troubles on limits and land property. Several well-preserved sites deserve protection such as northern wetlands or Yalahau Lagoon, border zone of Chetumal Bay and some of its adjacent lagoons, and Chinchorro Bank. There are federal and state laws related to conservation but specific actions are still few or absent; Mexico signed the Kingston protocol on specially protected areas and wildlife. A state (or international) coastal management plan must be made soon.

Seck, A. A. (1993). Contamination du peuplement benthique et pollution des baies de Dakar. *In: A. T. Diaw, M. D. Thiam, P. Bouland, P. S. Diouf, L. A. Lake, M. A. Mbow, P. Ndiaye, & M. D. Thiam (Coord.), Gestion des ressources côtières et littorales du Sénégal: Actes de l'Atelier de Gorée du 27-29 Juillet 1992.* (pp. 261-268). Gland, Suisse: UICN.

Seck, M. (1993). Principes d'élimination des déchets industriels. *In: A. T. Diaw, M. D. Thiam,*

P. Bouland, P. S. Diouf, L. A. Lake, M. A. Mbow, P. Ndiaye, & M. D. Thiam (Coord.), Gestion des ressources côtières et littorales du Sénégal: Actes de l'Atelier de Gorée du 27-29 Juillet 1992. (pp. 181-189). Gland, Suisse: UICN.

Vargas-Hernandez, J. M., Hernandez-Gutierrez, A. & Carrera-Parra, L. F. (1993). The reef system of Veracruz, Mexico. *In: S. I. Salazar-Vallejo, & N. E. Gonzalez Coastal And Marine Biodiversity Of Mexico.* Biodiversidad Marina Y Costera De Mexico. (pp. 559-575). [s. l.]: [s. n.].

Abstract: Since colonial times the coral reefs off Veracruz have been exposed to human impacts mainly coral extraction for building pollution, overfishing, souvenirs, and aquarists. To protect the reefs, a marine national park was decreed in August 1992. In this paper biotic and abiotic characteristics of the main reefs are described, the anthropogenic impact is analyzed and some suggestion are made for an adequate management plan.

Wood, A. (1993). Whale Sanctuary Proposed. *In: Underwater*, 3(1b-2b).

Abstract: Many individuals testifying at a public meeting on Maui would be happy if the proposed Hawaii humpback whale sanctuary were harpooned. Currently no one, including the National Oceanic and Atmospheric Administration (NOAA), claims to know what form the refuge would take. NOAA is able only to enforce existing endangered whale protection laws and decide what new restrictions are necessary, and it is potential new restrictions that have created a tempest in Hawaii. Officials of the Fisherman's Foundation believe that existing laws are sufficient and new laws may make it difficult for commercial and recreational fishing to continue. Humpback whales (*Megaptera novaengliae*) are currently protected by the ESA and the Marine Mammal Protection Act. In Hawaii, approaching closer than 100 yd. in most areas and 300 yd. in others, whether by boat, aircraft or even swimming, is an offense and fines can be stiff. The Fishermen's Foundation believes that most operators are conscientious in following the guidelines and that the foundation would rather be an advisor than an adversary. They would like to see a comprehensive panel of ocean users set up the rule making process. Otherwise they can envision complete restrictions on all vessels, which would severely affect the shore fishing and whale watching industries. The Hawaii Whale Research Foundation does not believe a sanctuary is absolutely necessary to save the humpback, but does think a refuge could help, if done correctly. They believe that people continue to be ignorant of the needs of the humpback, and that it is more social than previously thought, especially on the winter grounds, making them more susceptible to human pressure in and around the ocean. Also a concern is run-off and pollution from sewage and other sources which might affect whale habitat - already a rash of algal blooms have occurred in Hawaiian waters. Sanctuary status could be helpful if it addressed the run-off issue. The organization believes, however, that whale numbers are increasing in this area and thinks the corner has been turned. The sanctuary would be unique in that it would be the first "mono-species" federal sanctuary. Currently only one single resource sanctuary exists--the wreck of the Monitor, off Cape Hatteras, North Carolina, which became a national marine sanctuary in 1975. Anchoring, stopping, or drifting in the area is prohibited. Exact figures are not available but the whale-watching industry in Hawaii is a multimillion dollar business and is one example of interdependence of healthy environment and a healthy economy, claim man charter operators. Many who depend on the whales for their livelihood would like to see the NOAA become involved in education and enforcement of existing laws. Since 1977, several sites have been proposed for a sanctuary but the Hawaiian Islands National Marine Sanctuary became a reality when President Bush signed into law the Oceans Act of 1992. It encompasses an area of water adjoining the islands of Maui, Molokai, Lanai--including the Penguin Bank -and an area near the Kilauea Point National Wildlife Refuge on Kauai. Public comments on the proposed sanctuary are encouraged by the NOAA. Information regarding humpback conservation may be obtained

from the Hawaiian Whale Research Foundation

Brookhouse, P. (1994). Management of wildlife operations. *In:* Lash, J. and Raaymakers, S. Workshop on Oiled Seabird Cleaning and Rehabilitation, Townsville, Qld (Australia), 26 Feb 1991. Townsville, Qld (Australia): Great Barrier Reef Marine Park Authority Notes: 3 diagrams, 4 ref.

Abstract: The management of wildlife rescue operations is in principle no different to the management of any other kind of pollution event. Of the four processes of management, planning, organising, leading and controlling, the first two are discussed in relation to pollution events. Contingency planning consists of identifying the risks, identifying the authorities to be involved in management, developing cooperation between them, and developing in-house procedures for each. Organisation consists of allocating the overall management, the operations management, collection and dissemination of information, and the provision of support services. A command structure for wildlife operations is illustrated.

Clements, E. (1994). Marine survey and the safe carriage of hazardous substances. *In:* Ottesen, P. (ed.), *Hulls, Hazards And Hard Questions Shipping In The Great Barrier Reef. Meeting of Experts. Shipping in the Great Barrier Reef - Reducing the Risk of Spilling Oil and Other Hazardous Substances*, Canberra, A.C.T. (Australia). (pp. 125-129). Great Barrier Reef Marine Park Authority

Abstract: The surveys carried out by or on behalf of the Australian Maritime Safety Authority of the hull, machinery, safety and pollution prevention equipment carried on Australian cargo ships engaged in overseas or interstate voyages are described. AMSA's actions to safeguard ships from cargo hazards are summarised. The importance of safe manning and crew competence are highlighted.

Dann, P. & Jessop, R. (1994). The effect of oil on birds - an evaluation of the birds at risk along the Great Barrier Reef and a brief general review of the effects of oil on individuals and populations. *In:* Lash, J. and Raaymakers, S. Workshop on Oiled Seabird Cleaning and Rehabilitation, Townsville, Qld (Australia), 26 Feb 1991. Townsville, Qld (Australia): Great Barrier Reef Marine Park Authority Notes: illus., 2 graphs, 2 tables, 17 ref.

Abstract: All seabirds are not equally at risk from oil pollution. Using a classification of foraging methods, those most at risk are pursuit divers such as cormorants, plungers such as boobies and sometimes shearwaters, surface seizers such as gulls and pelicans, and when the oil is blown onshore, intertidal foragers such as waders. Lethal effects on individual birds include asphyxiation, immobilisation, poisoning and hypothermia. Mortality can also result from shock and microbial infections as secondary effects. Effects on populations obviously depend on the severity of the oil spill, and recorded examples are presented and discussed.

Dixon, J. A., Scura, L. F., Carpenter, R. A. & Sherman, P. B. (1994). Economic analysis of environmental impacts. (pp. 2, xii + 210 pp., 40 tab., 25 fig.; many ref.). [s. l.]: [s. n.].

Abstract: This book focuses on the imposition of monetary value on the environmental impacts of economic development. Although much of the emphasis is on project level impacts, it also recognizes the importance of macro level government policies on the patterns of resource use. It contains sixteen chapters divided into two parts. The use of environmental assessment procedures, valuable at the early stages of project identification and priority setting, are discussed in chapter 2. The basic theoretical assumptions that underlie the proposed approach to valuation are then outlined in chapter 3. The techniques themselves are presented in chapters 4, 5 and 6; Chapter 4 focuses on techniques that are generally applicable to project analysis, while chapters 5 and 6 concentrate on techniques which are more difficult to apply and whose use in project analysis has therefore been limited. Chapter 5 covers selectively

applicable techniques that rely on the existence of surrogate markets or the use of survey based approaches, and chapter 6 discusses the use of mathematical models, natural resource accounting, and analysis of economy-wide impacts within the broader context of economic development and environmental management. The limitations of the economic measurement of environmental impacts are discussed in chapter 7. Case studies, which illustrate complete economic analyses as well as the use of individual techniques, are presented in the nine chapters in part two. The first of these case studies examines the use of changes in the values of milk, fertilizer and firewood production to assess a watershed management and forest development project in Nepal; the second evaluates selected mangrove management schemes in Bintuni Bay, Indonesia, on the basis of changes in productivity in mangrove-based activities including fishing, forestry and hunting; the use of the cost-of-illness approach to estimate the health costs of air pollution in Jakarta, Indonesia, is illustrated in the third case; the fourth estimates the benefits of a soil conservation project in the Loess Plateau, China; the fifth compares the cost-effectiveness of several waste-water disposal methods in the Togonan Geothermal power plant, Leyte, Philippines; the sixth the benefits for tourists and local residents of the establishment of a new National Park in Madagascar; the trade-offs between ecology and economic functions in the Bonaire Marine Park, Dutch Antilles is the seventh case; while the eighth estimates willingness to pay for improved water supply in Onitsha, Nigeria; and the final case study focuses on the priorities for setting priorities for pollution control measures in Central and Eastern Europe. The book represents an updated form of the Economic analysis of environmental impacts of development projects, published in 1988.

Dwyer, K. (1994). The jurisdiction and operation of tourist and fishing vessels in the Great Barrier Reef. *In: Ottesen, P. (ed.), Hulls, Hazards And Hard Questions Shipping In The Great Barrier Reef. Meeting of Experts. Shipping in the Great Barrier Reef - Reducing the Risk of Spilling Oil and Other Hazardous Substances, Canberra, A.C.T. (Australia). (pp. 44-50). Great Barrier Reef Marine Park Authority*

Abstract: An overview is presented of tourism and the marine industry in Queensland with particular reference to the Great Barrier Reef region. Recreational boating and supporting facilities are described, and the organization and extent of the commercial fishing industry, including licensing arrangements. The present administration of marine safety in Queensland, and proposals for a new maritime legislative regime in the State, are explained, including new marine pollution provisions. Duty of care principles and the responsibilities of vessel operators are discussed, with emphasis on a holistic approach to vessel safety.

Gehling, R. (1994). Latest developments in the subdivision and construction standards of vessels with special regard to the prevention of pollution after damage. *In: Ottesen, P. (ed.), Hulls, Hazards And Hard Questions Shipping In The Great Barrier Reef. Meeting of Experts. Shipping in the Great Barrier Reef - Reducing the Risk of Spilling Oil and Other Hazardous Substances, Canberra, A.C.T. (Australia). (pp. 114-123). Great Barrier Reef Marine Park Authority* **Notes:** illus.

Abstract: The structural integrity and subdivision of ships, particularly oil tankers, are major factors in the prevention of pollution. Improvements made to international requirements in this area over recent years are described and placed in context with other areas of the maritime industry. On the structural side, existing standards are adequate as long as they are properly enforced. As to subdivision, requirements are being substantially upgraded in a series of amendments to MARPOL, to the stage where new tankers are truly environmentally friendly.

Grajios, R. (1994). Tanker owner's and operator's perspective. *In: Ottesen, P. (ed.), Hulls, Hazards And Hard Questions Shipping In The Great Barrier Reef. Meeting of Experts. Shipping in the Great Barrier Reef - Reducing the Risk of Spilling Oil and Other Hazardous*

Substances, Canberra, A.C.T. (Australia). (pp. 110-112). Great Barrier Reef Marine Park Authority

Abstract: The commercial shipping industry in Australia gives a high priority to pollution prevention. Measures being taken or considered are described under the following headings: (a) safety and environment protection management, including moves to adopt an International Safety Management Code; (b) the recent adoption of a charter of practice for Australian shipping; (c) controls on drug and alcohol use aboard ships; (d) on-board contingency plans for action following an oil spill, no matter how small; (e) the National Plan to Combat Oil Pollution.

Julian, M. (1994). Review of oil spill contingency planning in Australia and overseas. *In:* Ottesen, P. (ed.), *Hulls, Hazards And Hard Questions Shipping In The Great Barrier Reef. Meeting of Experts. Shipping in the Great Barrier Reef - Reducing the Risk of Spilling Oil and Other Hazardous Substances*, Canberra, A.C.T. (Australia). (pp. 52-62). Great Barrier Reef Marine Park Authority

Abstract: Planning and legislation relating to the control of oil spills varies between countries. The USA system makes the shipowner responsible for oil spill response activity through a commercial cleanup contractor; this approach is also being taken in Canada. However, in Australia and New Zealand, it is unlikely that the available work would support such a contractor. The system in the United Kingdom, funded by the taxpayer and structured as a one-tier system encompassing all facets of marine pollution management, is not suited to Australia's federal system of government. The Australian approach, therefore, is to put joint responsibility on the State and Federal Governments. Government policy is to put the burden of cost, wherever possible, on the section of industry responsible for a particular polluting incident.

Kruglov, M. (1994). The Black Sea ichthyofauna; composition and contemporary condition". *In: Bulletin of Marine Science*, 55(2-3), 1342. Notes: Fifth International Conference On Aquatic Habitat Enhancement

Abstract: Lack of resource management and unlimited fishing have led to disastrous declines in the commercially important fishes in the Black Sea. Some species like sturgeon turbot mackerel and bonito have entirely disappeared. Horse mackerel goat fish and grey mullet populations especially along the northern shores of the Black Sea are seriously threatened and continue to diminish each year. During the past decade the fishery harvest has been reduced by 90% and consists principally of European anchovy and sprat small pelagic species fisheries. The Black Sea shelf on the whole is an ecological catastrophe due to pollution; the north western bank is lifeless and all along the coast the fishes in the gulfs and bays are vanishing. The critical shelf habitat that supports spawning larval survival and recruitment is endangered. Studies of the coastal zone ichthyofauna were initiated in 1989 along the shores of the south Crimea in the most unpolluted natural areas to determine if the fishes here were impacted. Stationary seine collections (3-45 m) in conjunction with underwater visual observations (0-25 m) were made at Laspi Bay in 1989 and 1990 (April-October) to characterize the ichthyofauna. Three groups of benthic littoral fishes based upon hydrothermal conditions and type of substratum. The first group is composed of 21 species occurring at depths between 0-12 m and was dominated by the long striped wrasse. The second group is composed of eight species occurring at depths between 12-20 m and was dominated by a scorpion fish. The third group is composed of four species occurring at depths between 20-45 m and was dominated by a skate. Groups 1 and 2 form in May-June in response to warm water conditions and disband in October-November when water temperatures cool. Group 3 is found in a cold water mass and is stable throughout the year. Marine sanctuaries are proposed for the Crimean coast to protect the existing flora and fauna

Leech, J. W. (1994). Transport of oil and other hazardous substances in the Great Barrier Reef: Hydrographic aspects. *In: Ottesen, P. (ed.), Hulls, Hazards And Hard Questions Shipping In The Great Barrier Reef. Meeting of Experts. Shipping in the Great Barrier Reef - Reducing the Risk of Spilling Oil and Other Hazardous Substances, Canberra, A.C.T. (Australia).* (pp. 81-97). Great Barrier Reef Marine Park Authority Notes: maps, tables

Abstract: Shipwreck is one of the main causes of catastrophic marine pollution. One of the main instruments in avoiding shipwreck is the nautical chart, which describes and locates dangers to shipping. Thirty percent of the Australian continental shelf has been adequately surveyed by modern techniques and standards; a further 20 percent is regarded as temporarily adequate. Inevitably, many of the unsurveyed areas carry significant volumes of shipping; and this includes parts of the Inner Route of the Great Barrier Reef. Despite the introduction of compulsory pilotage on this route, human error continues to be a frequent cause of groundings. The continuation of the hydrographic survey of the continental shelf at a reasonable rate of effort must remain high on national priority ratings, both in itself and as a basis for the introduction of electronic charting systems such as ECDIS.

Mawson, V. (1994). CSIRO Division of Oceanography research report, 1992-1993. *In: Res. Rep. CSIRO Div. Oceanogr. Hobart, Tas Australia CSIRO*, 36.

Abstract: The research achievements of the CSIRO Division of Oceanography (Australia) are summarized for the period from January 1992 to June 1993. Since its creation in 1981, the Division has had prime national responsibility for delivery of oceanographic knowledge of the deep water around Australia, including custodianship of the RV Franklin. Details of research activity reported include the ocean role in climate variability and change, the Southern Ocean role in climate, prediction of tides and currents for offshore resources, characterization and prediction of major current systems and continental shelf processes in Australian waters, marine oils and biomarkers, environmental studies in coastal and estuarine waters, trace elements and organic pollutants, the global carbon cycle, development of marine instrumentation, developments and commercialization of remote sensing products and RV Franklin research.

Mori, G., Innamorati, M., Massi, L., Nuccio, C., Lavista, F. & Nidiaci, L. (1994). Alteration of marine coastal ecosystems in the Parco Naturale della Maremma. *In: G. Albertelli, R. Attaneo-Vietti, & M. Piccazzo (eds), Proceedings of the 10th Meeting of the Italian Association of Oceanology and Limnology, Alassio 466 November 1992 and proceedings of the Italian Association of Oceanology and Limnology AIOL from 1 January 1991 to 31 December 1992.* (pp. 451-460). Genova-Italy : AIOL .

Abstract: In 1975-76, the seasonal variations of phytoplankton biomass and composition were studied along the coast of the Parco Naturale della Maremma (Grosseto, Italy), which is influenced by the mouth of the Ombrone river. The results indicated that the area was not involved in any process of environmental pollution and biomass annual cycles were those generally reported for temperate seas. The study was performed again in 1989-90, showing a striking change in the trophic and biological situation, especially near the mouth of the river. The phytoplankton composition and its temporal variations were completely modified, following the heavy impact from the Ombrone River, whose nutritional load is often similar to that of eutrophicated areas.

Morton, B. (1994). Hong Kong's coral communities: Status, threats and management plans. *In: Marine Pollution Bulletin*, 29(1-3), 74-83. Notes: Special issue: The Pacific reefs: A paradise lost?

Abstract: This paper reviews the sparse literature on Hong Kong's scleractinian coral communities and explains, in terms of a locally complex climate and hydrography, the broad

aspects of their distribution. Corals are restricted to the less polluted, oceanic, eastern waters of Hong Kong and are most diverse in the middle reaches of protected bays from CD to similar to -10 m CD. Historical evidence suggests that local corals were once more widely distributed but that the settlement of Hong Kong, particularly since its colonization in 1841, has progressively restricted them. Coral collection for lime burning was common until World War II, but has since stopped. Local coral communities, therefore, started anew some 50 yr ago. In recent years, the economic development of Hong Kong has, through uncontrolled pollution, destroyed many coral areas, notably in Tolo Harbour. Today, construction of the new Chek Lap Kok airport and associated infrastructure, requires the dredging of >500 million m³ of marine sands. Dredging operations in eastern waters have destroyed coral communities, through silt suffocation. Other reclamations and borrow areas have also adversely affected corals. Legislation is being drafted and plans are being developed to create marine parks and reserves in Hong Kong. The proposed marine park at Hoi Ha Wan is to try and protect a local coral community. The proposed marine reserve at Cape d'Aguilar is also a coral area within the framework of a more wave-dynamic habitat. Existing legislation has not hitherto protected Hong Kong's corals. The proposed legislation may help, but the reality is that only remnants of what once must have been a spectacular coral community may survive in the territory's remotest bays

Post, J., Munasinghe, M. & McNeely, J. (1994). The economic feasibility and ecological sustainability of the Bonaire Marine Park, Dutch Antilles. Protected area economics and policy: linking conservation and sustainable development. (pp. 333-338, 3 ref.). [s. l.]: [s. n.].
Abstract: This case study describes an example of a protected area that in its capacity as a tourist centre for scuba diving has become ecologically sustainable and economically feasible for the community and for the individual, the Bonaire Marine Park in the Dutch Antilles. It determines whether the objectives of the park are successful, asks who benefits from the park, who pays, and whether exploitation of the park is sustainable. Two major kinds of benefits have been distinguished: financial (private) and economic (public). These benefits can occur through the collection of various taxes, through the creation of employment, and through foreign exchange. An assessment of the ecological sustainability of the park is done through an investigation of the perceived carrying capacity of the resource and through a photo-analysis of coral cover in areas of high diving pressure. It concludes that the Bonaire Marine Park provides a good example of an area where biodiversity conservation and economic development have been mutually reinforcing. Close monitoring of the health of the reefs as a function of the number of divers is necessary to set eventual limits, whereas strict pollution control is essential.

Raaymakers, S. (1994). Ship sources oil pollution in the Great Barrier Reef: Causes, frequency, response and prevention. *In*: Ottesen, P. (ed.), *Hulls, Hazards And Hard Questions Shipping In The Great Barrier Reef. Meeting of Experts. Shipping in the Great Barrier Reef - Reducing the Risk of Spilling Oil and Other Hazardous Substances*, Canberra, A.C.T. (Australia). (pp. 11-22). Great Barrier Reef Marine Park Authority Notes: 2 tables, 11 ref.
Abstract: Ship sources oil spills are discussed in the context of the Great Barrier Reef, including Torres Strait, which falls within the REEFPLAN area. About 2000 ships pass through the area each year, about 100 of which are tankers. There have been no significant spills in the area since 1970; however, there have been 19 collisions and 24 groundings of large ships since 1979, and operational discharges from large ships are commonly reported. The impacts of oil on the tropical marine ecosystems found in the area are discussed. The nature and extent of impacts from major spills can not be predicted with any accuracy, and actual examples have tended to be more detrimental than expected from experimental results. Arrangements for the prevention of spills in the area are described, and opportunities for improvement identified.

Smith, P. J. (1994). Genetic diversity of marine fisheries resources: possible impacts of fishing. (p. 53). Rome: FAO.

Abstract: This report reviews the evidence for the genetic impact of fishing on marine fisheries resources. The most widely used method for measuring genetic diversity in natural populations has been protein electrophoresis; marine teleosts have levels of genetic diversity ranging from 0-18 percent and marine invertebrates from 0-32 percent. Genetic studies have shown that populations of marine species are less differentiated than freshwater species, experience temporal changes, can be changed locally by pollution, and contain cryptic species. In natural populations fishing is a major source of mortality and is non random with respect to age and size of individuals. A common observation in heavily exploited teleost fisheries has been a decline in the age and/or size at sexual maturity. Size selective fishing would favor early maturity. However, growth rate in some fishes is density dependent and increases when the stock is reduced. Thus it is not possible to determine if the observed changes are genetic or compensatory in response to reduced stock density. Genetic drift is unlikely to be a major factor influencing levels of genetic diversity in many marine fisheries, except for some populations which have been reduced to near extinction levels. There is no evidence for loss of genetic diversity in collapsed stocks of pelagic species. The use of hatcheries to produce seed for aquaculture and enhancement could lead to loss of genetic diversity in natural populations through escape of farm stock or inappropriate choice of broodstock. Experimental studies are required to determine the heritability and the response to selection of life history characters of exploited species, and to determine if relaxation of fishing pressure allows the recovery of fast growing and late maturing genes or gene complexes in populations. A combination of experimental and field studies would permit a more rigorous testing of genetic changes in exploited populations. If genetic changes are demonstrated in exploited species then changes to management would be needed to conserve natural levels of diversity.

Untawale, A. G. & Dhargalkar, V. K. (1994). Eco-tourism potential along the Indian coasts. *In: Srivastava, P. S. (ed.), Proceedings Of Seminar On Ocean And Industry Realities And Expectations Held On October 25 And 26, 1994 At National Institute Of Oceanography, Dona Paula, Goa.* (pp. 100-106). New Delhi : India Soc. Of Ocean Sci. And Technol.

Abstract: Tourism has recently become one of the major industries in India. The concentration of tourism in India is on the historical as well as religious places, hill stations and to some extent the beaches. Eco-tourism is a new concept being considered in India for creating awareness in education, research, conservation, sustainable utilization and management of flora and fauna. India has several biosphere reserves, marine parks and sanctuaries having different eco-biological components and uniqueness in flora and fauna. These reserves have attracted several domestic and foreign tourists. However, inspite of the very interesting scenic spots with rich biodiversity, these areas have not received much attention for eco-tourism due to the lack of tourist oriented spots recreation as well as infrastructural facilities and poor media coverage highlighting the unique and varied biota of the region. It is however, necessary to have proper management plan with stringent measures to control pollution and minimize the impact of tourism on the coastal ecosystems, keeping in view the total carrying capacity of the area

Yang, X., Zhang, J., Ye, X., & Wei, L. (1994). The present environmental quality assessment of intertidal zone in natural protect area of Nanji Archipelago. *In: Donghai Mar. Sci.* 12(2), 70-76.

Abstract: This paper is based on the environmental background survey data from the intertidal zone of Nanji Archipelago in the 1992-1993 winter and summer seasons, using the environmental quality exponential method to assess water quality, substrate quality and environmental quality conditions of organisms in the intertidal zone of the natural protected area. The results show that the water quality in Natural Protect Area of Nanji Archipelago in

winter qualifies for the standard of first grade sea water, and that a large part of the area is clean in summer. The Guoshengao area is clean, however Huokunao sea water is slightly polluted. The sediment of Guoshengao has been slightly polluted, but the sediment of the Huokunao area is clean, having a close relationship with the species of sediments. The remains of heavy metal in organisms in the protected area do not exceed the standard. Suggestions and measurements are proposed for protecting the intertidal zone from pollution.

Becker, P. R., Mackey, E. A., Demiralp, R., Suydam, R., Early, G., Koster, B. J., & Wise, S. A. (1995). Relationship of Silver with Selenium and Mercury in the Liver of Two Species of Toothed Whales (Odontocetes). *In: Marine Pollution Bulletin*, 30(4), 262-271.

Abstract: Liver specimens archived in the National Biomonitoring Specimen Bank from beluga whales, *Delphinapterus leucas*, and from Alaska and pilot whales, *Globicephala melas*, from the North Atlantic were analysed for silver, selenium and total mercury. Silver concentrations in beluga whales were one to three orders of magnitude higher than the concentrations in pilot whales and those reported elsewhere for other marine mammals. The concentrations of silver in the livers of beluga whales were the same or in some instances higher than the concentrations of selenium or mercury. Like mercury, silver was positively correlated with selenium in both pilot and beluga whales. This suggests a possible role for selenium in the accumulation and storage of silver in both species of whales, and raises questions about the potential for silver at such high concentrations to affect radical-scavenging enzyme systems in these marine mammals.

Chapman, P. M. (1995). Ecotoxicology and Pollution-Key Issues. *In: Marine Pollution Bulletin*, 31(4-12), 167-177.

Abstract: The following key issues in ecotoxicology, the integration of ecology and toxicology, are discussed: standardized tests and tests of specific hypotheses; future needs relative to 'benchmarks'; exposure routes and reference comparisons; reproductive effects (e.g. for endocrine-disruptive chemicals) and non-standard data analyses; 'acceptable' variability; appropriate use of end-points (e.g. NOECs), biomarkers and bioindicators; external concentration effect vs internal dose response; setting testable hypotheses; integration and/or tiering with chemistry, physical and other variables; 'validation' vs proactivity. Ecotoxicology is proactive (e.g. directed testing, resulting in testable hypotheses) as opposed to reactive, the initial impetus for toxicology (determining the causes of observed effects). Ecotoxicology and policy must be integrated if the environment is to be protected.

Corbet, A. G. (1995). Navigation management: post-Donaldson. *In: Marine Policy*, 19(6), 477-486.

Abstract: This paper examines the Donaldson Report on the inquiry into prevention of pollution from merchant shipping, with respect to its findings on marine navigation management in Chapters 13-16 of the Report. The paper supports Donaldson in advocating the mandatory use of radio transponders to identify ships and to monitor their navigation, but is highly critical of Donaldson's reasoning for rejecting a 'blanket ban' safety margin around the UK coastline with respect to ships having significantly large quantities of pollutants onboard, and for rejecting wider active Marine Traffic Control or Management (MTC) for reducing both strandings and collisions.

Fishelson, L. (1995). Elat (Gulf of Aqaba) littoral: Life on the red line of biodegradation. *In: Isr. J. Zool.*, 41(1), 43-55.

Abstract: During the last three decades, intensive industrialization along the head of the Gulf of Aqaba has adversely affected the shallow water community, including the fringing coral reef. The main factors in this biodegradation and species extinction appear to be domestic and

industrial effluents, dust from fertilizers from the harbor-loading station, and oil spills. In the last decade, tourism became a major negative factor, especially at the Elat Coral Reserve. The most prominent results of this deterioration is the depletion of the soft-bottom communities, with a serious decline in macro-infauna, such as echinoderms and some gastropod molluscs, and the dominance of nematodes and polychaetes on the polluted sites. The decline is also documented in the intertidal *Tetraclita-Cellana* community, which disappeared along with accompanying species. This has also been observed in the Coral Reserve. A similar decline is also seen in tidal fish populations of blennies, gobies, and singnathids. Pollution in the Coral Reserve has also adversely affected the dominant branching coral species, destroying most of these, thus causing the almost complete disappearance of symbiotic fish species, such as *Dascyllus aruanus*, *Gobiodon* spp., *Paragobiodon* spp., and *Pseudochromis olivaceus*, that formerly sheltered in these corals. Data are provided on the endangered species of the Elat littoral, including the Coral Reserve. It is suggested that only direct and immediate prevention of land-borne pollutants can halt the collapse of the littoral coral communities and, thus, enable their regeneration.

Gabrielides, G. P. (1995). Pollution of the Mediterranean Sea. *In: Water Science and Technology*, 32(9-10), 1-10.

Abstract: The Mediterranean States adopted an action plan for the protection of their common sea from pollution as early as 1975. This comprehensive action plan is not limited to monitoring of marine pollution but includes all aspects relevant to environment and development. It is coordinated from the Athens-based Centre but regional offices also exist being responsible for the implementation of specific programmes. The scientific and technical component of the action plan (the MED POL programme) was the first one to be initiated involving more than 100 Mediterranean research and monitoring institutions. Selected results of the monitoring programme are presented shortly. The following parameters are dealt with: mercury, cadmium, copper and zinc, organohalogen compounds, organotins, organophosphorus compounds, herbicides and fungicides as well as synthetic persistent materials. The results have shown that pollution in the Mediterranean sea is limited to coastal areas where the sources, such as industries and population centres, are found. The north-western Mediterranean has shown higher pollutant concentrations either because of natural sources (case of mercury) or because of the industrial development of the region.

Glynn, P. W., Rumbold, D. G., & Snedaker, S. C. (1995). Organochlorine Pesticide Residues in Marine Sediment and Biota from the Northern Florida Reef Tract. *In: Marine Pollution Bulletin*, 30(6), 397-402.

Abstract: As part of a two-phased study, sediment and biota were collected from Pennekamp Coral Reef State Park and Key Largo National Marine Sanctuary and analysed for organochlorine pesticide residues. Phase 1 consisted of an inter-laboratory comparison using replicates of unspiked field samples. The five participating contract-laboratories differed in methodology, detection limits and their ability to detect pesticides. The highest concentration of pesticide reported in Phase 1 samples was 4.4 ng g⁻¹ wet wt aldrin, found in a fillet of *Haemulon plumieri*. Based on the inter-laboratory comparison, one laboratory was selected to analyse additional samples collected in Phase 2. Pesticides were detected in 43 of the 52 Phase 2 samples. The highest concentration reported in Phase 2 samples was 2.3 ng g⁻¹ [alpha]-BHC in *Panulirus argus* tail muscle. These results suggest that while most samples contained one or more residues, pesticide concentrations were low and trends in residue profiles were minor.

Hamilton, M., & Cocks, K. D. (1995). A small-scale spatial analysis system for maritime Australia. *In: Ocean & Coastal Management*, 27(3), 163-195.

Abstract: Within the field of resource and environmental management, the paramount value of

a spatial analysis system is as a tool for regionalising a case-area in diverse directed ways, each being useful for (i) increasing scientific understanding of that area (intellectualisation) or (ii) for allocating operational categories (for example, funding categories, regulatory categories) differentially between parts of the case-area (called operations support or policy support). Success in serving these scientific and administrative values depends in turn upon two primary attributes of the spatial analysis system and a larger number of secondary attributes. These primary attributes are (i) the range and quality of geocoded data sets held in store or able to be accessed and (ii) the range of spatial analysis techniques which can be called upon for operating on stored data sets. Secondary attributes influencing a spatial analysis system's value include its accessibility to potential users, its ease of use, the judgement and experience of its users and the quality of its cartographic and other outputs. The present paper is a status report on the Australian Coastal And Marine Resources Information System, CAMRIS, a spatial analysis system developed as a demonstration for Australia. CAMRIS contains or can access raw and value-added data sets which comprehensively cover both terrestrial and marine components of the Australian maritime estate. Onshore, for the immediate coastal strip, data held or accessible include geocoded data on vegetation, geology, landform, wetland and coastline type, land use, climate and population. For coastal drainage basins, data sets include river networks, river flows, wetland attributes, soils, geology, elevation, vegetation, mineral deposits, beach attributes, population and bird distributions. Nearshore data include geocoded data on estuary attributes, island attributes, seagrass beds and marine protected areas. Offshore (oceanic) geocoded data held or accessible include bathymetry, sea surface temperature and salinity dissolved oxygen profiles, together with a variety of geophysical records including gravity, magnetics, seismic track lines, substrates, waves, winds, storms, tides and cyclones. While raw data are stored as such whenever available, many of these data sets are in value-added form, held perhaps as a surface or choropleth or as a function of primary data items. A range of spatial analysis techniques is routinely available for application to CAMRIS data sets including those within the SPANS, Arc Info, and Idrisi geographic information systems, the S Plus exploratory data analysis package, and specialist in-house packages such as PATN for multivariate positive classification and LUPIS for resource allocation and normative classification. CAMRIS demonstration studies in various stages of completion address: (1) selection of coastal and marine protected areas; (2) identification of priority areas for the management of land-based marine pollution; (3) planning for coastal population growth; and (4) synoptic impacts of climatic change in the coastal zone. Further candidate studies being considered include mariculture prospects and proactive management of oil spills and leaks. An important indicator of success for the CAMRIS project would be for it to be seen as a prototype for a properly-funded multi-agency national maritime (coastal and marine) spatial analysis system. Australia, with one of the worlds largest and most diverse maritime estates and with a small population imposing increasing pressures on that estate, needs powerful policy and operations support tools.

Hammond, J. (1995). Underwater features of South Australia. *In: South. Fish.*, 3(1), 14-16.
Notes: illus.

Abstract: The CSIRO Division of Fisheries is engaged in a major project to document all of Australia's coastal underwater features, with emphasis on reefs and seagrass meadows - valuable nursery and feeding areas for fish, crustaceans and other marine animals. Maps will be produced that will be essential in the designation of marine parks and reserves, pinpointing vulnerable areas that need protection from pollution, and invaluable in the event of an oil spill or similar disaster.

King, S. E., & Lester, J. N. (1995). The Value of Salt Marsh as a Sea Defence. *In: Marine Pollution Bulletin*, 30(3), 180-189.

Abstract: The value of salt marsh as a buffer outside sea walls is appraised. As salt marsh width decreases an almost linear increase in wall height is necessitated until loss of a final thin strip causes an exponential rise in maintenance and construction requirements and costs. A minimum value is placed on salt marsh in its capacity as a sea defence and its use and non-use values are discussed. Except in special circumstances salt marsh has a low capital value, and while sale of land to wildfowling syndicates is found to be the highest direct value, this is far surpassed by the indirect value of savings on both capital and maintenance costs in sea defence terms. Reference is made to the coast of East Anglia in the UK and in particular to that of Essex.

Kitsos, T. R. (1995). Troubled waters: A half dozen reasons why the federal offshore oil and gas program is failing - a political analysis. *Moving Ahead On Ocean Governance: Round table Summaries*, Ocean governance Study Group 1994. (pp. 36-45).

Maragos, J. E., & Cook, C. W. Jr. (1995). The 1991-1992 rapid ecological assessment of Palau's coral reefs. *In: Coral Reefs*, 14(4), 237-252. Notes: Special Issue: Science and Management.

Abstract: At the request of the Palau and US governments, a team of 30 scientists under the leadership of the Nature Conservancy completed a rapid ecological assessment (REA) of nearshore marine resources in Palau in 1992. The REA provided ecological input to Palau's ongoing master plan for economic development and identified 45 marine sites worthy of special protection. The REA relied on previous literature, 1992 aerial photography, interviews, and field observations. A combination of qualitative and quantitative techniques were used to assess stony corals, other reef invertebrates, reef and shore fishes, macroscopic algae, seagrasses, sea turtles and other marine organisms. The REA covered a variety of coral reef habitats including beaches, seagrass beds, fringing reefs, lagoons, passes, channels, reef holes, patch and pinnacle reefs, barrier reefs, atolls, submerged reefs, mangroves, and "rock" islands. Major stresses to Palau's coral reefs include sedimentation from soil erosion, overfishing, and damage from periodic storms and waves. Minor stresses include dredge-and fill activities, sewage pollution, anchor damage, tourism use, ship groundings, aquarium fish collecting, and minor crown-of-thorns (*Acanthaster*) infestations.

McIntyre, A. D. (1995). Environmental monitoring of the oceans. *In: Marine Policy*, 19(6), 497-502.

Abstract: Monitoring in one form or another is a centuries-old activity but in recent years it has assumed a more rigorous form, partly in response to an increasing demand for data on which to base regulation and control measures for pollution, and partly thanks to the development of sophisticated technology. This article briefly discusses current pollution monitoring programmes and considers the Recommendations of the Donaldson Inquiry in this context.

McIntyre, A. D. (1995). Human Impact on the Oceans: The 1990s and Beyond. *In: Marine Pollution Bulletin*, 31(4-12), 147-151.

Abstract: This article traces the effects of human activities on the sea. It looks first at the damage done to natural populations of marine animals by excessive hunting and fishing. It then documents the impacts from a wide range of contaminating inputs, including discharges from the land, atmospheric deposition and accidents. It highlights the loss of coastal habitats arising from shoreline construction related to industry, tourism and aquaculture. Against this background it assesses the current state of the marine environment and looks at the problems ahead.

Mill, G. A., & Theophilou, J. A. (1995). Effluent re-use in a tourist resort - larnaca sewage treatment and irrigation project - cyprus. *In: Water Science and Technology*, 32(9-10), 115-124.

Abstract: Designs for sewerage, sewage treatment and effluent disposal prepared in the 1980's, included for marine disposal of secondary treated and disinfected effluent via a 1.5 km long sea outfall. A reappraisal of the scheme in 1990 reviewed alternative options with a view to reducing costs and utilising effluent. An economic comparison showed that effluent storage and irrigation was an attractive alternative to marine disposal. A scheme was designed whereby all effluent will be given secondary treatment, stored in reservoirs until required for irrigation, withdrawn through sand filters, disinfected and pumped to an irrigation distribution system serving public amenity areas throughout Larnaca, including parks, gardens, road verges and hotel areas. A sea outfall will not be provided. The advantages of the scheme are conservation of water, improvement to the environment and prevention of marine pollution at a reduction in cost compared to the originally proposed scheme.

Mwanje, J. I. (1995). Coastal tourism in East Africa: Perspective, concepts, development and management. *In: Linden, O. (ed), Proceedings Of The Workshop And Policy Conference On Integrated Coastal Zone Management In Eastern Africa Including The Island States. Report From The Swedish Agency For Research Cooperation With Developing Countries Marine Science Program. Manila: Manila Coastal Management Center*

Abstract: The East African coast is an area of great physical beauty encompassing a variety of coastal ecosystems which are of vital importance to tourism development. Sandy beaches, coral reefs, marine parks, sport fishing and the nearby game reserves and national parks are increasingly attractive to tourists, particularly within the unique sociocultural setting of the region. The economic value of tourism is increasingly important to the region, particularly in terms of foreign exchange earnings. In 1993, Kenya and Tanzania were expected to receive 1,000,000 and 215,000 tourists, respectively. As tourism continues to expand, there are serious concerns about the effects of poor development practices on this sector, caused by coastal pollution, erosion and sedimentation, destruction of coastal habitats and urbanization. Tourism development itself can also have a number of direct negative impacts on the natural and sociocultural environments of coastal areas. Poorly planned tourism development may result in pollution and degradation of coastal habitats, overexploitation of natural resources, skyrocketing land costs and clashes with local attitudes and values. Most countries in the region have ministries and other relevant organizations charged with the development and management of tourism. There is, however, a need to better synchronize and integrate policies and legislation affecting tourism at both the national and regional levels, particularly within the broader context of coastal zone management.

Plant, G. (1995). A European lawyer's view of the Government response to the Donaldson Report. *In: Marine Policy*, 19(6), 453-467.

Abstract: The Report of Lord Donaldson's Inquiry into the Prevention of Pollution from Merchant Shipping, of May 1994, discussed here, is a document of the first rank of importance for all those interested in shipping safety and the prevention of ship-source pollution. The UK Government is called upon to take a lead internationally, regionally and nationally in these interrelated fields, and its first published response, issued in February 1995, and many of its initiatives, examined here, suggest that it has, for once, heeded the cries of a major inquiry. In doing so, however, as is explained, it must constantly take into account major developments in the European Community. While finally, many new ideas and approaches are embraced or are being further considered by the Government, it is argued here that the whole process, by keeping strictly within the bounds of existing international law and by emphasising voluntarism (indeed, restricting strict enforcement actions to mere measures of last resort), it is somewhat behind international trends, manifested in the acceptance of the principle of mandatory ships'

routing and ship reporting systems and in the current debate on development of the Particularly Sensitive Sea Area concept.

Cortes, J. (1996). A reef under siltation stress: a decade of degradation. *In: Biological Conservation*, 76(2), 215.

Abstract: The coral reef at Cahuita National Park, Caribbean coast of Costa Rica, has been stressed by sediments from watersheds of rivers that flow to the sea near the Park. High sediment loads in these rivers are due to deforestation on the highlands and to inappropriate agricultural practices on the coastal plains. During the last decade natural disturbances (coral bleaching in 1983, sea urchin *Diadema antillarum* die-off in 1983 and 1992, at 7.4 earthquake in 1991) and other anthropogenic stresses (pollution, tourism) have contributed to the degradation of the coral reef.

Joyner, C. C. (1996). The 1991 Madrid Environmental Protection Protocol; Contributions to marine pollution law. *In: Marine Policy*, 20(3), 183-197.

Abstract: The 1991 Protocol on Environmental Protection to the Antarctic Treaty and its annexes contribute substantially to contemporary international law prohibiting marine pollution. As the Protocol approaches obtaining the number of ratifications necessary for entry into force, its relevance for international ocean law accordingly becomes more salient. Thus, measures in the Protocol and its annexes take on particular importance, as they are made to apply to all sources of pollution affecting the Southern Ocean ecosystem (i.e., sources from land, dumping, vessels, the atmosphere and the seabed). Such an all-encompassing approach well serves to bolster both the normative and policy framework for effecting anti-pollution marine law in the region.

Lerner, C. B. (1996). Sponges of Gale Island, Marine Biological Reserve of Arvoredo, Santa Catarina, Brazil (Porifera; Demospongiae). *In: Biociencias*, 4(2), 101-129. **Notes:** Original Title: Esponjas da ilha da gale, Reserva Marinha Biologica do Arvoredo, Santa Catarina, Brasil (Porifera; Demospongiae)

Abstract: The results are reported of the first extensive survey on the sponge fauna from a Brazilian littoral Island: Gale Island (27 degree 10'48 double prime S x 48 degree 24'18 double prime W), belonging to the "Reserva Biologica Marinha do Arvoredo", Santa Catarina, Brazil. The samples were SCUBA diving taken from December 1988 to January 1992, along eight transects, reaching the infralittoral of the island. The demosponges detected are *Polymastia janeirensis* (Boury-Esnault, 1973); *Polymastia* cf. *agglutinans* (Ridley & Dendy, 1886); *Halichondria lutea* Alcolado, 1984; *Pseudaxinella reticulata* (Ridley & Dendy, 1886); *Teichaxinella corrugata* (George & Wilson, 1919); *Mycale microsigmatosa* Arndt, 1927; *Tedania ignis* (Duchassaing & Michelotti, 1864); *Haliclona tubifera* (George & Wilson, 1919); *Haliclona mammillaris* Mothes & Lerner, 1994 and *Aplysina fulva* (Pallas, 1766). P. cf. *agglutinans*, H. *lutea*, T. *corrugata* and H. *tubifera* are new records for the Brazilian coast. P. *janeirensis* and M. *microsigmatosa* have their southern range pushed farther south to Santa Catarina in the Brazilian coast. P. *reticulata* is the most common species having occurred in all stations, followed by H. *lutea*, T. *ignis* and A. *fulva* found in three stations. A vertical zonation was detected in the island infralittoral: the M. *microsigmatosa* zone, extending from 0 to 5 meters, with only rare specimens of this single species and the P. *reticulata* zone, extending from 5 to 13 meters, where the species and the other ones detected, with the exception of M. *microsigmatosa*, were found. The extensive occurrence of calcareous algae in the island infralittoral and the large amount of very fine calcareous debris mixed with the sediment and partially covering the sponges suggest that this may be the main factor driving the species selection and the very sparse distribution of specimens detected. The detection of pollution sensitive species like T. *ignis* and A. *fulva* handles the first tool for future environmental

impact assessments in the marine biological reserve.

Lizarraga-Partida, M. L., & Cardenas, G. V. (1996). Influence of Water Circulation on Marine and Faecal Bacteria in a Mussel-Growing Area. *In: Marine Pollution Bulletin*, 32(2), 196-201.

Abstract: Surface water and mussel samples were taken over a 2-year period in the southern part of Todos Santos Bay to follow the evolution of three different bacterial populations. The patterns and variability of viable heterotrophic bacteria, *Vibrio*-like organisms and faecal coliform populations were recorded to detect and assess the effects of pollution sources in this region, where mussel culture has recently been established. Faecal coliforms (FC) in surface waters had consistently low levels throughout the sampling period, normally under 14 FC 100 ml⁻¹, the limit allowed by Mexican and US health agencies for areas dedicated to bivalve culture. We suspect that the southern part of Todos Santos Bay is protected from pollution generated in the north by its internal water circulation pattern, which is controlled in turn by the dominant winds in this region. A further implication of this circulation pattern is that the southern part of the area could be rapidly affected if organic wastes are discharged near the region of Punta Banda.

Morton, B. (1996). Protecting Hong Kong's marine biodiversity: Present proposals, future challenges. *In: Environmental Conservation*, 23(1), 55-65.

Abstract: Pollution from many sources, over-fishing and the rapid development of Hong Kong have had powerful, adverse, impacts upon local marine life reducing it to but a shadow of what it once was. This paper describes Hong Kong's newly enacted Marine Parks Ordinance Chapter 37 1995, discusses the existing situation with regard to the designation of marine parks and reserves, and describes the special features of each one. It argues that a territory-wide strategy will have to be implemented if representative intertidal and coastal water communities are to survive. Coastal zone planning and management need to be among the Hong Kong Government's highest priorities because there are indications that the marine parks and reserves will not be successful. The threats to them are too great. Conservation legislation and coastal planning exercises should also be integrated with those of China as soon as possible, especially for areas of coastline surrounding Hong Kong. This is because development within southern China is proceeding at such a pace that Hong Kong's protected areas are now being threatened by external factors as well as internal ones.

Ngoile, M. & Kiwia, M. A. (1996). Community participation in the development of Mafia Island marine park. *In: O. Linden, & C. G. Lundin National Workshop on Integrated Coastal Zone Management in Tanzania, Zanzibar, (Tanzania), 8-12 May 1995.* (pp. 124-132). Washington,-D.C.-USA : World Bank, Environmental Department, Land, Water and Natural Habitants Division.

Abstract: The southern part of Mafia Island hosts a great variety of natural resources and habitat types with considerable physical and biological diversity. Larvae produced within the reef system of southern Mafia is likely to contribute to the maintenance of reef related marine life, including commercial fish stocks in Tanzania and the northern Eastern Africa coastal waters. Thus southern Mafia may serve as a seed bank for an area much more extensive than Mafia itself. Threats undermining the sustainable resource use at Mafia include the recent rise in dynamite fishing, clear felling mangroves, use of illegal fishing gears, coral mining for building and lime production, anchorage damage, pollution from oil discharge and siltation and imbalances caused by changes in terrestrial run-off after deforestation in the Rufiji Delta. Marine turtles are threatened by encroachment at breeding sites and increasing numbers are caught in shark nets.

Oleksyn, J., & Reich, P. B. (1996). Pollution, habitat destruction, and biodiversity in Poland. *In: Biological Conservation*, 76(2), 216.

Abstract: In the past 50 yr Poland has experienced unprecedented deterioration of the environment and loss of biodiversity. Emissions of toxic gases, such as SO₂, have reached 3-4 million tons annually. Almost all surface waters are heavily polluted. Over 75% of the water in the Vistula, Poland's largest river, is unsuitable even for industrial use. Environmental pollution, habitat loss and fragmentation, and industrialization of agricultural lands and forests have contributed to the loss of biodiversity. As many as 2500 plant species may be endangered (c25% of all species) and 228 (2%) have been extirpated from Poland. Largest losses of flora and fauna have occurred in wetland ecosystems. Among vertebrate species 15 (2%) have been lost and > 210 (another 30%) are endangered.

Rajasuriya, A. (1996). Marine sanctuaries and conservation of fishery resources. *In: Morris, M. J., Masamichi, H., and Atapattu, A. R. (eds), Report And Proceedings Of The Sri Lanka Fao National Workshop On Development Of Community Based Fishery Management. Colombo, 3 5 October 1994.* 1996:

Abstract: The dwindling of coastal resources is of great concern to many developing countries. Critical habitats such as coral reefs, mangroves and seagrass beds make up the coastal ecosystems. These ecosystems are important for the well being of people, coastal communities in particular. Coastal fisheries sustain many economies, coral reef associated fisheries supply 10 to 12% of the world's total fish landings. About 90% of fish landings in tropical developing countries comes from coastal waters and supplies 40% to 95% of animal protein consumption. Human activities have begun to degrade these ecosystems. Destructive fishing methods, over harvesting, pollution and sedimentation due to unplanned land use practices are the major causes. Several countries have attempted to arrest this trend by introducing various regulations to manage resource exploitation and by declaring marine protected areas. However, measures taken to protect and manage the resources have not produced the desired results, mainly due to the lack of involvement of the communities concerned.

Warner, G. F., & Domaniewski, J. C. J. (1996). Fish farming and the environment. *In: Biological Conservation*, 76(2), 216.

Abstract: Environmental costs associated with the recent spread of intensive trout and salmon farming in the UK include contamination of downstream habitats by organic wastes and complex chemical pollutants used in treating fish. Escapes of selectively bred farm stock and exotic species may have important ecological effects by spreading diseases and parasites and threatening wild stocks by interbreeding and competition. Some examples of the detrimental effects of escaped Atlantic salmon on wild stock, as well as impacts on marine food chains, are given. Recommendations are made towards better management practices and the 'green' fish farm, including the use of legislation to minimize the negative impacts on the environment.

Wilkinson, C. R., Chou, L. M., Gomez, E., Ridzwan, A. R., Soekarno, S., & Sudara, S. (1996). Status of coral reefs in Southeast Asia: threats and responses. *In: Biological Conservation*, 76(2), 217.

Abstract: Coral reefs of SE Asia are both at the center of reef biodiversity, especially the archipelagos of Indonesia and the Philippines, and the focus of rapid economic and population growth. Major stresses are anthropogenic: organic and inorganic pollution, sedimentation and over-exploitation. Many countries have enacted strong legislation to protect coral reefs and gazetted some marine protected areas, but the resources are neither available nor of sufficient priority to ensure adequate protection of their coral reefs. Many reefs have already collapsed. Because human populations are expanding and economies are growing, it is predicted that most of the coral reefs in the region will be exterminated within the next 40 yrs. This situation will

only be prevented if governments provide: resources for education for sustainable exploitation practices; management of large areas; and the authority at the local government level for the protection and management of the coral reefs by the people who directly use them.

[Anon.]. (1997). Striking a balance. Improving stewardship of marine areas. (p. 155). Washington, DC: National Academy Press.

Abstract: The Marine Board of the National Research Council (NRC) has conducted major assessments of the scientific and technical prerequisites for exploring and understanding the nation's coastal and marine regions in a series of reports. These and other assessments have concluded that the nation's interest in the conservation and wise management of its ocean territory requires a sustained public investment in information gathering and management in this region. The findings from the Marine Board studies have indicated strong interest in the nation's coastal and marine areas by present and potential offshore industries, by coastal states responsible for resource development and environmental preservation of their offshore regions, and by the ocean research community. Few steps have been taken, however, to devise a comprehensive regulatory or management framework for current or future activities in federal and state waters or on or under the seabed in the nation's Exclusive Economic Zone. The need for a regulatory and management framework is likely to increase in the future as advances in offshore technology or changes in market conditions lead to the expansion of coastal populations and of marine recreation and tourism, activities that utilize or impinge on coastal and marine resources, such as marine aquaculture, offshore oil and gas and minerals exploration, and waste disposal in deeper waters. These activities may, in turn, conflict with plans for setting aside areas as marine sanctuaries and concerns about ocean pollution. In April 1993, the Marine Board sponsored a forum on ocean issues. Representatives from private industry, public agencies, public interest groups, and the academic ocean policy community were invited to air their views on the need for a national strategy to manage the nation's coastal and ocean resources and space. Based on the proceedings of the forum, the Marine Board identified emerging issues in marine area governance and management

Attwood, C. G., Harris, J. M., & Williams, A. (1997). International experience of marine protected areas and their relevance to South Africa. *In: South African Journal of Marine Science*, 18, 311-332.

Abstract: Marine protected areas (MPAs) have become necessary to counter modern threats to marine biodiversity and the sustainability of fisheries. Sensitive habitats, including coral reefs, estuaries and mangroves, have been effectively protected in large MPAs, which control resource use. Protection from pollution and physical destruction by fishing gear are important functions of MPAs in tropical and temperate regions. MPAs have been used to protect endangered species and to allow population recoveries. The advantages for fishery management include maintenance of spawner biomass, improvement of yield, simplified enforcement, research opportunity, insurance against stock collapse and maintenance of intraspecific genetic diversity. MPAs can be small with narrow, focused objectives, or large with core areas, buffer zones and exploitable areas to provide an integrated management approach. A variety of design considerations, based on ecological, fishery and socio-economic conditions, is presented. Optimal size and spacing have not been extensively tested and only theoretical arguments guide the choice of how much to protect. The process of establishing an MPA can be initiated by local communities or by governmental authorities. The former has better public support, whereas the latter promises a well planned system of MPAs. Community and industry involvement in the establishment process is essential for the effective functioning of MPAs. Successful MPAs are administered by national programmes and managed according to management plans. Monitoring, communication and enforcement are integral components of MPA management. South Africa is party to a number of international conventions which

promote the designation of MPAs. Better protection of the physical marine environment, incorporation of MPAs in fishery management procedures and the management of MPAs are the major areas where South Africa can improve its marine protection

Cesar, H., Lundin, C. G., Bettencourt, S., & Dixon, J. A. (1997). Indonesian coral reef - An Economic analysis of a precious but threthened resource. *In: Ambio*, 26(6), 345-350 .

Abstract: Indonesia's coral reefs are currently undergoing rapid destruction from human activities including: poison fishing; blast fishing; coral mining; sedimentation; pollution and overfishing. In this paper, these destructive activities are described and the private gains from these activities accruing to individuals are compared with the associated costs to society. It is shown that the social costs by far outweigh the short-term private gains. Yet, powerful forces have a clear interest in maintaining the status quo of destruction. These forces vary from high risk, high payoff poison fishing to poverty-trap activities such as coral mining. The paper concludes with a discussion on designing appropriate policy responses such as: local threat-based approach; national threat-based approach; integrated coastal zone management; and the use of marine protected areas.

DeSilva, M. W. R. N. (1997). Trials and tribulations of Sri Lanka's first marine sanctuary The Hikkaduwa Marine Sanctuary. Regional Workshop on the Conservation and Sustainable Management of Coral Reefs, Chennai (India), 15 17 Dec 1997. Chennai India: M.S. Swaminathan Res. Found.

Abstract: Coral reefs are under tremendous pressure from over exploitation of resources, unplanned tourism development pollution and other direct or indirect human related activities. The major threats to the coral reefs of the Hikkaduwa Marine Sanctuary are given. Substantial efforts have been made to focus attention on the Hikkaduwa Marine Sanctuary and to stem the degradation of the coral reefs, but very little ground level action has been taken to resolve some of the conflicts. The major constraints to the conservation and sustainable management of coral reefs have been outlined.

Guard, M., & Masaiganah, M. (1997). Dynamite Fishing in Southern Tanzania, Geographical Variation, Intensity of Use and Possible Solutions. *In: Marine Pollution Bulletin*, 34(10), 758-762.

Haynes, D. (1997). Marine Debris on Continental Islands and Sand Cays in the Far Northern Section of the Great Barrier Reef Marine Park, Australia. *In: Marine Pollution Bulletin*, 34(4), 276-279.

Hill, R. L. & Creswell, R. L. (1997). Incorporating Toxic Disturbance Effects into a Population Model of a Crustacean Fishery. 49. Annu. Gulf and Caribbean Fisheries Institute, Christ Church (Barbados), Nov 1996. Chap. 49, (pp. 139-155). [s. l.]: [s. n.].

Abstract: Population models have been used to describe and predict changes in population structures through time. In fishery applications these models (utilizing such factors as growth, recruitment, fishing mortality and natural mortality) are used to manage and regulate fishing activities. As our waters are increasingly impacted by both point and non-point source pollution the parameter of "natural mortality" must be examined in greater detail. Toxicological studies based on both commercially important species and proxy species have shown a variety of physiological effects that have not been addressed in practical applications of modeling. Stage specific mortality, altered rates of development and reduced growth have been reported. These effects were documented in a xanthid crab exposed to sub-lethal concentrations of the mosquito larvicide, methoprene, and have been incorporated into a crustacean fishery model. Impacts on survival and fecundity produce a much different picture for long term population growth that

needs to be considered in the application of population models. Multi-species tropical fisheries will tend to magnify the effects demonstrated on prey species through complex tropho-dynamic linkages. Design and placement of marine protected areas or attempts to rehabilitate degraded habitats must consider the effects of xenobiotics in the aquatic habitat and provide for restrictions of terrestrial inputs as part of their overall management strategy.

Kelleher, G. (1997). Australian treasure. *In: People and the Planet*, 6(2), 17-19.

Abstract: A review is presented of the work done to protect the Great Barrier Reef, Australia, and some of the potential dangers that it faces. The provision of an Act in 1975, the Great Barrier Reef Marine Park Act started the process of conserving the reef. The three zones offering varying levels of protection in the marine park are described: general use zones, which comprise almost 76% of the park area and which allows most non-destructive activities to continue; marine national park zones, in which some of the more destructive activities, such as commercial fishing are not permitted; and, preservation and scientific research zones in which only approved scientific research can occur. The major threats to the reef are pollution, from farming, overfishing, and tourism. It is argued that tourism may be the easiest of these activities to control, particularly because each tour operator is required to run a public education programme and is held responsible for the conduct of the visitor.

Liu, J. H., & Hills, P. (1997). Environmental Planning, Biodiversity and the Development Process: The Case of Hong Kong's Chinese White Dolphins. *In: Journal of Environmental Management*, 50(4), 351-367.

Abstract: Hong Kong has enjoyed more than 20 years of almost uninterrupted economic growth and the territory is widely recognized as one of the most successful of the newly industrializing economies. Economic success has, however, brought with it a variety of environmental problems including deterioration of air and water bodies and the loss of terrestrial and marine habitats. Environmental degradation also poses a serious threat to local biodiversity. Despite its stated commitment to environmental protection, the Hong Kong Government is still strongly growth-oriented and the territory's environmental institutions and policies often seem ineffective in resolving the conflicts that arise between development and the environment. To illustrate some of the contradictions inherent in Hong Kong's current approach to environmental and conservation issues, this paper focuses on the controversy surrounding the fate of the local population of the Indo-Pacific humped-back dolphin, or, as it is locally known, the Chinese white dolphin (*Sousa chinensis*). The dolphin's habitat has been disrupted by major development projects, marine pollution and fishing and shipping activity. It is possible that the species will be extinct in Hong Kong waters by the beginning of the next century. The paper examines the background to the controversy that has arisen surrounding the future of the dolphins and evaluates the Government's attempts to develop a conservation strategy to protect them. The preferred option - the creation of a dolphin sanctuary within a designated marine park area - has been strongly criticized by some local marine biologists and conservationists as being inadequate and inappropriate. The failure to address effectively the problems faced by the Chinese white dolphin may be attributed to the lack of an overall conservation strategy in Hong Kong, shortcomings in the territory's environmental impact assessment system and limited local scientific knowledge concerning the dolphin population.

Liu, J. H., & Hills, P. (1997). Marine protected areas and local coastal conservation and management in Hong Kong. *In: Local Environ.*, 2(3), 275-298.

Abstract: This paper focuses on the role of marine parks and reserves in the conservation of Hong Kong's coastal environment. This environment is under serious threat as a result of pollution of marine waters and habitat loss associated with urbanisation, large-scale reclamation projects, and inadequate treatment and disposal of sewage and industrial effluents.

The paper discusses whether in a highly urbanised and stressed environment like Hong Kong, which currently lacks a conservation strategy and an overall framework for handling sustainability issues, small marine parks and reserves can be effective in helping to conserve local biodiversity. The paper also suggests that Hong Kong should adopt a broader regional perspective on its coastal conservation and management problems, a perspective that recognises the significance for the territory of the rapid urban and industrial development taking place in neighbouring Guangdong Province. This will require more extensive and focused liaison with Chinese agencies.

Munoz, F. R., Gonzalez-Regalado, M. L., Flores, J. B., & Morales, J. A. (1997). The response of ostracod assemblages to recent pollution and sedimentary processes in the Huelva Estuary, SW Spain. *In: The Science of The Total Environment*, 207(2-3), 91-103.

Schmidt, K. F. (1997). "No-take" zones spark fisheries debate. *In: Science Washington*, 27(5325), 489-491.

Abstract: An unusual experiment is getting underway this month on a 30-kilometer-square patch of coral reefs, sea grass meadows, and mangrove swamps off the Florida Keys. Federal officials are banning all fishing from this part of the Florida Keys National Marine Sanctuary--in order to help replenish fisheries elsewhere. The hope is that the Western Sambo's Ecological Reserve, as it's called, will serve as a source of fish, larvae, and eggs that will spill over into surrounding waters to help restock populations suffering from overfishing, pollution, and heavy tourism. The reserve is the first no-fishing zone set up for this purpose in U.S. waters, but many ecologists and fisheries scientists hope it will fuel a trend. They argue that no-take reserves are crucial for preserving marine biodiversity and healthy ecosystems, and for restoring the ocean's dwindling fisheries. But although the Florida Keys reserve is finally a reality after six tumultuous years of back and forth between scientists, fishers, divers, aquarium fish collectors, local business leaders, and county, state, and federal officials, the idea that it and others like it will help enhance fish stocks is still very much a theory. Even those who support the strategy acknowledge that, in most instances, researchers don't know where many fish species spawn and how they disperse, making it difficult to pick out the best areas for protection.

Tejam, C. S. (1997). Socioeconomic benefits of integrated coastal management and environmental management programs: The case of clean rivers, marine parks, and fisheries. Regional Conf., Manila (Philippines), 14-16 Nov 1996. *In: S. A. Ross, C. S. Tejam, & R. M. P. Rosales (eds), Sustainable Financing Mechanisms: Public Sector Private Sector Partnership*. Chap. 6, (p. 215). GEF; UNDP; IMO Regional Programme for the Prevention and Management of Marine Pollution in the East Asian Seas.

Abstract: This paper reviews the experiences of coastal and environmental management programs according to the three themes of clean rivers, marine parks, and fisheries development. It concentrates on the successful implementation of the Clean River Program of Singapore; the Coral Reef Protection and Marine Park Management Program in Phuket Island, Thailand; and the Coastal Resource Management Program of Brunei Darussalam, particularly on the concrete social and economic benefits that coastal and marine management programs have brought to the countries that invested in them.

Whitfield, A. K. (1997). Fish conservation in South African estuaries. *In: Aquatic Conservation: Marine and Freshwater Ecosystems*, 7(1), 1-11.

Abstract: Habitat degradation, mainly through land use changes and excessive freshwater abstraction, has a major negative effect on southern African estuarine systems. Less important at present, but showing increasing signs towards becoming a major problem is environmental pollution, especially organic and inorganic wastes from industrial, agricultural and domestic

sources. Although the major threats to estuarine-associated fishes are usually linked to environmental degradation, there is also evidence to suggest that certain fish species are declining in abundance primarily as a result of overfishing. The viability of estuaries as nurseries and feeding grounds for fishes is directly related to the accessibility and productivity of these systems. Examples of the mismanagement of South African estuaries through excessive siltation, freshwater deprivation, poorly planned dredging activities, and artificial manipulation of estuary mouths, are discussed. The need for conservation legislation based on a sound knowledge of the biology and ecology of threatened fish species, their communities and their habits is highlighted. Examples of possible 'indicator', 'keystone', 'umbrella' and 'flagship' species for South African estuaries are given. Although estuaries on the subcontinent have long been recognized as nursery areas for a number of recreationally important marine fish species, these systems have not formed an integral component in the selection of marine reserves. The dependence of many marine teleosts on estuarine habitats necessitates the inclusion of these ecosystems in any aquatic reserve planning exercise. The plight of endemic fish species is discussed, with the effects of both environmental degradation and overexploitation being highlighted. It is concluded that the future health of South Africa's estuaries and their fishes depends on imaginative resource management and on the improved implementation of conservation measures in partnership with decision-makers, managers, scientists and estuarine users.

[Anon.]. (1998). Norway's National Report on Implementation of the Convention on Biological Diversity. Miljøverndepartementet Report. [s. l.]: [s. n.], Pp. - pp. 70

Abstract: The conservation of biological diversity has a long tradition in Norway, and is linked with nature conservation, natural resource management, the prevention of pollution, land use management and the utilization of biological resources for commercial purposes in the primary industries. Since Norway ratified the Convention on biological diversity on 9 July 1993, we have given high priority to the implementation of the Convention at both national and international level. The Convention stresses that consideration of biological diversity must be integrated into all relevant sectors>

Brebbia, C. A. (1998). Environmental coastal regions. Second International Conference on Environmental Coastal Regions.. organized by Wessex Institute of Technology, UK". Held in Cancun, Mexico in September 199. (pp. 436 p. : ill., maps ; 24 cm.). Boston: WIT Press.

Cassano, E. R. (1998). International recognition and protection for United States National Marine Sanctuaries. California and the World Ocean '97, San Diego, CA (USA), 24-27 Mar 1997. In: O. R. Magoon, H. Converse, B. Baird, & M. Miller-Henson (eds), 'Taking a Look at California' s Ocean Resources: An Agenda for the Future. Vol. 1 (p. 98). Reston, VA-USA: ASCE.

Abstract: The United States National Marine Sanctuary Program (Marine Sanctuary Program) was mandated under Title III of the Marine Protection, Research and Sanctuaries Act (MPSRA) of 1972 as amended. The Marine Sanctuary Program was created to identify and manage areas of the marine environment that "posses conservation, recreational, ecological, historical, research and esthetic qualities which give them national and in some instances international significance". The size and scope of many of the designated United States Marine Sanctuaries include ocean areas that cross several jurisdictional zones. The Marine Sanctuary Program recognizes that maritime activities, in the form of vessel traffic constitute one of the major threats to sanctuary resources. This threat is in the form of marine pollution from vessels as, either operational or accidental discharge of pollutants, or physical groundings. This paper describes the existing national and international legal framework that limits the United States ability to fully protect the resources of a sanctuary in the Territorial Sea and the Exclusive

Economic Zone (EEZ). The MPSRA is examined to see how sanctuary regulations may be implemented to protect resources by monitoring and controlling foreign vessel movement and discharges

Gabrie, C. & Moyne-Picard, M. (1998). L'état des récifs coralliens en France Outre-Mer: Nouvelle Calédonie, Wallis et Futuna, Polynésie Française, Clipperton, Guadeloupe, Martinique, Mayotte, La Réunion, Îles Eparses de l'Océan Indien. (p. 136). Paris-France: Ministère de l' Aménagement du Territoire et de l' Environnement. Notes: This book exists as an english translation 37 pp.

Abstract: The International Coral Reef Initiative (ICRI) is a partnership among nations and organisations to mobilise government and stakeholder support for vigorous and effective actions to address threats to the worlds coral reef ecosystems, by promoting their protection and sustainable development. This document on the state of coral reefs in the French Overseas Departments and Territories (DOM-TOM) was drawn up as part of French undertakings as a member of the ICRI, on request from the French Ministry of Spatial Planning and Environment and with the support of the Secretariat for Overseas Affairs and the French Institute of the Environment (IFEN). Overseas Departments and Territories are located in three of the worlds oceans. Their geographical distribution account for the wide variety of coral reef types, and hence their outstanding natural diversity. Cultural, historical, political and administrative differences between the DOM-TOM have also given rise to a range of different management tools and methods. This brochure is the executive summary of a larger document containing a chapter on each of the DOM-TOM, to be published in English and French. The document was commissioned from C. GABRIE (Consultant in Tropical Marine and Coastal Environments) as a preliminary and as yet incomplete assessment of the state of DOM-TOM coral reefs. The assessment was made in collaboration with a large number of managers and researchers. The resulting document is intended as an aid for policy-makers, by describing the specific features of the various coral reefs and explaining why they need ta be preserved, and also for scientists, by outlining the management and conservation tools available at national and international level. The document describes the current state of coral reefs, their importance, the pressures being exerted on those ecosystems and the responses mode by the various parties involved (types of coral reefs: fringing reefs, barrier reefs, atolls, platform reef, heritage value and social and economic importance, species diversity, consequences of coral reef damage, causes of coral reef degradation: natural pressures with global change, cyclones, coral bleaching, Acanthaster infestations, coral diseases, human pressures (land management, mining, agriculture and sediment run-off, water pollution, aggregate extraction and dredging, coastal reclamation, exploitation of biological resources, potentially harmful fishing methods) responses to the problems with the relevant organisations, regional arrangements, legislation and regulations, international conventions, land use management and planning, planning and management tools (integrated coastal aree management, water management, local environment charter, management of biological resources), conservation measures (marine protected areas, ZNIEFF areas, RAMSAR sites, Biosphere Reserves, Coastal and Lakeshore Conservation Agency CRLRL), coral reefs and development policy, monitoring networks (Worldwide Coral Reef Monitoring: Global Coral Reef Monitoring Network GCRMN, Reef Check...), research, sources of funding European funding, private funding

Hannan, J., & Smith, A. (1998). Rocky reef habitats. *In: Fish NSW*, 3(Winter), 29.

Abstract: Rocky reefs are generally areas of rocky bottom occurring within estuarine and marine waters below low tide level. Along the coastline of New South Wales (Australia), prominent areas of rocky reef occur seaward of most headlands and rock platforms. Rocky reefs support a great variety of marine life, typically including hundreds of species of fish, invertebrates and algae. Diverse assemblages of brown, red and green macroalgae, along with

sponges, ascidians and other sessile invertebrates enhance habitat complexity. A number of marine parks, aquatic reserves and intertidal protected areas provide for the protection of rocky reefs and their associated animals and plants in New South Wales. Potentially damaging activities such as fishing, collecting, anchoring and discharging pollutants are variously restricted or banned within these areas. Managers and planners at all levels of government are also becoming more conscious of the impacts of land-based activities on aquatic habitats such as rocky reefs. Controls on urban and rural development now routinely address issues relating to runoff, pollution and sediment.

Jaffe, R., Leal, I., Alvarado, J., Gardinali, P. R., & Sericano, J. L. (1998). Baseline study on the levels of organic pollutants and heavy metals in bivalves from the Morrocoy National Park, Venezuela. *In: Marine Pollution Bulletin*, 36(11), 925-929.

Abstract: Bivalves have been extensively used as bioindicators of pollution in aquatic environments, particularly in coastal areas worldwide. The rationale behind the use of bivalves in monitoring programmes has been discussed in several scientific reports since the introduction of the 'Mussel Watch' concept. The present study reports the concentrations of selected organic and inorganic contaminants in the flat tree-oyster (*Isognomon alatus*) from one of the largest marine parks in Venezuela, the Morrocoy National Park, as an initial step to determine the present levels of contaminants and establish a baseline reference for future monitoring efforts. The Morrocoy National Park (Fig. 1) covers an area of about 32000 acres, most of which comprises aquatic habitats such as mangrove forests, seagrass beds and coral reefs. The Park is composed of a series of small islands that provide a natural habitat for many endangered species of birds and constitute excellent nursery environments for numerous fish species. Its beauty has made this Park one of the primary tourist attractions in Venezuela

Lam, M. (1998). Consideration of customary marine tenure system in the establishment of marine protected areas in the South Pacific. *In: Ocean & Coastal Management*, 39(1-2), 97-104 . **Notes:** Special issue: Integrated management and sustainable development in coastal zones

Abstract: The biodiversity of the South Pacific Region is of global importance. Changes accompanying economic development have undermined the Pacific's traditional social systems, including their capacity for resource management, and the environment has suffered as a result. The South Pacific's social and landmarine tenure systems require local ownership involvements and management. Centralized administration and management systems which began in the colonial period had failed to promote marine resource management. Customary landowners need to be involved from the very beginning in decisions about the future of their resources. The need to establish marine protected areas (MPA) is urgent. Population growth, urbanization and rapid development are causing overharvesting of finite marine resources as well as pollution of the coastal zone. The success of MPA will depend on the customary right holders and their ability to satisfy both their subsistence needs and their aspiration for economic development. This paper proposes the establishment of MPAs in the South Pacific by using a strategy of community based management that has been established in the customary marine tenure system. The use of some traditional conservation method could also be effectively incorporated into MPA systems.

Lesage, V., & Kingsley, M. C. S. (1998). Updated status of the St. Lawrence River population of the beluga, *Delphinapterus leucas*. *In: Can. Field Nat.* 112(1), 98-114.

Abstract: The beluga, *Delphinapterus leucas*, in the St. Lawrence Estuary is at the southern limit of the distribution of this species. The large distances separating this population from northern belugas, its low genetic variability, and the rarity of beluga sightings outside their normal range in the Gulf, suggest that it is isolated from its northern conspecifics. Over-exploitation and attempted extermination reduced this population to the low hundreds; it is now

conservatively indexed at between 600 and 700 and is slowly increasing. Reproductive rates, survival rates at each age, and population age structure are similar to those of other beluga populations. Factors potentially limiting the size of this population include limits on food stocks and extent of critical habitat; its growth rate may be affected by low genetic variability, boat traffic, and environmental contamination. St. Lawrence belugas are protected from hunting and are excluded from marine mammal species targeted by the whale-watching industry. Regulations and guidelines on the behaviour of marine traffic under the Fisheries Act and within the operating mandate of the Saguenay Marine Park offer some protection from disturbance although more may be needed. Pollution reductions upstream and improved controls on toxic compounds, are helping to reduce ambient levels of contaminants, but efforts to accelerate and maintain this progress are important.

Mann, B., Taylor, R., & Densham, D. (1998). A synthesis of the current status of marine and estuarine protected areas along the KwaZulu-Natal coast. *In: Lammergeyer*, (45), 48-64, 35 ref. **Abstract:** Notes are given on the location, size, functions, management, evidence in support of protected area function (active protection of existing resources) and some management problems experienced within 2 marine reserves and 10 estuarine protected areas on the KwaZulu-Natal coast of South Africa. Management problems include illegal fishing, tourism pressure, destruction of swamp and mangrove forests and large-scale afforestation with *Eucalyptus* sp. in adjacent catchments, pollution, and altered hydrological regimes in rivers.

Muthiga, N. (1998). National perspective of marine protected areas management in Kenya. *In: Salm, R.; Tessema, Y. Partnership for Conservation Report of the Regional Workshop on Marine Protected Areas, Tourism and Communities. Nairobi Kenya: IUCN EARO, Pp. - 28 32 p.*

Abstract: There are four marine national parks and six marine national reserves in Kenya, which encompass a diverse selection of marine habitats including coral reefs, mangrove forests, and seagrass beds. Endangered species occur in the waters of all marine protected areas (MPAs). Some lie adjacent to the most heavily developed tourist beaches in Kenya, and the Mombasa Marine Reserve is next to the port of Mombasa, which raises concerns about the threat of pollution. Even with government subsidy, there would still be a need to develop ways to enhance the management of MPAs. Several programmes are running with the aim to develop integrated MPA management plans that will incorporate a framework for collaboration among stakeholders. Finding alternative resource uses for the communities utilising marine reserves has also been initiated at the Mpunguti Marine National Reserve. The development of other alternatives, including aquaculture, reef restoration, and artificial reefs, are also being explored>

Price, H. (1998). Coastal links-partnerships for watershed and marine protection. California and the World Ocean '97, San Diego, CA (USA), 24-27 Mar 1997. *In: O. R. Magoon, H. Converse, B. Baird, & M. Miller-Henson (eds), Taking a Look at California's Ocean Resources: An Agenda for the Future. vol. 1. (pp. 823-834). Reston: ASCE.*

Abstract: The Water Quality Protection Program (WQPP) is an interagency-public-private partnership to enhance and protect the physical, chemical and biological conditions in the Monterey Bay National Marine Sanctuary and its 11 adjacent watersheds. Currently, 27 federal, state and local agencies and organizations are working with businesses, landowners, scientific and public representatives to develop and carry out strategies for a range of water quality and watershed issues. Issues addressed by the program include urban and agricultural runoff, marinas and boating activities, wetland/riparian degradation, point sources of pollution, and regional monitoring. A prime focus is to more efficiently integrate the large number of existing programs and projects related to these issues (over 100!), eliminate gaps and redundancies, and

pool interagency resources to address problems.

Tiercelin, C. (1998). Étude sur la prévention et la lutte contre les pollutions marines en Mauritanie. Rapport De Mission (24 Mai - 4 Juin 1998). Plouzane: Technopôle Brest-Iroise, Pp. 200 p. + Bibliographie

Van-Coops, J. F. & Yap, J. A. (1998). Developing integrated access to contemporary aerial photography and water quality-related data for a portion of the Elkhorn Slough and vicinity, North Monterey County. California and the World Ocean '97, San Diego, CA (USA), 24-27 Mar 1997. In: O. R. Magoon, H. Converse, B. Baird, & M. Miller-Henson (eds), Taking a Look at California's Ocean Resources: An Agenda for the Future. vol. 1. (pp. 370-381). Reston: ASCE.

Abstract: Effective management of water quality and non-point source pollution in the vicinity of the Elkhorn Slough National Estuarine Sanctuary (NES) in Monterey County has been hampered by lack of, or difficult access to, information required for implementation of adopted strategies and procedures, status and trends analysis, evaluation of permitting issues and impacts, and monitoring of mitigation sites and permit condition compliance. This paper describes a project undertaken by the Technical Services Division of the California Coastal Commission to develop access to contemporary aerial photography and a variety of water quality-required information for seven critical subwatersheds in the vicinity of Elkhorn Slough NES, and to provide these essential elements of the material required for effective stewardship and balanced decision-making to all levels of resource managers and interested persons in the region.

Yu, H., & Thia-Eng, C. (1998). ICM training for marine pollution prevention and management. In: *Ocean & Coastal Management*, 38(1), 69-86.

Abstract: The GEF/UNDP/IMO Regional Programme on Marine Pollution Prevention and Management in the East Asian Seas (MPP-EAS) conducts annually a regional training course on the application of the integrated coastal management (ICM) system for addressing marine pollution problems. The training initiative is unique in that: (a) the training curriculum is tailored for strengthening environmental protection and management capacity in the developing countries; (b) it is conducted in the ICM demonstration sites which provide practical exposure to the problems and their solutions; (c) it is a joint effort of a number of educational and research institutions in the region; and (d) it focuses on providing a broad-base, multidisciplinary training to environmental and natural resource planners, managers and trainers. The training package includes ICM approaches, tools and methodologies particularly concerning institutional arrangements, improving legal regime and enforcement, environmental monitoring, scientific services, sustainable financing and information management. This paper attempts to review the outputs, experiences and lessons learned from the past three years.

[Anon.] (1999). Barcelona Convention: New Protocols and Amendments. In: *Environ. Policy Law*, 29(4), 194 .

Abstract: Since signing the Barcelona Convention on the Protection of the Mediterranean Sea Against Pollution in 1977, the European Union has brought forward numerous Protocols aimed at strengthening the prevention of marine pollution. In the context of the revision and improvement of the legal provisions of the Mediterranean Action Plan, the contracting parties adopted a new Protocol to the Barcelona Convention in 1995, signed by 16 Mediterranean countries and the Community. This Protocol on Specially Protected Areas and Biological Diversity in the Mediterranean replaced an existing Protocol. The amendments included in the revised Protocol are designed to strengthen protection and improve the natural and cultural heritage of the Mediterranean through the designation of specially protected areas and the

tightening of conservation measures for endangered species. The text also aims to protect natural habitats and maintain biological diversity in the long term. The new Protocol includes an Annex covering common criteria for the choice of protected marine and coastal areas and another concerning endangered species and those whose exploitation should be regulated. The Protocol also contains programmes and measures aimed at addressing pollution from certain land-based sources and activities listed in the Annex.

[Anon.]. (1999). Rapport des conclusions. 2ème atelier sur la planification d'urgence en cas de pollutions maritimes. Nouakchott: [s. n.]

Boersma, P. D., & Parrish, J. K. (1999). Limiting abuse: marine protected areas, a limited solution. *In: Ecological Economics*, 31(2), 287-304. Notes: Special Issue: Ecological Economics and Sustainable Governance of the Oceans

Abstract: Designation of marine protected areas (MPAs) is increasing as humans seek to combat overexploitation of marine resources and preserve the integrity of the ocean's unique biodiversity. At present there are over 1300 MPAs. The primary legal responsibility for the designation of MPAs falls to individual countries, but protection of the marine environment at large scales is also critical because ocean circulation does not honor legal boundaries and often exceeds the influence of any one nation or group of nations. There are many reasons for establishing MPAs; the papers we surveyed principally referred to scientific, economic, cultural, and ethical factors. Two approaches predominated: fisheries management and habitat protection. Although the major threat to terrestrial systems is habitat loss, the major threats to the world's oceans are fisheries overexploitation, coastal development, and chemical and biological pollution. MPAs may provide conservation of formerly exploited species as well as benefits to the fishery through leakage of 'surplus' adults (spillover) and larvae (larval replenishment) across reserve boundaries. Higher order effects, such as changes in species richness or changes in community structure and function, have only been superficially explored. Because many MPAs are along coastlines, within shipping lanes, and near human centers of activity, the chance of chemical and biological pollution is high. Use of MPAs to combat development and pollution is not appropriate, because MPAs do not have functional boundaries. The ocean is a living matrix carrying organisms as well as particles and therefore even relatively environmentally sensitive uses of coastal ecosystems can degrade ecosystem structure and function via increasing service demands (e.g. nutrient and toxics transformation) and visitation. Whether an MPA is effective is a function of the initial objectives, the level of enforcement, and its design. Single reserves need to be large and networked to accommodate bio-physical patterns of larval dispersal and recruitment. Some authors have suggested that reserve size needs to be extremely large - 50-90% of total habitat - to hedge against the uncertainties of overexploitation. On a local scale, marine protected areas can be effective conservation tools. On a global scale, MPAs can only be effective if they are substantively representative of all biogeographic zones, single reserves are networked within biogeographic zones, and the total amount of area reserved per zone is 20% or greater. The current size and placement of protected areas falls far short of comprehensive or even adequate conservation objectives.

Burlington, L. B. (1999). Ten Year Historical Perspective of the NOAA Damage Assessment and Restoration Program. *In: Spill Science & Technology Bulletin*, 5(2), 109-116.

Abstract: The United States Oil Pollution Act of 1990 (OPA) was enacted to reduce the probability of oil spills in U.S. waters. A key provision of the legislation enables recovery of damages for restoration of injured natural resources and lost services due to oil spills. The National Oceanic and Atmospheric Administration (NOAA) developed regulations that set out a process for determining the appropriate type and scale of restoration actions to accomplish

this goal. The restoration plan developed through this process is the basis for an economic claim for natural resource damages. The regulations recognize that various methods, including environmental models, may be used in identifying and quantifying injuries to natural resources and losses of their services and in developing a restoration approach for these injuries. Rather than designating particular assessment measures, NOAA requires each trustee to decide which methodologies are appropriate for each incident, given its particular facts and circumstances. Any procedure chosen must meet the standards in the rule: it must provide information useful for determining restoration needed for an incident, the cost of the method must be commensurate with the quality and quantity of information it is expected to generate, and, of particular significance here, the method must be reliable and valid for the particular incident. This paper describes how methods are selected, how they might be used, and what legal standards would be applied should these methods be used as evidence in litigation.

Edwards, A., & Clark, S. (1999). Coral Transplantation: A Useful Management Tool or Misguided Meddling? *In: Marine Pollution Bulletin*, 37(8-12), 474-487.

Abstract: The primary objectives of coral transplantation are to improve reef 'quality' in terms of live coral cover, biodiversity and topographic complexity. Stated reasons for transplanting corals have been to: (1) accelerate reef recovery after ship groundings, (2) replace corals killed by sewage, thermal effluents or other pollutants, (3) save coral communities or locally rare species threatened by pollution, land reclamation or pier construction, (4) accelerate recovery of reefs after damage by Crown-of-thorns starfish or red tides, (5) aid recovery of reefs following dynamite fishing or coral quarrying, (6) mitigate damage caused by tourists engaged in water-based recreational activities, and (7) enhance the attractiveness of underwater habitat in tourism areas. Whether coral transplantation is likely to be effective from a biological standpoint depends on, among other factors, the water quality, exposure, and degree of substrate consolidation of the receiving area. Whether it is necessary (apart from cases related to reason 3 above), depends primarily on whether the receiving area is failing to recruit naturally. The potential benefits and dis-benefits of coral transplantation are examined in the light of the results of research on both coral transplantation and recruitment with particular reference to a 4.5 year study in the Maldives. We suggest that in general, unless receiving areas are failing to recruit juvenile corals, natural recovery processes are likely to be sufficient in the medium to long term and that transplantation should be viewed as a tool of last resort. We argue that there has been too much focus on transplanting fast-growing branching corals, which in general naturally recruit well but tend to survive transplantation and re-location relatively poorly, to create short-term increases in live coral cover, at the expense of slow-growing massive corals, which generally survive transplantation well but often recruit slowly. In those cases where transplantation is justified, we advocate that a reversed stance, which focuses on early addition of slowly recruiting massive species to the recovering community, rather than a short-term and sometimes short-lived increase in coral cover, may be more appropriate in many cases.

Field, C. D. (1999). Rehabilitation of Mangrove Ecosystems: An Overview. *In: Marine Pollution Bulletin*, 37(8-12), 383-392.

Abstract: The concept and goals of mangrove ecosystem rehabilitation are considered and contrasted with ideas of ecosystem restoration. Three reasons for mangrove rehabilitation: conservation and landscaping; multiple use systems for high sustainable yield and protection of coastal areas, are then examined in detail. In each case, the underlying philosophy and limitations are presented. The practical problems of site selection for mangrove planting and techniques for regenerating mangroves are then considered. Some comments and data are then offered on mangrove ecosystem rehabilitation that is being carried out world-wide. Comment is made on the paucity of information. The practice and importance of monitoring and

maintaining rehabilitated mangrove ecosystems is then presented. Finally, there is a discussion on the future management and research needs of mangrove ecosystem rehabilitation.

Fratantoni, P. S. (1999). The Formation and Evolution of Tortugas Eddies in the Southern Straits of Florida and Gulf of Mexico. *In: Diss. Abst. Int.*, 59, Pt B Sci. and Eng.(9), 4700 .

Notes: Degree: PhD. Thesis Publ. Date: 1998, 181 pp. Source: UMI, www.umi.com.

Abstract: Large cyclonic eddies on the northern edge of the Florida Current are the dominant mesoscale features within the southern Straits of Florida. these eddies, which remain stationary for months near the Dry Tortugas, are fundamental to the retention of fish larvae and provide a mechanism for the advection of pollutants into the Florida Keys National Marine Sanctuary. Observations and model results presented herein demonstrate a strong relationship between the generation of anticyclonic rings from the Gulf of Mexico Loop Current and the evolution of cyclonic Tortugas eddies in the southern Straits of Florida. It is proposed that Tortugas eddies evolve from cyclonic Loop Current frontal eddies which are formed on the western limb of the Loop Current, propagate along the boundary of the current, and become stationary near the Dry Tortugas. in several observed cases, the eddies remain stationary near the Dry Tortugas until they are impacted by an approaching Loop Current frontal eddy. Simulations using a high resolution numerical model indicate that the collision between a Loop Current frontal eddy and a stationary Tortugas eddy typically results in eddy coalescence and ejection of a smaller vortex which propagates through the Straits of Florida. The length of time an eddy spends near the Dry Tortugas is increased when the Loop Current sheds an anticyclonic ring. The ring-shedding process forces the unstable growth and slowed propagation of cyclonic Loop Current frontal eddies and hence a delay in the downstream propagation of the Tortugas eddy. Model frontal eddies were seeded with synthetic surface drifters to investigate the retention characteristics of the eddies throughout their life cycle. Simulations indicate that the eddies retain surface particles despite the severe deformation associated with eddy collisions. Drifters launched within the stronger of two colliding eddies tended to remain concentrated within the seeded eddy while those launched within weaker eddies were redistributed along the features' periphery due to the shearing experienced by the weak eddy. The results suggest an additional intermittent branch in the recruitment pathways previously identified within the Straits of Florida.

Gray, J. S. (1999). Using Science for Better Protection of the Marine Environment. *In: Marine Pollution Bulletin*, 39(1-9), 3-10.

Abstract: Recently there has been an increasing tendency to reduce and even ignore the role of science in protecting the marine environment. The 'greens' have lost patience and believe that the most effective action is to influence legislation directly whether there is a scientific basis for the case they are making or not. Brian Wynne of Lancaster University and Sue Mayer of Greenpeace in *New Scientist* (Wynne, B. G. and Mayer, S. (1993) even went so far as to approve a headline for their article "How Science is failing the environment". From my 30 odd years of research on the marine environment, I believe strongly that these views are wrong. Science is still progressing and is continuing to find new methods which can be used to demonstrate effects of man's activities on the marine environment. What is lacking is a willingness to apply these methods. The failing, I believe, is in application at managerial and political levels.

Hodgson, G. (1999). A Global Assessment of Human Effects on Coral Reefs. *In: Marine Pollution Bulletin* , 38(5), 345-355.

Abstract: Coral reefs have been used by humans as recreation areas and as a source of food and other products for thousands of years. The effects of humans on coral reefs are not well understood, especially on a regional or global scale. A special survey protocol called "Reef

Check" was designed to be used by volunteer recreational divers, trained and led by marine scientists, and based on the use of high value, easily identified indicator organisms. During a period of 2.5 months, a global survey of over 300 reefs in 31 countries and territories indicates that few reefs remain unaffected by man, even very remote sites. Overfishing has reduced fish and invertebrate indicator organisms to low levels at most reefs, including those within marine protected areas. The ratio of live to dead coral cover was higher in the Red Sea than in other regions, indicating that reef corals are in the best condition there. In future years, by increasing the number of reefs and the frequency of surveys, the Reef Check program could provide a valuable method to detect broad-brush changes on a local, regional and global scale, as well as increasing public support for coral reef conservation.

Hooker, S. K., Whitehead, H., & Gowans, S. (1999). Marine Protected Area Design and the Spatial and Temporal Distribution of Cetaceans in a Submarine Canyon. *In: Conservation Biology*, 13(3), 592-602.

Abstract: The Gully, the largest submarine canyon off the coast of eastern Canada, is currently under consideration as a marine conservation area, primarily because of the increasing interest in oil and gas production on the Scotian Shelf. Cetaceans, as a guild of abundant, large organisms that are relatively sensitive to such threats, provide a reliable means to determine the boundaries for a conservation area in this region. We compared the abundance of cetaceans between the Gully and other parts of the Scotian Shelf and Slope and found that abundance was higher in the Gully. We also assessed cetacean distribution and relative abundance within the Gully relative to search effort for several spatial and temporal parameters: depth, slope, sea surface temperature, and month. Distribution within the Gully was most strongly correlated with depth, but was also significantly correlated with sea surface temperature and month. Five of the 11 cetacean species commonly found in the Gully, and all those for which the Gully formed significant habitat on the Scotian Shelf, were concentrated in the deep (200-2000 m) mouth of the canyon. We suggest that a year-round marine protected area is necessary for the Gully. A core protection zone should be defined in the Gully based on depth and bounded by the 200-m isobath. A buffer zone around the core zone should be defined to provide protection from activities with further-reaching effects, such as noise, dredging, and chemical pollution.

Huber, M. E. (1999). Oceans at Risk! *In: Marine Pollution Bulletin*, 38(6), 435-438.

Huber, R., & Jameson, S. C. (1999). Montego Bay, Jamaica: A case study in public-private partnerships for pollution prevention and management of a valuable coral reefecosystem. *In: Tropical Coasts*, 5(2)(6(1)), 22-27. Notes: Understanding public perceptions of the Great Barrier Reef and its management

Kullenberg, G. (1999). Approaches to addressing the problems of pollution of the marine environment: an overview. *In: Ocean & Coastal Management*, 42(12), 999-1018.

Abstract: A review is presented of major international actions taken to address the pollution of the marine environment, from various sources. The actions are put into the context of the third United Nations Convention on the Law of the Sea and the outcomes of the United Nations Conference on Environment and Development 1992, and are related to major issues facing society with respect to the marine environment. These concern governance, institutions, implementation of international agreements, capacity building, as well as impacts on the ocean and needs for research and observations. The need for political will to act is also emphasized.

Kullenberg, G. (1999). The exclusive economic zone: some perspectives. *In: Ocean & Coastal Management*, 42(9), 849-855.

Abstract: A brief presentation is made of the concept of the Exclusive Economic Zone (EEZ)

adopted by the United Nations Conference on the Law of the Sea, and included as a major feature of the Law of the Sea. The potential of the EEZ for the small developing island countries is discussed, together with the possibility of using the EEZ to achieve a larger measure of equity among nations than the prevailing one. The role of the EEZ in obtaining improved ocean governance, more sustainable management of the marine resources and control of marine pollution is considered. The need for building an indigenous capacity to deal with the marine resources and issues is identified and the possibility of achieving this through regional cooperation. The possibilities inherent in the EEZ regime for oceanic islands are discussed, with focus on the Indian Ocean, the Mediterranean and the central Atlantic Ocean.

Lally, K., & Berkelmans, R. (1999). Coral bleaching and climate change on the Great Barrier Reef: an update. *In: Reef Research*, 9(2), 4-5.

Abstract: In early 1998, a mass coral bleaching event took place on the Great Barrier Reef (GBR), Queensland (Australia) and broad scale aerial surveys of 654 reefs in March and April 1998 indicated that 87% of inshore reefs showed at least some bleaching, compared to 28% of offshore reefs. The 1998 coral bleaching event was not confined to the GBR and coincided with an unusual meteorological year, being the warmest year on record globally, the most extreme year for sea temperatures on the GBR, based on a 95 year record, and the end of a long El Nino event. To what extent climate change is caused by Greenhouse gas emissions or is simply an existing natural trend, is still being debated by climatologists, but it is certain that coral bleaching is connected to climate extremes. Although management agencies such as the Great Barrier Reef Marine Park Authority can do nothing about climate change itself, the importance of documenting potential links between climate change and bleaching is recognized. Factors such as sediment runoff, nutrients, pollutants and dredging may also contribute to, or exacerbate, coral bleaching and mortality.

Morrison, R. J. (1999). The regional approach to management of marine pollution in the South Pacific. *In: Ocean & Coastal Management*, 42(6-7), 503-521.

Abstract: Marine pollution does not recognise maritime boundaries. Consequently, protection of the marine environment from pollution must involve an international cooperative effort, with near neighbours, in particular, working together to protect coastal and ocean areas close to their political boundaries. This paper describes a regional approach adopted from 1988 to 1994 in the South Pacific Region to address marine pollution problems. Some 25 countries and territories lie within the region. Apart from Australia, New Zealand and Papua New Guinea, the countries of the region consist basically of a large number of small islands separated by substantial stretches of ocean. Growing populations and demands for better living standards are exerting increasing pressures on coastal and marine resources, leading in some cases to significant marine pollution. The Region has limited financial and technical resources to address such problems and countries have therefore determined to assess and control them through a concerted regional approach. This paper reviews aspects of this effort, outlining the methods adopted, describing the outcomes and discussing the problems and lessons learned.

Morrison, R. J., & Naqasima, M. R. (1999). Fiji's Great Astrolabe Lagoon: baseline study and management issues for a pristine marine environment. *In: Ocean & Coastal Management*, 42(6-7), 617-636.

Abstract: The Great Astrolabe Lagoon (18[deg]45'S, 178[deg]32'E), located some 70 km south of Suva, the capital of Fiji, is a marine environment in relatively pristine condition, impacted only by low human populations on small islands. The Great Astrolabe Reef which encloses the Lagoon is a barrier reef composed of oceanic ribbon reefs. A baseline study of the Lagoon was carried out in 1989-92 which consisted of two components: (1) biological monitoring of permanent reef transects, and (2) water and sediment quality monitoring. Twelve

study sites encompassing different habitats were visited regularly during the study period. Substrate cover, hard coral cover, plant cover and counts of selected motile invertebrates were taken. Fish counts were also conducted. The water quality studies included temperature, dissolved oxygen and nutrients, trace metal analyses and microbiological examination of edible bivalves. Sediment samples were also analysed for a range of macro- and micro-elements. The reefs that were relatively inaccessible to the local villagers were found to be in a healthier state than those in close proximity to the islands. There were several problems encountered in the reef monitoring studies which exemplify the constraints of conducting research in a relatively isolated location. Water analyses indicated that the Lagoon is relatively free from pollution with pH, dissolved oxygen, temperature and salinity data close to open ocean values. Apart from nitrate, all nutrient values were below detection limits. Nitrate values averaged 0.74 μmolL , but varied from 0.2 to 1.9 μmolL . Data for trace metals in water were consistent with no contamination. Shellfish samples showed no contamination by trace metals and minimal faecal coliform contamination. Sediments showed no contamination by trace metals and were dominated by high magnesium calcite and aragonite, with minor amounts of low magnesium calcite. There are increasing pressures on this area, both from local residents who wish to move to a more cash oriented economy through increased fishing and tourism, and from external tourism interests. The Lagoon has also been suggested as a marine national park. Some of the management issues associated with these alternatives are discussed.

Morton, B. (1999). At Last, Changing Environmental Policy Initiatives in Hong Kong. *In: Marine Pollution Bulletin*, 38(7), 519-520.

Pickering, H., Whitmarsh, D., & Jensen, A. (1999). Artificial Reefs as a Tool to Aid Rehabilitation of Coastal Ecosystems: Investigating the Potential. *In: Marine Pollution Bulletin*, 37(8-12), 505-514.

Abstract: Utilising case studies, the paper identifies the potential of artificial reefs as a tool to aid the rehabilitation of coastal ecosystems from an ecological perspective. It goes on to discuss how this potential can be constrained by the action of a complex array of legal frameworks and political processes which are not necessarily attuned to or supportive of the needs of habitat restoration (whether based on artificial reefs or other technologies). Apart from institutional inertia, one of the main reasons why support for habitat restoration projects may be lacking is that, while their costs may be expressed in monetary terms, their benefits rarely are. The paper concludes by exploring techniques by which both the benefits and costs of coastal rehabilitation may be monetised, thereby placing them on the same footing as other programmes whose economic returns are more easily quantified.

Ruitenbeek, J., Ridgley, M., Dollar, S., & Huber, R. (1999). Optimisation of economic policies and investment projects using a fuzzy logic based cost-effectiveness model of coral reef quality: empirical results for Montego Bay, Jamaica. *In: Coral-Reefs*, 18(4), 381-392.

Abstract: For effective mitigation of human impacts, quantitative models are required that facilitate a comprehensive analysis of the effects of human activity on reefs. Fuzzy logic procedures generate a complex dose-response surface that models the relationships among coral abundance and various inputs (e.g., physical damage, sedimentation, nutrient influx), within the context of the abiotic marine environment. This is linked to a nonlinear economic structure incorporating technical interventions (e.g., pollution treatment) and policy interventions (e.g., taxation) in eight economic sectors. Optimization provides insights into the most cost-effective means for protecting coral reefs under different reef quality targets. The research demonstrates that: (1) it is feasible to use fuzzy logic to model complex interactions in coral reef ecosystems; and, (2) conventional economic procedures for modeling cost-effectiveness can result in sub-optimal policy choices when applied to complex systems such as

coral reefs. In Montego Bay, Jamaica, up to a 20% increase in coral abundance may be achievable through using appropriate policy measures having a present value cost of US\$153 million over 25 years; a 10% increase is achievable at a cost of US\$12 million.

Scarlett, A., Donkin, P., Fileman, T. W., & Morris, R. J. (1999). Occurrence of the Antifouling Herbicide, Irgarol 1051, within Coastal-water Seagrasses from Queensland, Australia. *In: Marine Pollution Bulletin*, 38(8), 687-691.

Abstract: The s-triazine herbicide Irgarol 1051 is now widely distributed throughout European coastal waters. In Australia, the compound is not registered for use as a biocide in antifouling paints. To investigate contamination, seagrasses were sampled from the east coast of Queensland and within the Great Barrier Reef Marine Park. A green alga was also sampled from the Outer Barrier Reef. Tissues were analysed for the presence of Irgarol 1051 using solvent extraction followed by quantification with GC-MS and confirmation by GC-MS-MS. Irgarol 1051 was detected at nine of the ten locations sampled. Concentrations of up to 118 ng g⁻¹ wet weight leaf tissue were recorded in samples from the Gold Coast (near Brisbane) which is the highest plant tissue concentration yet reported. Antifouling paint purchased within Australia was analysed by GC-MS (full scan) and found to contain Irgarol 1051. The concentrations of Irgarol 1051 reported within the Australian coastal environment are potentially toxic and the possible consequences for long-lived herbivores (such as the dugong) and for endosymbiotic algae of corals, are discussed.

Shumway, C. A. (1999). A neglected science: applying behavior to aquatic conservation. *In: Environmental Biology of Fishes*, 55(1-2), 183-201, 7 pp. of ref.

Abstract: Using examples from marine, freshwater, and terrestrial realms, the paper asserts that behavioural information is invaluable in five conservation areas: (1) managing wild species (e.g., designing marine reserves; reducing animal-human conflicts; understanding and managing species' responses to human-induced environmental stress such as fishing, introduced species, and chemical, visual, and acoustic pollution); (2) actively reversing the decline of imperiled wild species (e.g., reducing bycatch by improving selectivity of fishing gear; re-establishing breeding populations and boosting reproduction); (3) assessing biodiversity (e.g., modeling population viability; censusing and monitoring populations and species); (4) captive breeding and reintroduction programmes (e.g., minimizing loss of valuable phenotypes; teaching or maintaining valuable survival skills); and (5) changing human behaviour in resource exploitation (e.g., using principles from social psychology). Both realized and potential applications to fishes are stressed. Finally, behavioural diversity, a valuable but neglected element of biodiversity, needs to be explicitly conserved to maintain diverse populations. Arguments are presented that the conservation of species diversity and genetic diversity alone does not necessarily protect important behavioural diversity. The maintenance of both individual and population variability may be essential for the preservation of a species.

Talbot, B. (1999). Protecting aquatic biodiversity. *In: Fish NSW*, 2(Autumn), 14-16 .

Abstract: During 1997, the New South Wales National Parks and Wildlife Service released a draft biodiversity strategy for public comment. The goal of the strategy is to protect the native biological diversity of New South Wales (Australia) and maintain ecological processes and systems. The fish and marine vegetation strategy, which was not included, will be developed with objectives and strategies relating to: community consultation, education and involvement; implementing bioregional assessment and planning; establishing a comprehensive and representative marine park and aquatic reserve system; effectively managing protected aquatic areas; establishing mechanisms for identification, recovery and rehabilitation of threatened fish species, populations and ecological communities; identifying and protecting critical fish habitat; conserving species outside their natural habitat; effectively managing pest fish species;

assessing and minimizing the impacts of pollution on aquatic biodiversity; promoting and applying ecologically sustainable fisheries management processes; effectively managing water resources to conserve biodiversity and meet economic, social and community needs and implementing a program of inventory and monitoring of aquatic biodiversity.

Wells, P. G. (1999). Biomonitoring the Health of Coastal Marine Ecosystems - The Roles and Challenges of Microscale Toxicity Tests. *In: Marine Pollution Bulletin*, 39(1-9), 39-47.

Abstract: Coastal marine ecosystems in many parts of the world are under unrelenting stress caused by urban development, hazardous or toxic substances, overfishing, habitat destruction, the introduction of exotic species and natural toxins. Biomonitoring plays a vital role in governmental and industrial strategies to identify, assess, control and reduce these problems. Sensitive and practical techniques in biomonitoring are needed in all of the strategic approaches - from toxic chemical rating and classification, to pollution source control, status and trends monitoring, and assessments of "marine ecosystem health". Due to the sheer magnitude and scope of the challenge, biomonitoring coastal ecosystems demands new and innovative approaches that are relatively easy and cheap to deploy and that provide timely and accessible information to environmental managers and policy makers. This paper explores recent developments in microscale toxicity testing - a branch of aquatic toxicology involving the discovery and application of small-scale, innovative, sensitive, practical, inexpensive and frequently automated biological techniques. Highlights of a recent unique synthesis (Wells et al., 1998) are given, describing microscale tests at various biological and phylogenetic levels. Many of these tests are marine and focus on gametes, embryos and other young life stages. They can be utilized in the field (in vivo), with field collected samples, and in the laboratory. Their low cost, sensitivity, practicality and speed are their strengths, and commercial test kits have been developed as a result. But being largely "single-species" and sub-individual-level biomonitors, do such microscale tests provide information directly useful to protecting vital ecosystem processes? Indeed, how can this question be addressed? The needs and challenges of matching the most promising of the microscale tests with higher level (population, community, ecosystem) measurements to protect habitats and biodiversity are discussed. Improving marine biomonitoring and protecting coastal ecosystem health demands such new techniques within the context of new paradigms and rigorous approaches for their application.

Yanez-Arancibia, A. (1999). Terms of reference towards coastal management and sustainable development in Latin America: introduction to Special Issue on progress and experiences. *In: Ocean & Coastal Management*, 42(2-4), 77-104. Notes: Special Issue: Integrated Coastal Management in Latin America.

Abstract: This paper is the introduction to a Special Issue Progress on Ocean and Coastal Management in Latin America: Experiences Towards Sustainable Development. This volume presents a variety of perspectives on the meaning, forms, methods, international cooperation, and experiences in integrated coastal management in 14 countries through 13 papers authored by experts in Latin American experiences. At present, the new international forums and the economic and environmental globalization induce different strategies for evaluating the real problems and advance towards planning the integrated coastal management, both from a national or regional perspective. At the opening of the new millenium Latin America has new scenarios under NAFTA, MERCOSUR, APEC, CARICOM, moreover a number of bi- or trilateral international agreements. The purpose of this Special Issue is to expose various definitions and points of view on integrated coastal management, providing an up-to-date assessment of key issues and country experiences, but not necessarily or reconciling divergent perspectives. Latin America is a "new world mosaic". A mosaic of authors' training and experiences; of roots and cultural heritage resources; of social development; of ecosystems and ecological approaches; of biogeographical regions and

biodiversity; of climatic zones; of pristine areas as well as highly degraded zones. This Special Issue has four key wordconcepts in its title: (a) coastal zone; (b) integrated coastal zone management; (c) sustainable development, and (d) Latin America. In this introductory paper I offer what are the terms of reference meaning of each of this concern, as a framework for the invited paperscountries included in this volume. In the last section each contribution is summarized and a classification inside "coastal management techniques" is presented, concluding that the papers incise on: Coastal management plans, Land-use zoning and setbacks, Marine protected areas, Management and restoration of coastal habitats, Coastal pollution control, Shoreline stabilization, Close access regimes, Capacity building, Inter-agency coordination, Conflict resolutions, Environmental assessment, and International cooperation. The variations in scope and the amount of progress made by different Latin American countries show the difficulty of creating a single integrating management approach. Nevertheless, at the opening of the new millenium Latin America will arrive at a competitive maturity stage concerning ICZM.

[Anon.]. (2000). Marine reserves needed to safeguard world's fish. *In: Marine Pollution Bulletin*, 40(12), 1068-1069.

[Anon.]. (2000). More marine reserves for Australia. *In: Marine Pollution Bulletin*, 40(8), 653-654.

[Anon.]. (2000). More protection needed for marine reserves. *In: Marine Pollution Bulletin*, 40(8), 652.

Bakan, G., & Buyukgungor, H. (2000). The Black Sea. *In: Marine Pollution Bulletin*, 41(1-6), 24-43.

Bianchi, C. N., & Morri, C. (2000). Marine Biodiversity of the Mediterranean Sea: Situation, Problems and Prospects for Future Research. *In: Marine Pollution Bulletin*, 40(5), 367-376.

Abstract: Mediterranean marine biodiversity has received only a fraction of the attention accorded to its terrestrial counterpart, despite the great cultural and economic importance that the sea has been having for the Mediterranean countries. A rough estimate of more than 8500 species of macroscopic marine organisms should live in the Mediterranean Sea, corresponding to somewhat between 4% and 18% of the world marine species. This is a conspicuous figure if one considers that the Mediterranean Sea is only 0.82% in surface area and 0.32% in volume as compared to the world ocean. The high biodiversity of the Mediterranean Sea may be explained by historical (its tradition of study dates older than for almost any other sea), paleogeographic (its tormented geological history through the last 5 my has been determining the occurrence of distinct biogeographic categories), and ecological (its variety of climatic and hydrologic situations within a single basin has probably no equals in the world) reasons. Present-day Mediterranean biodiversity is undergoing rapid alteration under the combined pressure of climate change and human impact, but protection measures, either for species or ecosystems, are still scarce. To understand the role and patterns of Mediterranean marine biodiversity, marine ecological research should: first, re-value those scientific areas currently unfashionable with funding agencies (systematics, biogeography and taxonomy); second, start monitoring biodiversity with a long-term approach at a whole Mediterranean scale, possibly through an internationally co-ordinated network of marine protected areas

Blackmore, G. (2000). Field Evidence of Metal Transfer from Invertebrate Prey to an Intertidal Predator, *Thais clavigera* (Gastropoda: Muricidae). *In: Estuarine, Coastal and Shelf Science*, 51(2), 127-139.

Buchan, K. C. (2000). The Bahamas. *In: Marine Pollution Bulletin*, 41(1-6), 94-111.

Abstract: The archipelago of the Bahamas contains the largest tropical shallow water area in the Western Atlantic. Located on the northern and eastern margins of two large submerged banks and a number of smaller more isolated banks, the Bahama Islands, of which there are over 700, are low-lying and composed of limestone. A sub-tropical climate and a geographic position between two major warm ocean currents affect the region with seasonal variability, which influences the biological communities inhabiting the ocean and coastal areas. The Bahama Banks are separated from the North American continent by the Florida Straits and from each other by deep channels, some in excess of 2000 m. Two deep water channels cut into the larger Great Bahama Bank. Most of the marine area is shallow (marine resource with both ecological and economic value). The Bahama Islands are dependent on their seas to maintain a GDP of US\$ 2.7 billion through tourism and harvest of marine resources. To date, the fishing industry has benefited from the relatively high ecological productivity of the shallow banks and their related habitats. Commercially important fisheries include Spiny Lobster, conch and nassau grouper which, together, make up the bulk of fisheries income. Clear warm waters and white sand beaches, along with its close proximity to the USA, make the Bahamas a prime tourist destination. Tourism is the mainstay of the Bahamian economy, accounting for 60% of the gross domestic product. Agricultural and forestry operations are limited and impacts in the coastal zone from these are negligible. However, land reclamation and construction for tourism development, along with sand mining, dredging, over-fishing, poor fishing practices and their respective impacts of habitat loss, beach erosion and over-exploitation of target and non-target marine resources are becoming increasingly apparent as developmental pressures grow. Environmental regulations are in place through a number of parliamentary acts. Management of established marine and coastal protected areas has been undertaken by the Bahamas National Trust (BNT), which along with other organisations, carry out environmental education programs to increase awareness and reduce impact on the marine and coastal areas of the archipelago

Carbone, F., & Accordi, G. (2000). The Indian Ocean Coast of Somalia. *In: Marine Pollution Bulletin*, 41(1-6), 141-159.

Abstract: Somalia has the longest national coastline (3025 km) in Africa with an estimated shelf area (depth 0-200 m) of 32,500 km². The country is divided into the northern coastal plain of Guban, which has a semi-arid terrain; the northern highlands with rugged mountain ranges containing the country's highest peak (2407 m); and the Ogaden region which descends to the south from the highlands and which consists of shallow plateau valleys, wadis and broken mountains. The latter region continues to the Mudug plain in central Somalia. From Ras Caseyr to the Kenya border, the coast runs north-east to south-west, coinciding with the displacement caused by the Mesozoic marginal subsidence. This general structure is complicated by sedimentary troughs crossing the Horn of Africa, and by large sedimentary basins, cutting the coastline and extending inland into Southern Somalia and Northern Kenya (Juba-Lamu embayment, Mogadishu basin). Offshore, the western Somali Basin extends from Socotra to the Comores. The open shelf environments developed along the Somali coast are a consequence of an extensive marine transgression, connected to coastal subsidence or inland uplift. The rocks along the southern coastal belt are Pliocene-Pleistocene, and are characterized by a sequence of both marine and continental deposits of skeletal sands, coral build-ups, eolian sands and paleosols. As well as eolian and biogenic sedimentary processes, sea-level fluctuations, Holocene climatic changes and neotectonic movements have combined to produce the modern coastline. A notable feature is an ancient dune ridge complex, known as the Merka red dune, which rims the coast extending beyond the Kenyan border and which separates the narrow coastal belt from the Uebi Shebeli alluvial plain. Two features of note are the Bajuni Archipelago, which consists of islands, islets and skerries, forming a barrier island separated

from the coast by a narrow marine sound, and a braided, channelized coastal area, which originated from the drowning of a paleofluvial net. The southern Somali coast, with that of Kenya and Tanzania, forms part of the Somali Current Large Marine Ecosystem, encompassing 700,000 km², and extending 800 km between Dar es Salaam and Ras Hafun. Abundant biomass develops here due to upwelling. The shelf area has a wide variety of coral reefs, mangroves, seagrass meadows, beaches and estuaries. In shallow water areas the abraded flats are colonized by scattered coral communities with variable cover. A true fringing reef is achieved in places only in the Bajuni archipelago. All along the southern Somali coastal shelf there are spreading meadows of *Thalassodendron* seagrass, and benthic communities typical of mobile sandy substrates are limited to beach ridges and shoals developed along the coastline. Around the Bajuni barrier island and the channelized area there is more diversity. Mangroves grow on the tidal belts of the channels, and there are expanses of salt flats. Large-scale alteration produced by man on the Somali coast is relatively recent, but has accelerated in the last few decades, especially around major cities. This alteration affects especially backshore areas where the Pleistocene coral reefs are quarried. At present, the continental shelf is not adequately monitored or protected, so coastal habitats are being degraded, living marine resources are overexploited, and pollution levels are increasing, all of which affect natural resources and biodiversity. Somalia is one of the world's poorest and least developed countries, with few resources and devastated by civil war, but since 1993 it has been part of the Common Market for Eastern and Southern Africa (COMESA). This will affect fisheries and aquaculture in terms of the investment, production, trade and fish consumption of the member states. There are currently no marine protected areas and no legislation concerning their establishment and management, although the World Conservation Monitoring Centre (WCMC) Protected Areas Database lists Busc Busc Game Reserve as an MPA. In 1992, The WCMC also listed the following coastal sites as proposed protected areas: Zeila (important sea bird colonies on offshore islets), Jowhar-Warshek, Awdhegle-Gandershe. The area from Kisimayo to Ras Chiambone is probably of highest priority, as it is important for coral reefs, marine turtles, and mangrove resources, although it is still poorly known.

Crosby, M. P., AbuHilal, A., AlHomoud, A., Erez, J., & Ortal, R. (2000). Interactions among scientists, managers and the public in defining research priorities and management strategies for marine and coastal resources: Is the Red Sea Marine Peace Park a new paradigm? *In: Water Air and Soil Pollution*, 123(1-4), 581-594.

Froescheis, O., Looser, R., Cailliet, G. M., Jarman, W. M., & Ballschmiter, K. (2000). The deep-sea as a final global sink of semivolatile persistent organic pollutants? Part I: PCBs in surface and deep-sea dwelling fish of the North and South Atlantic and the Monterey Bay Canyon (California). *In: Chemosphère*, 40(6), 651-660.

Abstract: The understanding of the global environmental multiphase distribution of persistent organic pollutants (POPs) as a result of the physico-chemical properties of the respective compounds is well established. We have analysed the results of a vertical transport of POPs from upper water layers (0-200 m) to the deepwater region (>800 m) in terms of the contamination of the biophase in both water layers. The contents of persistent organochlorine compounds like polychlorinated biphenyls (PCBs) in fish living in the upper water layers of the North Atlantic and the South Atlantic, and at the continental shelf of California (Marine Sanctuary Monterey Bay and its deep-sea Canyon) are compared to the levels in deep-sea or bottom dwelling fish within the same geographic area. The deep-sea biota show significantly higher burdens as compared to surface-living species of the same region. There are also indications for recycling processes of POPs - in this case the PCBs - in the biophase of the abyss as well. It can be concluded that the bio- and geo phase of the deep-sea may act similarly as the upper horizons of forest and grasslands on the continents as an ultimate global sink for

POPs in the marine environment

GomezParra, A., Forja, J. M., Delvals, T. A., Saenz, I., & Riba, I. (2000). Early contamination by heavy metals of the Guadalquivir estuary after the Aznalcollar mining spill (SW Spain). *In: Marine Pollution Bulletin*, 40(12), 1115-1123.

Haynes, D., & Johnson, J. E. (2000). Organochlorine, Heavy Metal and Polyaromatic Hydrocarbon Pollutant Concentrations in the Great Barrier Reef (Australia) Environment: a Review. *In: Marine Pollution Bulletin*, 41(7-12), 267-278.

Abstract: Past monitoring of heavy metals, organochlorine compounds and polyaromatic hydrocarbons (PAHs) has found that pollutant concentrations are generally low within the Great Barrier Reef Marine Park and World Heritage Area and are indicative of a relatively unpolluted environment. The exceptions are sites that are adjacent to human activity such as ports and harbours, urban centres and areas adjacent to intensive agricultural activity. These sites have elevated concentrations of a range of pollutants. Concentrations of dioxins have also been found to be elevated in marine park sediments. Elevated pollutant concentrations are generally the consequence of effluent discharge, urban stormwater, and agricultural and industrial runoff. However, a majority of Great Barrier Reef pollutant data are now dated, and contemporary information is required concerning the distribution and impact of pollutants in the Queensland marine environment. The utility of specialized monitoring tools such as biomarkers for tropical marine environments urgently needs to be examined. With this information, appropriate risk assessment and monitoring can be implemented and effective management strategies developed to protect tropical marine ecosystems including the Great Barrier Reef.

Haynes, D., & Michalek-Wagner, K. (2000). Water Quality in the Great Barrier Reef World Heritage Area: Past Perspectives, Current Issues and New Research Directions. *In: Marine Pollution Bulletin*, 41(7-12), 428-434.

Abstract: Elevated sediment and nutrient concentrations have long been regarded as the pre-eminent water quality threats to the Great Barrier Reef, with the potential risk posed by other pollutants such as heavy metals, persistent chlorohydrocarbons, PCBs and petroleum related compounds considered to be of lesser consequence. However, the management focus on these latter types of pollutants has recently shifted to acknowledge the potential impact posed by diuron, dioxins, dieldrin, and mercury and cadmium concentrations detected in sediments and biota along the Great Barrier Reef and southern Queensland coastline. In general, these threats originate from areas dominated by intensive cropping agriculture and are exacerbated by high rainfall and erosion rates in the wet tropics region of the Queensland coast. Maintenance of long-term monitoring programmes, which utilize innovative data acquisition techniques will enable assessment of change in environmentally relevant pollutant concentrations over time. However, improved land management practices, which include an immediate minimization of vegetation clearance and responsible use of pesticides and fertilizers in Queensland are essential if water quality in the Great Barrier Reef World Heritage Area is to be maintained and protected

Haynes, D., Muller, J., & Carter, S. (2000). Pesticide and herbicide residues in sediments and seagrasses from the Great Barrier Reef world heritage area and Queensland coast. *In: Marine Pollution Bulletin*, 41(7-12), 279-287.

Johnson, A. K. L., & Ebert, S. P. (2000). Quantifying Inputs of Pesticides to the Great Barrier Reef Marine Park - A Case Study in the Herbert River Catchment of North-East Queensland. *In: Marine Pollution Bulletin*, 41(7-12), 302-309.

Abstract: The Great Barrier Reef Marine Park (GBRMP) is an ecosystem whose ecological features are recognized internationally. There is a need to evaluate the impacts of historical and contemporary changes in land use on the GBRMP. This paper quantifies pesticide inputs in the Herbert River catchment of North Queensland in the context of changes in land use over the last 100 years. We show that three major phases of rural land use and land cover change have occurred, with large areas of native vegetation converted to agricultural production. The increase in agricultural land has seen a corresponding increase in the area receiving pesticides. We present data showing application histories for organochlorine, organophosphate, phenoxy, triazine, urea, mercurial and azole group pesticides. While the fate of these pesticides in aquatic and marine systems is largely unknown, these trends pose a significant challenge for agricultural industries in complying with the principles of ecologically sustainable development (ESD)

Leao, Z. M. A. N. (2000). Box 2: The Abrolhs National Marine Park. *In: Marine Pollution Bulletin*, 41(1-6), 120-121.

Morton, B. (2000). Scientific deja vu. *In: Marine Pollution Bulletin*, 40(11), 887-888.

Nelson, P. (2000). Australia's National Plan to Combat Pollution of the Sea by Oil and Other Noxious and Hazardous Substances - Overview and Current Issues. *In: Spill Science & Technology Bulletin*, 6(1), 3-11.

Abstract: Australia's National Plan to Combat Pollution of the Sea by Oil and Other Noxious and Hazardous Substances (the National Plan) has operated since 1973. The objectives of the National Plan are based on Australia's obligations as a signatory to the International Convention on Oil Pollution Preparedness, Response and Co-operation 1990 and a responsibility to protect natural and artificial (man made) environments from the adverse effects of oil pollution and minimise those effects where protection is not possible. The Australian Maritime Safety Authority (AMSA) is the managing agency of the National Plan, working together with the States and Northern Territory governments, other Commonwealth agencies, ports, and the shipping, oil and exploration industries, to maximise Australia's marine pollution response capability. The 1990s have been a period of significant change for oil spill response arrangements in Australia. The National Plan was extended in 1998 to cover chemical spills and is currently in the process of implementing the oil spill response incident control system (OSRICS). A fixed wing aerial dispersant spraying capability was implemented in 1996 and a research and development program has been put in place. The development of a computer-based National Oil Spill Response Atlas was a major project completed during 1999.

Pearce, J. B. (2000). The New York Bight. *In: Marine Pollution Bulletin*, 41(1-6), 44-55.

Price, A., Klaus, R., Sheppard, C., Abbiss, M. A., Kofani, M., & Webster, G. (2000). Environmental and bioeconomic characterisation of coastal and marine systems of Cameroon, including risk implications of the Chad-Cameroon pipeline project. *In: Aquatic Ecosystem Health and Management*, 3(1), 137-161.

Abstract: We assess the status of Cameroon's coastal and marine environment, from field survey results and analysis of existing environmental and bioeconomic datasets. The study was undertaken at a broad level, and at greater resolution in the area likely to be influenced by the Chad-Cameroon pipeline. Thirty-six coastal sites are characterised using a proven, robust environmental assessment technique. Solid waste was more prevalent and abundant than beach oil, and both were most common around Douala towards Kribi. Offshore sampling was undertaken at 77 sites, 80% of which were dominated by mud or silt fractions, whereas hard substrata were uncommon. Key biological resources were identified in three main areas of the

Cameroon coast, from the analysis of existing environmental data, using a Geographic Information System: (1) northern region around Ndian (mangroves); (2) central region in and around Douala (mainly mangroves and including a protected area); and (3) southern region between Kribi and Campo (mangroves including a protected area). Coastal uses/pressures are greatest around Douala, an area associated with at least five different major uses/pressures. Other parts of the coast appear to have fewer uses/pressures, although these areas are extensive. Coastal areas where concentrated biological resources coincide with coastal uses/pressures are extensive, encompassing much of the coastal zone. These are indicative of resource-use conflicts, where management action should be a high priority. Areas where biological resources coincide with multiple heavy coastal uses and pressures are fewer and less extensive. Cameroon's coastal resources (e.g. fisheries) are of direct significance. Their ecosystem services are also important, an estimated US\$ 8.3 billion y⁻¹ nationally. This is equivalent to US\$ 600 person⁻¹ y⁻¹, a figure approximating per capita gross national product (US\$ 610). Within the pipeline project area, ecosystem services may be ca. US\$ 1.5 billion y⁻¹, or US\$ 105 person⁻¹ y⁻¹. Estimated project benefits from royalties are equivalent to only US\$ 4 person⁻¹ y⁻¹ over 30 years and about 1700 jobs. Major project costs are ca. US\$ 1.8 billion. Valuations of both ecosystems and the project necessarily make assumptions. Nevertheless, even large reductions in individual habitat values do not undermine the remarkable overall value of ecosystem service and natural capital, nor their importance in cost-benefit analysis. Our assessment of overall risk of coastal oil pollution in the project area combines probability of spillage (based on previous work), and a modified index of environmental sensitivity. This estimates the extent of coastline and habitats at risk, and the associated degree of overall risk. High risk areas include: (1) area between Enyangoe and Ondja (northcentral project area); (2) area from Loiaba to south of Biyo (southcentral project area); and (3) segment of coast to the north and south of Campo (south project area). The same process can be applied using different oil spill scenarios or more comprehensive datasets.

Ruiz, F., Gonzalez-Regalado, M. L., Baceta, J. I., & Munoz, J. M. (2000). Comparative ecological analysis of the ostracod faunas from low- and high-polluted southwestern Spanish estuaries: a multivariate approach. *In: Marine Micropaleontology*, 40(4), 345-376.

Abstract: The distribution and abundance of both living and total ostracod populations from the estuaries of the southwestern Spanish coast are discussed. A total of 68 species were obtained from 120 bottom samples collected in the channels, channel margins and salt marshes. Four assemblages were recognized in this area: (a) *Urocythereis oblonga* assemblage, with marine species well-represented in sandy substrates located near the mouths; (b) *Loxoconcha rhomboidea* assemblage, mainly developed in the quiet tidal channels connected with the main channels of the marine domains; (c) *Loxoconcha elliptica* assemblage, enclosing the most cosmopolitan and euryhaline species, very abundant in muddy sediments and low to moderate hydrodynamic conditions; and (d) *Leptocythere porcellanea* assemblage, only observed in the clayey-silty channel margins of the most protected ebb channels. In these transitional environments, very unfavorable conditions for the ostracod development were found in: (a) the erosional channels and channel margins; (b) most of the salt marsh samples with high subaerial exposure; and (c) sectors with high metallic pollution levels and acidic waters

Schiff, K. C., James Allen, M., Zeng, E. Y., & Bay, S. M. (2000). Southern California. *In: Marine Pollution Bulletin*, 41(1-6), 76-93.

Simberloff, D. (2000). No reserve is an island: Marine reserves and nonindigenous species. *In: Bulletin of Marine Science*, 66(3), 567-580.

Abstract: The metaphor of nature-reserve-as-island that dominated reserve design in the 1980s

has yielded to the recognition that reserves can rarely be very isolated. Supervening phenomena like chemical pollution are difficult to control even with substantial buffers. Biotic pollution—that is, invasion by nonindigenous species—is one such phenomenon that has received less attention in marine reserve design and management than in the terrestrial and freshwater realms. This difference is probably less a function of real differences in degree and nature of invasion and damage among these habitats than a reflection of less knowledge about the organization of marine communities and the origins of their component species than is usually available for their terrestrial and freshwater counterparts.

Thia-Eng, C., Gorre, I. R. L., Adrian Ross, S., Bernad, S. R., Gervacio, B., & Corazon Ebarvia, M. (2000). The Malacca Straits. *In: Marine Pollution Bulletin*, 41(1-6), 160-178.

Abstract: The Malacca Straits have long been an important trade route linking the Indian Ocean to the South China Sea and Pacific Ocean. From the seventh to the eleventh century, the Srivijaya empire controlled them, followed in the fifteenth century by the port kingdom of Malacca. Western maritime powers also recognized the strategic importance of the Straits, and in 1511, the Portuguese captured Malacca. In 1641, the Dutch occupied what is now known as Jakarta, and from the seventeenth to the eighteenth century, the Dutch East India company controlled the trade in the Straits (Ross et al., 1995). The British also recognized the need to control the Straits to ensure the safe passage of British merchant ships on their way to China, and in 1819 established a colony in Singapore. In 1824, the British and the Dutch ended their rivalry with a treaty whereby Britain agreed to 'safeguard the Straits and keep them open for other friendly nations' (Chia, 1998). In recent years, the Straits have become a very important trade route. In 1993 and 1995, over 100,000 oil and cargo vessels traversed it each year, carrying 3.23 million barrels of crude oil through the Straits each day (Sakura Institute of Research, 1998). Shipping accidents have occurred more frequently, recently, which is attributed to heavy traffic in the Straits with shallow, narrow channels and shoals. Despite these hazards, economic efficiency dictates that vessels continue to use the Straits. The Straits are also rich in renewable and non-renewable resources, including productive coastal ecosystems, extensive capture fisheries, aquaculture, coastal tourism, mining and valuable natural gas reserves. This chapter looks at the natural environmental conditions and the status of the coastal resources, the sustainability of existing activities, critical environmental problems and management. It is based on the Malacca Straits Environmental Profile (Chua et al., 1997) and other studies undertaken by the GEFUNDPIMO Regional Programme for Marine Pollution Prevention and Management in the East Asian Seas, referred to as the Regional Programme in this document.

Underwood, A. J. (2000). Experimental ecology of rocky intertidal habitats: what are we learning? *In: Journal of Experimental Marine Biology and Ecology*, 250(1-2), 51-76.

Abstract: Experimental analyses of causes of patterns of distribution and abundance of intertidal animals and plants on rocky shores have been a major activity for many years. In this review, some of the themes and topics that have emerged from such analyses are briefly discussed to provide an up-date for practitioners and ecologists working in other habitats. Conceptual issues include the widespread occurrence of transphyetic use of the same resources (space and food), theories and experimental analyses of intermediate disturbance in relation to numbers of species, the complex but pervasive nature of indirect interactions among species, relative importance of 'top-down' versus 'bottom-up' control of assemblages and the importance to rocky intertidal species of 'supply-side' influences on densities and interactions. Methodological advances include experimental designs for complex and patchy, interacting sets of species, the importance of controls in experimental manipulations and methods for analyses of hierarchical scales of patterns and processes. Finally, some contributions to social issues (pollution, biodiversity) and some scenarios for future directions are briefly considered.

White, A., & Vogt, H. P. (2000). Philippine Coral Reefs Under Threat: Lessons Learned After 25 Years of Community-Based Reef Conservation. *In: Marine Pollution Bulletin*, 40(6), 537-550.

Abstract: The Philippine archipelago consists of more than 7000 islands. Most of these islands have extensive coral reefs or coral communities. For centuries, reefs and their associated resources have provided the livelihood for a large portion of the coastal population. However, reefs as sources of income are threatened by over-exploitation and by the use of destructive fishing methods. The scientific community, natural resource managers and many of the small-scale fishermen are aware that catches are falling rapidly while the fast growing population requires increasing amounts of fish. Since the early 1970s, various programs have tried to counter the decline of Philippine coastal resources. This article reports about successful examples of reef conservation in the provinces of Negros Oriental, Batangas and the Tubbataha Reef National Marine Park, Palawan. In all three localities, significant areas of reefs are legally protected and sustainable management regimes are working effectively. In Negros and Batangas this success is partly a result of intensive education programs that contributed to the active involvement of the traditional fishermen and the larger coastal community. Community participation and co-operation of all institutions involved in resource management are regarded as the key elements of sustainable reef management in these areas. This paper presents the objectives, programs and achievements as well as the fruitful networking of the participating organizations. Particular emphasis is placed on the experiences and lessons emanating from 25 years of reef conservation while showing the overall objective of sustainable use is still far on the horizon. It is suggested that more integrated forms of management, involving various stakeholders, and that address the numerous intertwined issues, will save Philippine reefs.

White, A., Vogt, H. P., & Arin, T. (2000). Philippine Coral Reefs Under Threat: The Economic Losses Caused by Reef Destruction. *In: Marine Pollution Bulletin*, 40(7), 598-605.

Abstract: In the Philippines, coral reef fisheries provide livelihood for more than a million small-scale fishers who contribute almost US\$ 1 billion annually to the country's economy. The rapidly growing population needs increasing amounts of fish and other marine organisms. However, overfishing, destructive fishing methods and sedimentation have damaged or destroyed many reef areas. Fish catches have fallen well below the sustainable levels of healthy reefs. The economic losses to the coastal fishing population are considerable. Various programmes have and are trying to counter coral reef decline by establishing sustainable management regimes. The economic benefits of such programmes appear to exceed their investment costs. As an example, the start-up and maintenance costs of a successful island marine reserve project have been compared to the losses caused by reef destruction and the gains from reef management. The results clearly show that the economic benefits from a managed reef area due to higher catches and revenue from small-scale tourism far exceed costs. Coral reefs are also a major attraction for an increasing number of local and international tourists. In addition to providing income for the tourism industry, these reef visitors are often willing to contribute to the costs for reef management. The annual willingness-to-pay assessed in three popular diving destinations are significant. An estimated US\$ 300,000 could be collected annually as entrance fees or donations in Mabini, Batangas alone. It is estimated that the 27,000 km² of reef in their degraded condition still contribute at least US\$ 1.35 billion annually to the economy. Reef management involving local fishing communities, local governments and other concerned organizations is a cost-effective way to alleviate the pressure on the numerous threatened coral reefs. In addition, economic valuation and cost-benefit analysis can provide essential information to support more investment in reef conservation.

Willis, T. J., & Babcock, R. C. (2000). A baited underwater video system for the determination of relative density of carnivorous reef fish. *In: Marine and Freshwater Research*,

51(8), 755-763.

Abstract: Estimates of the relative density of fishes form the basis of many marine ecological studies as well as the assessment of effects of fishing or pollution. Plasticity in the behavioural response of large reef fishes to SCUBA divers means that commonly used underwater visual census (UVC) techniques do not always provide reliable estimates of relative density. The paper describes the system configuration, deployment methods, testing and use of a remotely deployed baited underwater video (BUV) system for the survey of carnivorous reef fishes (snapper, *Pagrus auratus* and blue cod, *Parapercis colias*) in marine reserves of northern New Zealand. Concurrent UVC and BUV surveys inside and outside a marine reserve showed that, whereas UVC detected few snapper in either area (resulting in little confidence in statistically significant results), BUV demonstrated significant differences in relative density. Conversely, blue cod were found to occur at significantly higher densities within the reserve by UVC, but not by BUV. The provision of accurate estimates of fish size (<20 mm error) from video footage also illustrated differences in size structure between protected and fished populations. The data suggest that a combination of survey techniques is likely to be necessary where multispecies assemblages are being assessed.

Zann, L. (2000). The Eastern Australian Region: a Dynamic Tropical/Temperate Biotone. *In: Marine Pollution Bulletin*, 41(1-6), 188-203.

Abstract: Eastern Australia lies in an overlap of tropical Indo-Pacific and temperate bioregions because of the influence of the southward-flowing East Australian Current. It has a very high biodiversity, from tropical coral reef and seagrass in the north, to coastal lakes and kelp communities in the south. Offshore, Norfolk and Lord Howe Islands and Elizabeth and Middleton Reefs, are the highest latitude coral reefs in the world. The coastal region includes South-East Queensland and New South Wales (NSW) and supports almost half of Australia's population. Catchments have been extensively cleared for agriculture and water quality in many rivers and estuaries is poor. There has been major loss of wetlands and acid soil runoff causes fish kills and diseases in estuaries. The coastline is exposed, and much has been mined for heavy minerals and is subject to erosion. Urbanization and industrialization, particularly in the Sydney area, has resulted in sewage and heavy metal pollution. Many of the coastal fisheries are declining, largely because of loss of water quality and wetlands habitats, and in some cases overfishing. Marine environmental management (the responsibility of the two states to the 3 mile limit, and the Commonwealth to the boundary of the 200 mile EEZ) is variable, and largely focused on the urban centres. Queensland has a system of marine protected areas (MPAs) while NSW has minimal protected areas. The major issues are declining water quality, loss of estuarine habitats, degradation of coastal lakes, and localized pollution from heavy metals and sewage in the Sydney area.

[Anon.]. (2001). US marine sanctuary. *In: Marine Pollution Bulletin*, 42(9), 707.

Bellamy, D., & Wilkinson, P. (2001). Ospar 98/3: An Environmental Turning Point or a Flawed Decision? *In: Marine Pollution Bulletin*, 42(2), 87-90.

Abstract: While the problems of over-fishing and eutrophication continue largely unchecked, the Ospar Commission, which exists to improve the quality of European seas, requires governments, the public and the oil companies to find [UK pound]20 billion to remove millions of tons of steel to demonstrate its commitment to the mantra that 'the seas are not dustbins'. The decision, taken in 1998, was made despite a paucity of evidence to identify the environmental impact redundant rigs create, despite the absence of scientific support to demonstrate that removal is the best practicable environmental option and in the knowledge that the decision had more to do with a green anti-oil agenda than with improving marine quality. It may be shown in the fullness of time not to be in the best interests of the environment. Moreover, and perhaps

more importantly, the manner in which the decision was made is lacking in important respects.

Blackmore, G. (2001). Interspecific variation in heavy metal body concentrations in Hong Kong marine invertebrates. *In: Environmental Pollution*, 114(3), 303-311.

Abstract: Accumulated body concentrations of cadmium, copper and zinc were investigated in 19 species of intertidal invertebrates (the barnacles *Tetraclita squamosa*, *Capitulum mitella*, *Balanus amphitrite*, *Megabalanus volcano*, the bivalves *Saccostrea cucullata*, *Septifer virgatus* and *Brachidontes atratus*, the chiton *Acanthopleura japonica* and the gastropods *Cellana grata*, *Cellana toreuma*, *Patelloida saccharina*, *Patelloida pygmaea*, *Siphonaria japonica*, *Tegula argyrostoma*, *Lunella coronata*, *Monodonta labio*, *Nerita albicilla*, *Thais clavigera* and *Thais luteostoma*) collected from a relatively unpolluted area in Hong Kong, i.e. two shores within the Cape d'Aguilar Marine Reserve. In general body metal concentrations could be explained by the accumulation strategy of the analysed organism and by physiological requirements for the essential metals, i.e. copper and zinc. Zinc concentrations were, therefore, greatest in the barnacles and the oyster *S. cucullata*. Copper concentrations were greatest in those gastropods containing the respiratory pigment haemocyanin and in *S. cucullata*. One species collected from the sheltered shore, i.e. *T. luteostoma*, had much higher copper body concentrations compared with exposed shore conspecifics and this may be attributed to a diet that was dominated by oysters, which have high copper body concentrations. In contrast to both copper and zinc, cadmium body concentrations showed little interspecific variation.

Brodie, J., Christie, C., Devlin, M., Haynes, D., Morris, S., Ramsay, M., Waterhouse, J., & Yorkston, H. (2001). Catchment management and the Great Barrier Reef. *In: Water Science and Technology*, 43(9), 203-211. **Notes:** River symposium 2000. Sustaining Rivers - Defining the New International Agenda, Elsevier Science Ltd., Pergamon, P.O. Box800 Kidlington Oxford OX5 1DX UK

Abstract: Pollution of coastal regions of the Great Barrier Reef is dominated by runoff from the adjacent catchment. Catchment land-use is dominated by beef grazing and cropping, largely sugarcane cultivation, with relatively minor urban development. Runoff of sediment, nutrients and pesticides is increasing and for nitrogen is now four times the natural amount discharged 150 years ago. Significant effects and potential threats are now evident on inshore reefs, seagrasses and marine animals. There is no effective legislation or processes in place to manage agricultural pollution. The Great Barrier Reef Marine Park Act does not provide effective jurisdiction on the catchment. Queensland legislation relies on voluntary codes and there is no assessment of the effectiveness of the codes. Integrated catchment management strategies, also voluntary, provide some positive outcomes but are of limited success. Pollutant loads are predicted to continue to increase and it is unlikely that current management regimes will prevent this. New mechanisms to prevent continued degradation of inshore ecosystems of the Great Barrier Reef World Heritage Area are urgently needed.

Efstratiou, M. A. (2001). Managing Coastal Bathing Water Quality: The Contribution of Microbiology and Epidemiology. *In: Marine Pollution Bulletin*, 42(6), 424-431.

Fowler, C., & Treml, E. (2001). Building a marine cadastral information system for the United States - a case study. *In: Computers, Environment and Urban Systems*, 25(4-5), 493-507.

Abstract: Depleted marine resources and increased threats by man-made pollutants are forcing many countries to increase law enforcement and begin offshore planning. Accurate, useable, and accessible digital boundaries, with defined territorial claims, are becoming essential for daily business in the ocean. The term cadastre has not often been used in the context of the marine environment, though many (and some may argue all) of the cadastral components such

as adjudication, survey, and owner rights have a parallel condition in the ocean. This paper discusses some of the framework issues that must be considered in the development of marine cadastral data and the use of these data in a marine information system for the United States. The unique features of coastal and marine data, the policy framework that surrounds the development of these data, and the implications to state, national, and international policy are discussed. In addition, a specific case study, the Ocean Planning Information System is outlined as a "real world" application where these cadastral data have been applied toward integrated ocean planning and governance.

Hossain, M. S. (2001). Biological aspects of the coastal and marine environment of Bangladesh. *In: Ocean & Coastal Management*, 44(3-4), 261-282.

Abstract: Bangladesh, which has a warm tropical climate and abundant annual rainfall, has very rich coastal waters; these support diverse and abundant marine life. The coastal and marine environment is becoming increasingly important in fulfilling social, economic, development and strategic objectives of the country. The biological character is briefly reviewed to provide a background to the main habitats and their condition. The marine resources are described, while emphasis is given to living resources, particularly ecosystems and fisheries. Of the inter-tidal ecosystems, mangroves are the most diverse and highly productive and very important regionally. Considering the major regional and global context, fisheries and aquaculture are important, particularly for penaeid shrimp (*Penaeus monodon*) and also for pomfret, hilsa, bombay duck, mackerel, eel, ribbon fish, snapper, cat fish and Indian salmon. Oil, domestic, urban and industrial pollutants are a problem in several parts of the coastal zone, although effects on ecosystem structure and function are generally not well known. The coastal zone is also fast becoming the depository for solid wastes. The orientation towards coastal management action requires clear guidance, a well-organized government structure, and -- most importantly -- a well defined set of objectives and actions.

McLachlan, M. S., Haynes, D., & Muller, J. (2001). PCDDs in the water/sediment-seagrass-dugong (Dugong dugon) food chain on the Great Barrier Reef (Australia). *In: Environmental Pollution*, 113(2), 129-134.

Abstract: Polychlorinated dibenzo-p-dioxin (PCDD) and dibenzofuran (PCDF) concentrations were measured in sediment and seagrass from five locations in or adjacent to the Great Barrier Reef Marine Park. A full spectrum of C15-8DDs were present in all samples and, in particular, elevated levels of C18DD were found. PCDFs could not be quantified in any samples. The PCDD concentrations ranged over two orders of magnitude between sites, and there was a good correlation between sediment and seagrass levels. There were large quantities of sediment present on the seagrass (20-62% on a dry wt. basis), and it was concluded that this was a primary source of the PCDDs in the seagrass samples. The PCDD levels in the seagrass samples were compared with the levels in the tissue of three dugongs stranded in the same region. The relative accumulation of the 2,3,7,8-substituted PCDD congeners in the dugongs decreased by over two orders of magnitude with increasing degree of chlorination. This was attributed to the reduced absorption of the higher chlorinated congeners in the digestive tract, a behaviour that has been observed in other mammals such as domestic cows.

Michel, P., Averty, B., Andral, B., Chiffolleau, J. F., & Galgani, F. (2001). Tributyltin along the Coasts of Corsica (Western Mediterranean): A Persistent Problem. *In: Marine Pollution Bulletin*, 42(11), 1128-1132.

Morton, B. (2001). Dredging Through the Remains. *In: Marine Pollution Bulletin*, 42(5), 333-334.

Obura, D. O. (2001). Kenya. In: *Marine Pollution Bulletin*, 42(12), 1264-1278, many ref.

Abstract: The Kenya coast is bathed by the northward-flowing warm waters of the East Africa Coastal Current, located between latitudes 1 and 5° S. With a narrow continental shelf, the coastal marine environments are dominated by coral reefs, seagrass beds and mangroves, with large expanses of sandy substrates where river inputs from Kenya's two largest rivers, the Tana and Athi rivers, prevent the growth of coral reefs. The marine environment is characterized by warm tropical conditions varying at the surface between 25 and 31°C during the year, stable salinity regimes, and moderately high nutrient levels from terrestrial runoff and groundwater. The semi-diurnal tidal regime varies from 1.5 to 4 m amplitude from neap to spring tides, creating extensive intertidal platform and rocky-shore communities exposed twice-daily during low tides. Kenya's marine environment faces a number of threats from the growing coastal human population estimated at just under three million in 2000. Extraction of fish and other resources from the narrow continental shelf, coral reef and mangrove ecosystems increases each year with inadequate monitoring and management structures to protect the resource bases. Coastal development in urban and tourist centres proceeds with little regard for environmental and social impacts. With a faltering economy, industrial development in Mombasa proceeds with few checks on pollution and other impacts. In 1998 Kenya's coral reefs suffered 50-80% mortality from the El Nino-related coral bleaching event that affected the entire Indian Ocean. The institutional, human resource and legal infrastructure for managing the coastal environment has in the past been low, however these are rapidly improving with the revitalization of national institutions and the passing in 1999 of an Environment Act. Marine Protected Areas are the key tool currently used in management of marine ecosystems, and focus principally on coral reefs and biodiversity protection. New initiatives are underway to improve application of fisheries regulations, and to use Integrated Coastal Area Management as a framework for protecting marine and coastal environments.

Rand, G. M., & Carriger, J. F. (2001). US environmental law statutes in coastal zone protection. In: *Environmental Toxicology and Chemistry*, 20(1), 115-121.

Abstract: U.S. federal legislation relevant to the coastal zone and adjacent ocean was reviewed and included the Coastal Zone Management Act, Clean Water Act, Marine Protection Research and Sanctuaries Act, and Oil Pollution Act. Problems affecting these waters involve complex activities/issues related to multimedia sources of pollution and coastal land use planning. Effective pollution control requires state-local-federal interaction with a better understanding of scientific as well as social and economic issues.

Sheppard, C. (2001). The Main Issues Affecting Coasts of the Indian and Western Pacific Oceans: A Meta-analysis from Seas at the Millennium. In: *Marine Pollution Bulletin*, 42(12), 1199-1207.

Abstract: A review of the world oceans in three volumes by 365 scientists, provides scope for several 'meta-analyses' of the main problems affecting over 100 areas in the year 2000. This article summarises the main issues affecting a sub-set of the reviewed areas, covering Asian, African and Arabian countries dealt with in Volume 2, which included over 50 articles. From all issues raised, assessment is made of the nature of the major ones, including evaluation of reasons why so many of them remain important issues after so much attention to them. These include long standing problems, several problems more newly flagged as becoming particularly important, the issue of global warming and no less than three related issues connected with fishing and over exploitation. One or two issues such as industrial pollution and sewage, previously considered of almost universal concern, almost traditional pollution issues even, continue to feature strongly for some countries, but while these were almost always referred to in Seas chapters, by and large these categories appear not to be the most pressing of issues today, except in localized areas (albeit areas where huge numbers of people live). Perhaps other

issues have simply taken over. They are excluded from this article.

Smith, S., & Rule, M. J. (2001). The Effects of Dredge-Spoil Dumping on a Shallow Water Soft-Sediment Community in the Solitary Islands Marine Park, NSW, Australia. *In: Marine Pollution Bulletin*, 42(11), 1040-1048.

Yap, H. T. (2001). Another Look at Coral Reef Degradation. *In: Marine Pollution Bulletin*, 42(7), 527.

Yap, H. T. (2001). A good word on marine reserves, though probably not the last. Fully-protected Marine Reserves: A Guide. *In: Marine Pollution Bulletin*, 42(12), 1421-1422. Notes: C.M. Roberts, J.P. Hawkins, 2000. WWF Endangered Seas Campaign, Washington, D.C. and Environment Department, University of York, York, 131 pp

Ofiara, D. (2002). Natural resource damage assessments in the United States: rules and procedures for compensation from spills of hazardous substances and oil in waterways under US jurisdiction. *In: Marine Pollution Bulletin*, 44(2), 96-110.

Pearce, J. (2002). The future of fisheries - marine protected areas - a new way forward or another management glitch? *In: Marine Pollution Bulletin*, 44(2), 89-91.

Cambers, G. ([s. d.]). Planning for coastal erosion / eastern Caribbean islands. (also in French and Spanish). Environment and development in coastal regions and in small islands. APPENDIX III. Forum Contributions up to 30th September 2000.