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THE ROLE OF ICLARM ON WETLAND PROTECTION, UTILIZATION AND MANAGEMENT

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IINSTITUTIONAL PROFILE

The International Center for Living Aquatic Resources Management (ICLARM) was incorporated in the Philippines in 1977. ICLARM is an autonomous, non-governmental, non-profit, international scientific research center similar in many ways to the international agricultural research centers. It conducts, stimulates and accelerates research on the development and management of living aquatic resources to assist developing countries meet their nutritive, economic and social needs.

Recently, ICLARM was admitted into the Consultative Group for International Agricultural Research (CGIAR). It will now assume formally, within the CGIAR system, the lead role in international research for fisheries and aquaculture. ICLARM's goal is improved production and management of fisheries resources for sustainable benefits of present and future generations of low-income users in developing countries.

At the top of the organization structure of ICLARM is the Board of Trustees. Administrative responsibility belongs to the Director General. From January 1993 on, there will be four research programs: Coastal Resource Systems Program (CRSP), Inland Aquatic Systems Program, Coral Reef Management Program and National Research Support Program. Future research on wetlands will fall under the CRSP and will involve Social Sciences, Fishing/Farming Systems and Ecology/Biology Divisions. One of the three research thrusts of the CRSP, viz. Integrated Management Strategies for Coastal Aquatic Resources, will study systems strongly affected by wetlands.

ICLARM'S WORK ON WETLANDS: PAST AND PRESENT

ICLARM has no mandate to specifically study wetlands; hence our research on wetland utilization and management has always been a component of larger projects, generally in the context of aquaculture and fisheries studies, or of the development of coastal management plans. The geographical focus of ICLARM's work on wetlands reflects both its international orientation and its location in the Philippines. Below are short descriptions of some ICLARM programs and projects that dealt with wetlands.

Work on milkfish culture in mangrove areas

Dr. Kee-Chai Chong conducted a series of studies on the economics of Philippine milkfish culture industry from 1978 to the early 1980s (Chong et al. 1984). In those years, production technology was extensive; use of inputs (e.g., fertilizer) was limited. He attributed this partly to the opening up of mangrove areas for conversion to ponds; increases in aquaculture production at that time was achieved through area expansion. In effect, the relative "price" of land (pond) was low due to subsidies given for pond construction. Hence production technologies employed tended to favor the use of this factor.

Coastal Resources Management Project (CRMP)

The CRMP is a regional project executed by ICLARM for ASEAN and the U.S., whose major task is the development of site-specific coastal area management plans for selected sites in each of the ASEAN countries (Table 1).

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[1]Presented at the Workshop on the Protection and Sustainable Use of Wetland Resources in the Philippines, Institute of Forest Conservation, University of the Philippines, Los Ba$os, Laguna, 30 September to 2 October 1992. ICLARM Contribution No. 858.

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Table 1:
Sites of the ASEAN/US Coastal Resources Management Project, executed by ICLARM from January 1986 to December 1992.

Country	Location	Remarks on Wetlands
Brunei Darussalam	All coast	Mangrove in relatively good state, see Zamora (1992)
Indonesia	Segara Anakan Lagoon, Indian Ocean, Coast of Central Java	Mangrove spreading on newly-accreted land (L. soemodihardjo et al. 1991).
Malaysia	Coast of Johore Baru State	Most mangrove are converted, some conserved (Paw and Chua 1991)
Philippines	Lingayen Gulf, N.W. Luzon	Mangrove patchy, logged over (Paw and Chua 1991)
Singapore	Entire country	Very few, degraded mangrove (Paw and Chua 1991)
Thailand	Ban Don Bay, Gulf of Thailand and Phangha Bay, Adaman Sea coast	Mangrove converted to shrimp ponds; mangrove affected by tin mining (Aksornkoae 1989)

The project sites in the six ASEAN countries (Table 1) are in various stages of development, indicating corresponding levels of conflict in resource utilization. With respect to wetlands (mangrove areas), it was observed that the common trend is overharvesting of forest resources and conversion into other uses, e.g., for aquaculture or agriculture, for tourism and for urban or industrial settlements, among others. A holistic concept was adopted for the coastal planning component, which strives to consider the interrelationships of land and water, of coastal resources and habitats, and of conflicts of uses of the resources and the environment.

The management plans call for a balanced use of the coastal resources to optimize societal benefits derived therefrom. With respect to wetlands (mangroves), the recommendations range from zonation (where there remain underexploited wetlands such as in Brunei Darussalam (Jaafar and De Silva 1991)) to rehabilitation and/or protection (where wetlands are endangered such as in Lingayen Gulf, Philippines (Luna 1991)).

The project has given strong emphasis to public education and has produced two documents aimed at informing laypersons on the role of wetlands (Anon 1988, Fortes 1989).

Selected publications on mangroves resulting from this project are given in the Bibliography below.

Socioeconomic Valuation of Coastal Resources of Southwestern Latin America

Among the objectives of this project are to identify the major processes, relationships and factors determining the dynamics of coastal resource uses, and to design, test and validate a mathematical programming model for the social and economic valuation of the most important coastal resources. The set of values derived are the shadow prices which indicate the social benefits being given up by, for example, conversion of a unit of mangrove area for other uses.

This methodology provides one way for determining the socioeconomic value of coastal resources (e.g., mangroves in their undisturbed state) vis—vis other uses, e.g., logging, mining, aquaculture, agriculture or even urban or industrial development. One of the preliminary results of the project is shown in Figure 1 which illustrates, indirectly, the tradeoffs in the alternative uses of mangrove areas. Valuation is an important process to undertake in determining the best use of coastal resources and in designing management plans. In the following years, ICLARM will make this methodology and the corresponding software available to interested users; inquiries are welcome.

Other works

ICLARM contributions related to wetlands and originating from projects other than the three listed above have occasionally been published in the "ICLARM Newsletter" (e.g. Chansang 1979), or its successor, NAGA, the ICLARM Quarterly (e.g. Pullin 1989). Also, various papers have been published which emanated from staff research on coastal fisheries. One of these is multiple regression analysis by Pauly and Ingles (1988) of penaeid shrimp yields in various parts of the world, and the corresponding areas of coastal vegetation, and in which they included, among others, data previously presented by Turner 1977 and Martosubroto and Naamin (1977).

They concluded, among other things that the non-linear (i.e. logarithmic) nature of such relationship precludes using them for prediction of the shrimp yields resulting from losses of mangrove or other

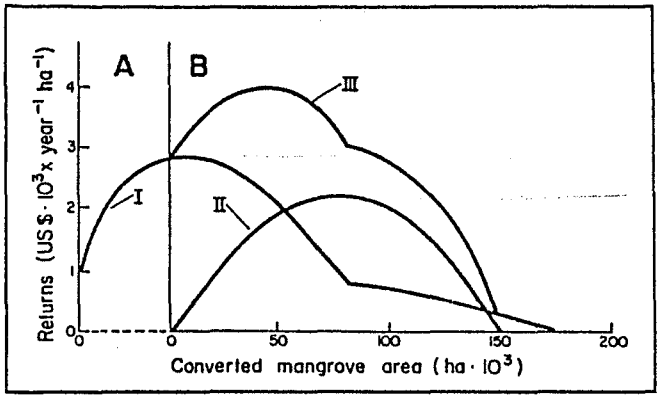

Figure 1: Schematic representation of economic returns from alternative mangrove use/exploitation strategies in Ecuador, South America. Plane A corresponds to a strategy with "no-conversion", while plane B corresponds to a strategy with varying levels of conversion. Curve I depicts the rent derived from the use of mangroves in their natural state; Curve II depicts net benefits derived from alternative uses of mangroves (shrimp mariculture) at various levels of conversion; and Curve III depicts social net benefits and results from the summation of I and II at various levels of conversion (from M. Aguero, ICLARM, unpublished data).

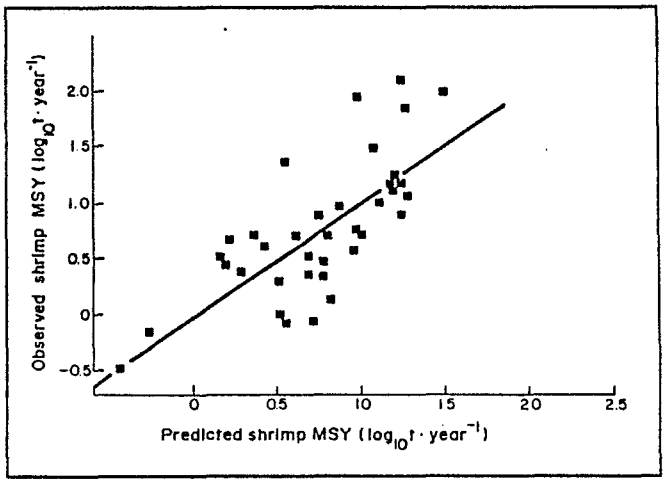

Figure 2: Plot of observed log (shrimp yields) vs. log (predicted shrimp yields), as derived from the empirical model of Pauly and Ingles (1988), which is based on log (intertidal vegetation) and log (latitude) as predictors. The good fit (r=0.725, for N=38) must not detract from the fact that the model cannot be used for prediction (see text).

intertidal vegetation, notwithstanding their tight fit (see e.g. Fig. 2).

We hope that future work in this area will help establish better predictive tools, and combined with valuation techniques, help safeguard as many wetlands as possible.

Bibliography (contributions generated by the CRMP and not cited above are marked with a *)

Anon. 1989. Mangrove must live. ICLARM Poster No. 2. ASEAN/US CRM Project, in cooperation with Asian Wetland Bureau and World Wildlife Fund, Malaysia.

Aksornkoae, S. 1989. Management and conservation of mangrove resources for coastal development in Southeast Asian nations, p. 11-15. In T.-E. Chua and D. Pauly (eds.) Coastal area management in Southeast Asia: policies, management strategies and case studies. ICLARM Conference Proceedings 19.

*Cabahug, D.M., JR. and L.R. Garces. 1992. Assessment of mangrove forest resources in Brunei Darussalam, p. 59-74. In G. Silvestre, H.J.H. Matdanan, P.H.Y. Sharifudin, M.W.R.N. De Silva and T.-E. Chua (eds.) The coastal resources of Brunei Darussalam: status, utilization and management. ICLARM Conference Proceedings 34.

Chansang, H. 1979. Review of knowledge on mangroves in Southeast Asia and the Southwest Pacific, with emphasis on management applications. ICLARM Newsletter 2(1): 3-4.

Chong, K.C., M.S. Lizarondo, Z.S. de la Cruz, C.V. Guerrero and I.R. Smith. 1984. Milkfish production dualism in the Philippines: a multidisciplinary analysis on continuous low yields and constraints to aquaculture development. ICLARM Tech. Report 15, 70 p.

*Darus, M.b.Hj.M. and Haron, b.Hj.A.H. 1989. The management of Matang mangrove forest reserves in Peninsular Malaysia. p. 77-84. In T.-E. Chua and D. Pauly (eds.) Coastal area management in Southeast Asia: policies, management strategies and case studies. ICLARM Conference Proceedings 19.

Fortes, M.D. 1989. Seagrasses: a resource unknown in the ASEAN region, ICLARM Educ. Ser. 5, 46 p.

Jaafar, Hj.M.Hj. 1991. The integrated management plan for the coastal zone of Brunei Darussalam (summary). Tropical Coastal Area Management 6(3): 3-8.

Luna, C.Z. 1991. The Lingayen Gulf coastal area management plan (summary). Tropical Coastal Area Management 6(3): 16-19.

Martosubroto, P. and N. Naamin. 1977. Relationship between tidal forests (mangrove) and commercial shrimp production in Indonesia. Mar. Res. Indonesia (8):81-86.

Pauly, D., J. Ingles. 1986. The relationship between shrimp yields and intertidal vegetation (mangrove) areas: a reassessment. pp 277-283. In A. Ya$ez-Arancibia and D. Pauly (Eds.) IOC/FAO Workshop on Recruitment in Tropical Coastal Demersal

Communities: Submitted Papers. IOC Workshop Report No. 44, Supplement.

Paw, J.N. and T.-E. Chua. 1991. An assessment of the ecological and economic impact of mangrove conversion in Southeast Asia, p. 201-212. In L.M. Chou, T.-E. Chua, H.W. Khoo, P.E. Lim, J.N. Paw, G.T. Silvestre, M.J. Valencia, A.T. White and P.K. Wong (eds.) Towards an integrated management of tropical coastal resources. ICLARM Conference Proceedings, 22.

Pullin, R.S.V. 1989. Third world aquaculture and the environment. NAGA, the ICLARM quarterly, 12(1):10-13.

Soemodihardjo, S., Suroyo and Suyarso. 1991. The mangroves of Segara Anakan: an assessment of their condition and prospects, p. 213-222. In L.M. Chou, T.-E. Chua, H.W. Khoo, P.E. Lim, J.N. Paw, G.T. Silvestre, M.J. Valencia, A.T. White and P.K. Wong (eds.) Towards an integrated management of tropical coastal resources. ICLARM Conference Proceedings, 22.

Turner, R.E. 1977. Intertidal vegetation and commercial yields of penaeid shrimp. Trans. Amer. Fish. Soc. 106:411-416.

Zamora, P.M. 1992. Mangrove resources of Brunei Darussamlam, p. 39-58. In G. Silvestre, H.J.H. Matdanan, P.H.Y. Sharifudin, M.W.R.N. De Silva and T.-E. Chua (eds.) The coastal resources of Brunei Darussalam: status, utilization and management. ICLARM Conference Proceedings 34.