

**For discussion on  
11 July 2012**

**Legislative Council**  
**Panel on Food Safety and Environmental Hygiene**

**Marine Fish Culture in Hong Kong**

**PURPOSE**

On grounds of environmental impact, there has been a general moratorium since 1990 on the issue of new fish culture licences and raft area extensions in existing fish culture zones (FCZs) and designation of new FCZs. We are reviewing the moratorium, as recommended by the Committee on Sustainable Fisheries. This paper briefs Members on the current state of the review, including the development of an analytical tool for assessing the environmental acceptability of FCZs.

**THE COMMITTEE ON SUSTAINABLE FISHERIES**

2. In December 2006, the Government established the Committee on Sustainable Fisheries (the Committee) to study the long term directions, goals and strategy for the sustainable development of the local fisheries industry. In its report released in May 2010, the Committee observed that apart from assisting fishermen to develop or switch to modernised and sustainable modes of operation, further measures should be put in place to manage fishing efforts, including banning trawling, in Hong Kong waters. The Committee recommended, inter alia, a review of the moratorium to facilitate fishermen to switch from capture fisheries to mariculture. Mariculture is considered a practical alternative for capture fishermen to make a living as their artisan skills would be useful in farming marine fish.

3. In the 2010-11 Policy Address, the Chief Executive announced that the Government would implement a package of fisheries management measures, including banning trawling in Hong Kong waters through legislation in order to restore our seabed and marine resources as soon as possible. To take forward the trawl ban, the Government introduced the Fisheries Protection (Specification of Apparatus)(Amendment) Notice 2011 (Amendment Notice) into LegCo in March 2011. The Subcommittee on the Amendment Notice was briefed on measures being taken to assist the fishing community. In that context, we reported that the Agriculture, Fisheries and Conservation Department (AFCD) was engaging relevant Bureaux/Departments to lay the ground work for a review of the moratorium on the issue of new licence for mariculture operations.

### **THE MORATORIUM IN 1990**

4. Before 1980, marine fish culture used to be conducted in an *ad hoc*, unregulated manner. Since 1982, marine fish culture has come under the purview of the Marine Fish Culture Ordinance (Cap. 353) which requires all marine fish culture activities to operate under licence in designated FCZs. At that time, there were 24 designated FCZs. As the industry continued to grow, there were 1 810 licensees operating in 28 FCZs in December 1988, with another 1 298 applications for fish culture licences on the waiting list, pending the identification of suitable new FCZs / raft areas.

5. Meanwhile, there was a growing concern in the Government and the community that not only would mariculture suffer from poor water quality if the size of the industry continued to grow, it would also generate pollutants degrading the marine environment. In 1989, the Government commissioned a consultancy to assess the environmental impact of mariculture in Hong Kong. As an interim measure, no new FCZs were to be designated, except for forced re-site necessitated by public works. In 1990, the Government endorsed various recommendations from the consultancy, including :

- (a) the continuation of the moratorium on the designation of new FCZs; and

- (b) stringent restrictions on the grant of new licences or raft area extensions in existing zones.

Since then, only one new FCZ has been designated to accommodate mariculturists from a FCZ degazetted to make way for a public works project; extension of zone areas has been permitted in six FCZs solely for the purpose of allowing reduction of raft density; and no new fish culture licence has been issued.

## **DEVELOPMENTS SINCE 1990**

6. In the past 20 years, there have been changes in the operational mode and business environment of local fish culture activities, which help reduce the pollutants released in FCZs and improve the marine environment in their vicinity. Some pertinent developments are set out in the ensuing paragraphs.

### Reduction in raft area

7. The environment has improved in most FCZs as a result of drop-outs, cancellation of licences, and management measures which encourage the relocation of fish culture rafts from overcrowded FCZs to thinly populated zones. As at May 2012, there were 1 012 licensees operating in 26 FCZs, relative to 1 792 licensees in 28 zones in June 1989 (i.e. a 44% reduction in the number of licensees). During the period, the total licensed raft area has also been reduced from 50 ha to 29 ha (i.e. a 42% reduction). Annex A gives further information about the licensed raft area of the 26 FCZs. A map showing the locations of the FCZs is at Annex B.

### Improvement in feeding regime

8. Minced trash fish was once the commonest fish feed used by local fish farmers. This is considered a major source of pollution from mariculture activities. Under the continuous efforts of AFCD, minced trash fish is now seldom used for grow-out stage. Instead, whole trash fish and pellet feed are now used for larger fish, resulting in a significant reduction in pollution loading from mariculture due to less leaching and feed wastage. The surge in the price of trash fish has also provided an incentive for fish

farmers to minimise feed wastage by controlling ration size and frequency of feeding. We anticipate the usage of pellet feed for grow-out stage will further increase in the coming years due to the continuous increase in the price of trash fish.

#### Refuse / fish carcass collection and disposal

9. Domestic refuse from fish farms is now minimal as dwellings on raft are forbidden. Clean-up campaigns, undertaken jointly by District Offices, Marine Department and mariculturist associations, have also been successful in reducing refuse. Fish farmers are now more aware of the importance of proper disposal of fish carcasses. Recognising that fish carcasses are the major source of fish disease vectors, most fish farmers now dispose of fish carcasses on land in refuse collection points after applying disinfectants. An interdepartmental procedure on the disposal of fish carcasses after massive fish kills is in place to assist fish farmers to dispose of fish carcasses after such incidents.

#### Enhanced law enforcement

10. After a series of intensive enforcement against domestic dwellings on rafts between 1989 and 1993, and as a result of the continuous / regular patrol and monitoring of FCZs by AFCD since then, illegal dwellings are now virtually nonexistent. AFCD has been maintaining vigilance in curbing resurgence of such irregularities on fish rafts.

#### Reduction in stocking density

11. As a good aquaculture practice, AFCD encourages fish farmers to adopt an optimal stocking density. An optimal stocking density not only minimises possible impact on the environment, it also reduces the risks associated with fish diseases due to overcrowding. The average stocking density of marine fish farms in 2010 was 6 kg per square metre. Not only is this much lower than the figure (of 18 kg per square metre) prevailing in 1989, it is in compliance with the recommended stocking density of 10 kg per square metre which stemmed from a consultancy study commissioned by the Environmental Protection Department in 1990<sup>Note 1</sup>.

---

Note 1: Assessment of the Environmental Impact of Marine Fish Culture in Hong Kong. Ove Arup and Partners (1990).

## Biofilters

12. To further enhance the environmental management of FCZs, specially designed artificial reefs known as biofilters have been deployed at some FCZs. Many animals growing on biofilters are filter feeders feeding on micro-organisms in water. They clean water by removing nutrients and suspended particles through its filter feeding activities. The benefits of biofilters have been confirmed by local researchers. Their research data reveal that benthic community composition at biofilter deployment sites is more diverse than control sites at FCZs and is similar to control sites without fish farming activities <sup>Note 2</sup>. These indicate that biofilters can be used to effectively mitigate the possible impact of marine fish culture activities on the marine environment. Furthermore, fish and shellfish, attracted to aggregate and propagate around biofilters, feed on the feed remains and fish excreta from fish culture activities. This in turn enhances fisheries resources in the zones by transforming potential pollution into potential fisheries production.

13. At present, 34 units of biofilters have been deployed at the Lo Tik Wan, Kau Sai and Sham Wan FCZs. AFCD has recently commissioned a study to improve the design of biofilters with a view to deploying some at zones with shallower water. The department will also continue to explore the opportunities for deploying more biofilters at suitable FCZs as an added environmental management measure.

## Reduction in pollution loading

14. Partly as a result of the developments mentioned in paragraphs 7 to 13 above, there has been a significant reduction in nitrogen loading from mariculture activities into the local waters in the last two decades. Nitrogen loading from mariculture in Hong Kong has dropped from an estimated 2 163 kg per day in 1990 <sup>Note 1</sup> to 246.6 kg per day in 2011 <sup>Note 1</sup>.

---

Note 2: Final Report on the Provision of Contract Research to Study the Effect of Biofilter Deployment on the Water Quality, Sediment and Benthic Community at Sham Wan Fish Culture Zone. City University of Hong Kong (2009).

## **WATERMAN**

15. The University of Hong Kong, with the assistance of AFCD, has recently developed a computer database / modelling system on the water environment of Hong Kong, named WATERMAN. Amongst its four major components, the fisheries management system provides objective and scientific assessments on the environmental acceptability of existing and potential FCZs, which in turn allow us to determine the carrying capacity of these zones. Carrying capacity refers to the maximum allowable fish stocking density for the sustainable and environmentally acceptable fish farming activities. It is governed by factors such as tidal flushing rate of the site, organic loading from fish farms, and the statutory / indicative water quality objectives applicable to the local waters.

16. WATERMAN adopts a very conservative approach when calculating the carrying capacity of existing FCZs. It has included all the environmental fluctuations captured in the past 10 years from field observations. More importantly, a safety margin equivalent to 95 to 99 percentile of past field data has been applied to ensure that it has taken into account extreme weather, hydrological and environmental scenarios, including slack tides, seasonal stratification and algal blooms. It is a very useful tool for assessing the environmental sustainability and the carrying capacity of FCZs. Initial assessments based on WATERMAN reveal that some FCZs in Hong Kong may have the capacity of holding additional fish stock without compromising the marine environment. In other words, we are probably under-utilising the potential of our FCZs, and there may be room for increasing the total stocking volume for sustainable development of the marine fish culture in Hong Kong.

## **WAY FORWARD**

17. In moving forward, we will take into account any comments that Members may have on this subject, the findings of WATERMAN and other relevant factors. We are guided by the principle that any proposed measures should satisfy the prevailing test of environmental acceptability. Our plan is to consult relevant bureaux / departments, the trade and relevant stakeholders in the near future on whether the moratorium on the issue of new fish culture licences in FCZs with surplus carrying capacity remains

appropriate in present day circumstances, including the possibility of launching a trial scheme that might serve as the basis for assessing the merits of any proposed changes.

### **ADVICE SOUGHT**

18. Members are invited to note and advise on the contents of this paper.


**Food and Health Bureau  
Agriculture, Fisheries and Conservation Department  
June 2012**

**Annex A                      Licensing details of the 26 designated fish culture zones**

Fish Culture Zone	Zone area (sq.m)	Historical maximum licensed area (sq.m)	Current licensed area (as at May 2012) (sq.m)	Percentage of reduction of licensed area
Ap Chau	4,200	1,639	453	72%
Cheung Sha Wan	214,200	25,942	16,139	38%
Kai Lung Wan	27,045	7,008	5,820	17%
Kat O	32,400	11,968	4,172	65%
Kau Lau Wan	11,200	4,320	1,265	71%
Kau Sai	46,200	14,162	13,057	8%
Leung Shuen Wan	17,300	8,173	6,541	20%
Lo Fu Wat	5,400	4,062	1,578	61%
Lo Tik Wan	109,200	32,539	23,225	29%
Ma Nam Wat	40,100	34,807	5,009	86%
Ma Wan	46,300	14,704	14,554	1%
O Pui Tong	105,600	49,764	6,684	87%
Po Toi	3,000	640	272	58%
Po Toi O	38,200	9,688	4,330	55%
Sai Lau Kong	7,200	2,605	327	87%
Sha Tau Kok	180,000	20,312	17,272	15%
Sham Wan	180,600	29,764	16,800	44%
Sok Kwu Wan	141,200	31,803	26,796	16%
Tai Tau Chau	62,800	19,670	12,540	36%
Tap Mun	72,400	23,686	11,548	51%
Tiu Cham Wan	17,000	13,900	1,355	90%
Tung Lung Chau	80,000	23,929	12,700	47%
Wong Wan	22,500	7,892	1,286	84%
Yim Tin Tsai	136,300	32,414	23,950	26%
Yim Tin Tsai (East)	149,500	37,134	21,294	43%
Yung Shue Au	342,000	64,458	43,103	33%
Total:	2,091,845	526,983	292,070	*****



# Fish Culture Zones in Hong Kong 香港魚類養殖區

 Fish Culture Zone 魚類養殖區

- 1 Sha Tau Kok 沙頭角
- 2 Ap Chau 鴨洲
- 3 Kat O 吉澳
- 4 O Pui Tong 澳背塘
- 5 Sai Lau Kong 西流江
- 6 Wong Wan 往灣
- 7 Tap Mun 塔門
- 8 Kau Lau Wan 較流灣
- 9 Sham Wan 深灣
- 10 Lo Fu Wat 老虎笏
- 11 Yung Shue Au 榕樹凹
- 12 Leung Shuen Wan 糧船灣
- 13 Tiu Cham Wan 吊杉灣
- 14 Tai Tau Chau 大頭洲
- 15 Kai Lung Wan 雞籠灣
- 16 Kau Sai 滘西
- 17 Ma Nam Wat 麻南笏
- 18 Po Toi O 布袋澳
- 20 Po Toi 蒲台
- 21 Sok Kwu Wan 索罟灣
- 22 Lo Tik Wan 蘆荻灣
- 24 Ma Wan 馬灣
- 25 Yim Tin Tsai 鹽田仔
- 26 Cheung Sha Wan 長沙灣
- 28 Yim Tin Tsai (East) 鹽田仔(東)
- 29 Tung Lung Chau 東龍洲

