檔號： PA/S 423/12 (5)　　會議文件第 2/98 號

臨時本地船隻諮詢委員會

敷設人工魚礁研究

目　的

本文件旨在把漁農處委聘顧問公司所做的敷設人工魚礁研究知會委員，並徵詢委員的意見。

背　景

漁農處擬展開一項計劃，在香港水域選定地點、建造並敷設人工魚礁，以期增加本地魚量，並且緩減因濫捕、沿岸發展和污染所造成的影響。漁農處已委聘香港環境資源管理顧問公司，於 1997 年 7 月展開敷設人工魚礁研究，以期訂立香港特別行政區水域人工魚礁敷設及管理策略。

諮詢工作

香港環境資源管理顧問公司的顧問人員擬備諮詢文件，概述這項研究的進度，並附有初步選址研究結果。這份文件載於附件。

徵詢意見

請委員考慮香港環境資源管理顧問公司所做的諮詢工作，特別就人工魚礁敷設地點方案的暫定選址一覽提出意見。

文件提交

隨附的諮詢文件由香港環境資源管理顧問公司派員在1998年2月27日會議席上講解，屆時由海事處高級海事主任司徒洛基先生陪同出席。

香港特別行政區海事處

1998年2月18日

Brief for PAC, PLVAC, COMBAY and POC Consultative Committees

ARTIFICIAL REEF DEPLOYMENT STUDY
ENVIRONMENTAL RESOURCES MANAGEMENT - HONG KONG LTD

Introduction

The Agriculture and Fisheries Department (AFD) has initiated an extensive and challenging programme to site, construct and deploy artificial reefs (ARs) in Hong Kong waters to improve local fish stocks and mitigate impacts arising from stock exploitation, coastal development and pollution. ERM Hong Kong Limited (ERM) has been commissioned by AFD to formulate an AR deployment and management strategy for the waters of the Hong Kong Special Administrative Region (SAR). While the ERM Study will make maximum use of international research and experience with ARs, as well as existing local fisheries and environmental data, this information alone will not be sufficient to ensure the success of AFD's AR programme. Community support and involvement will be equally critical to the implementation and overall effectiveness of the AR management policies.

Consequently, consultation to enhance the public's awareness of AR issues, to gather input on stakeholder values and priorities for incorporation into deployment and management recommendations, and to cultivate support for the AR programme will be an essential element of the Study.

The Consultation Programme

The consultation programme will be conducted in two stages. The first stage (October 1997) focussed on introducing the concept of ARs, explaining the benefits of ARs, and identifying key issues. The second stage (March 1998) will respond to the issues raised in the first stage, describe how public input has been incorporated, and present AR deployment and management strategies developed during the Study. Specific concepts to be covered in each stage are presented below.

FIRST STAGE CONSULTATION CONCEPTS

- Effectiveness of ARs worldwide in enhancing fisheries resources.
- Fishery and marine ecology benefits of ARs in Hong Kong.
- Expected improvements in yields of high value target species.
- The need for effective management in order to achieve fisheries enhancement.
- The desire to obtain public input on site selection and management options.

SECOND STAGE CONSULTATION CONCEPTS

- Proposed AR deployment sites.
- Range of AR management options and recommendations.
- Details of expected economic and ecological benefits of the strategies.
- Recommended materials and deployment configurations.
- The use of public input in formulating recommended strategies.
- The desire to receive public comment on the proposals.

Study Progress

This Study is designed to build on international experience with ARs, especially from other SE Asian countries, and thus avoid previously encountered problems associated with improper siting, inadequate management, and inappropriate designs and materials. In addition to international experience, implementation of an effective AR programme in Hong Kong requires a firm foundation of local knowledge. Although this information will greatly strengthen the scientific basis for AR deployment, the AR programme in Hong Kong will not succeed without effective management and local fishing community support. Fishing effort on ARs has to be adequately managed, as the fish aggregation effects of ARs in Hong Kong may facilitate capture and exacerbate stock depletion. Development of AR management plans will thus require careful assessment of available legislative and regulatory instruments to determine the most appropriate means of protecting and conserving these areas.

This Study presents a review of legislation applicable to the management and deployment of artificial reefs (ARs) in Hong Kong. It is recommended that changes are made to the Fisheries Protection Ordinance to allow for the designation of "Special Areas" where fishing is prohibited or controlled through a permitting system. This would allow AR deployment sites to be listed as "Special Areas" and therefore fishing effort be controlled. The permitting system would enable AFD to allocate permits to fishing communities that are dependent on particular fishing areas or that have demonstrated a traditional use of the area.

A review has shown that worldwide experiences with ARs have varied markedly from the failure and subsequent moratorium on artificial reefs in the Philippines to the ongoing, rapid expansion of programmes in Chinese Taipei and Europe. Despite the varying experience between different countries there were, however, common themes:

- ARs are not effective if hard bottom high profile habitat is not limited;
- ARs can contribute to overfishing if their only effect is aggregation of remaining resources;
- ARs should be deployed as part of a programme of wider management measures to reduce fishing pressure;
- ARs can fail and waste limited Government funds if they are incorrectly sited; and,
- ARs can be effective at protecting ecologically important habitat from the effects of bottom trawling.

This Study presents results of ecological and economic modelling performed to examine the impacts on Hong Kong's fish stocks of the introduction of Marine Protected Areas (MPAs) (equivalent to closed areas) and AR deployment. The analyses assumed that ARs are deployed in a protected area where fishing effort is zero. The analysis factored in a 3.3% annual increase in fishing pressure. Given these assumptions, the analyses showed that MPAs greatly retard the rate of decline in overall biomass and help to rebuild fisheries resources. Although ARs are predicted to only modestly increase the overall stocks, they are predicted to have a significant increase in high value target species of interest to AFD. These findings suggest that a combination of ARs and MPAs would stabilize the Hong Kong fishery. If these measures are also combined with a modest but determined effort to reduce fishing pressure, as opposed to the 3.3% increase modelled, the increases of stocks would be considerably greater.

The design, configuration and deployment of ARs will depend on the specific goals of selected sites. Sites with the main goal of habitat protection will be designed and engineered in such a way that reef units are resistant to removal by trawlers and configured such that paths of trawlers are obstructed. Sites with the goal of enhancing juvenile populations are recommended to focus more on habitat heterogeneity and ecosystem enhancement to provide food and shelter for juveniles. Sites will be selected using a two-tiered screening system followed by application of prioritisation criteria to select the six highest priority sites for AR deployment in Hong Kong.

Goals for Artificail Reef Deployment in Hong Kong

The final element of developing a strategy for artificial reef deployment is to establish site selection criteria so that sites which satisfy the multiple goals for deployment in Hong Kong can be identified.

GOALS FOR AR DEPLOYMENT IN HONG KONG

- To enhance fish stocks and marine resources in Hong Kong.
- To rehabilitate habitats that have been degraded.
- To protect spawning, nursery and marine protected areas.
- To enhance the habitat quality in open seabed areas.

Artificial Reef Site Selection Criteria

Two selection criteria have been proposed in te current study.
Tier 1, the preliminary screening criteria, they are areas incompatible to AR deployment now and in the future. Once these areas have been identified they will be excluded from the further stages of the site selection process. They include

- Principal Fairway and Shipping Lanes
- Existing Port Facilities
- Future Reclamation
- Underwater Cable and cross harbour tunnels

Tier 2, the secondary screening criteria, these include areas which might have potential to be considered in the future, but will not be considered in this Study. These areas will also be excluded in the site selection process. They consist of

- Breakwaters and the future reclamations' perimeters
- Active Marine Borrow Areas and Mud Disposal Areas
- Underwater Water Supply Pipeline
- Sewage Outfall
- Existing Marine Parks and Reserves

After screening off these constraints, a long list of proposed deployment areas will be generated. By applying the last step, the prioritization criteria, a short list of six most appropriate sites will be formed. Priority will be decided based on a series of detailed environmental, social and economic criteria.

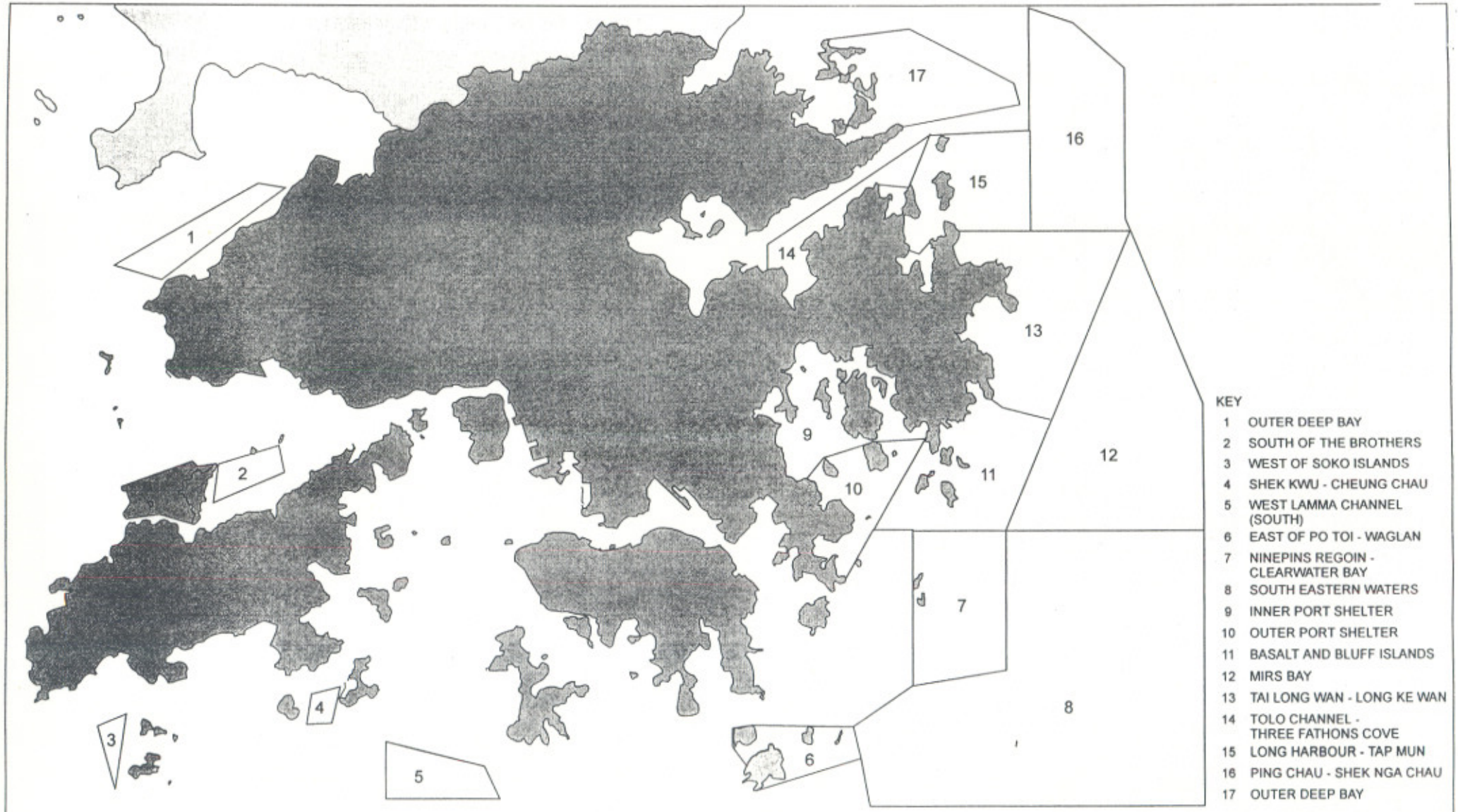
Environmental Criteria, eg
- Favourability of Existing Environmental conditions
- Opportunities for habitat Restoration
- Potential Increases in stocks of High Value Species

Social Criteria, eg
- Recreational Opportunities
- Degree of Community Support

Economic Criteria, eg
- Cost of Construction
- Benefits to the Local Fishermen

Provisional Long List of Proposed Artificial Reef Deploynebt Sites

1. Outer Deep Bay
2. South of the Brothers
3. West of the Soko Islands
4. Shek Kwu - Cheung Chau
5. West Lamma Channel (South)
6. East of Po Toi - Waglan
7. Ninepins Region - Clearwater Bay
8. Southeastern Waters
9. Inner Port Shelter
10. Outer Port Shelter
11. Basalt & Bluff Islands
12. Mirs Bay
13. Tai Long Wan - Long Ke Wan
14. Tolo Channel - Three Fathoms Cove
15. Long Harbour - Tap Mun
16. Ping Chau - Shek Nga Chau
17. Outer Deep Bay



FIGURE

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