

檢討與制定海水水質指標 Review and Development of Marine Water Quality Objectives

第一階段公眾諮詢文件 First Stage Public Engagement

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概要 Outline

1. 以海水水質指標作為管理海水水質的工具
Water quality objectives (WQOs) as a management tool
2. 本港海洋水域的特點
Characteristics of local marine waters
3. 實益用途和敏感受體
Beneficial uses and sensitive receivers
4. 外國制定海水水質指標的做法
International practices in deriving WQOs
5. 建議檢討水質指標方法
Proposed review approaches
6. 徵求你的意見
Advice sought

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以海水水質指標作為管理海水水質的工具

WQOs as a management tool

- 避免過度保護或保護不足
Avoid over-protection and under-protection
- 維持本港海洋環境的擬用用途
Sustain the intended uses of our marine environment
- 為敏感受體提供足夠的保護
Offer adequate protection to sensitive receivers
- 提供環境評估和污染控制的科學及法律依據
Form the scientific and legal basis for environmental impact assessment and pollution control

慣用模式 General Approaches

1. 無損害功能模式 **The Non-Degradation Approach:**

- 最嚴格的模式，禁止所有污染物的排放
Much more stringent and may prevent any discharges
- 通常只應用於具有高生態環境價值的水域
Generally restricted to waters of high environmental value

慣用模式 General Approaches

2. 功能保護模式 The Use-Protection Approach:

- 最常用的模式 (加拿大、美國、歐洲、澳洲和中國)
Most common (Canada, USA and Europe, Australia and China)
- 強調水體的擬用用途
Emphasis on intended use
- 考慮個別水體的因素
Consider site-specific factors
- 應用於輕微至中度污染的生態系統
Apply to ecosystems that are at least “*slightly to moderately*”
disturbed
- 容許評估各管理辦法的成本效益，同時達到生態系統特定的管理目標
Allows the costs and benefits of various management options to
be evaluated while achieving specific ecosystem management
goals

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本港海洋水域的特點

Characterization of marine waters

1. 水文特徵 (例如水流、鹽度、營養物、葉綠素-a、溶解氧、混濁度、溫度、細菌含量等)
Hydrographic characteristics (e.g. current, salinity, nutrients, Chl. a, dissolved oxygen, turbidity, temperature, bacteria)
2. 生物特徵 (例如魚類、底棲動物、浮游植物等)
Biological characteristics (e.g. fish, bottom dwelling animals, phytoplankton)
3. 污染源及污染程度 (例如生活和工業污水、金屬、毒性有機物)
Source and level of contamination (e.g. domestic and industrial discharges, metals, toxic organics)



隱蔽的河口環境

Estuarine and sheltered

受珠江影響

含豐富營養物、混濁度高

鹽度低

季節性及空間性的變化較大(尤其在夏季)

開闊的海洋環境

Oceanic and exposed

營養物含量低、混濁度低

鹽度高

季節性及空間性的變化較小

Influence from the Pearl River

High nutrient & turbidity

Low salinity

Large seasonal and spatial variations (especially in summer)

過渡區

Transitional

受人類活動影響較大

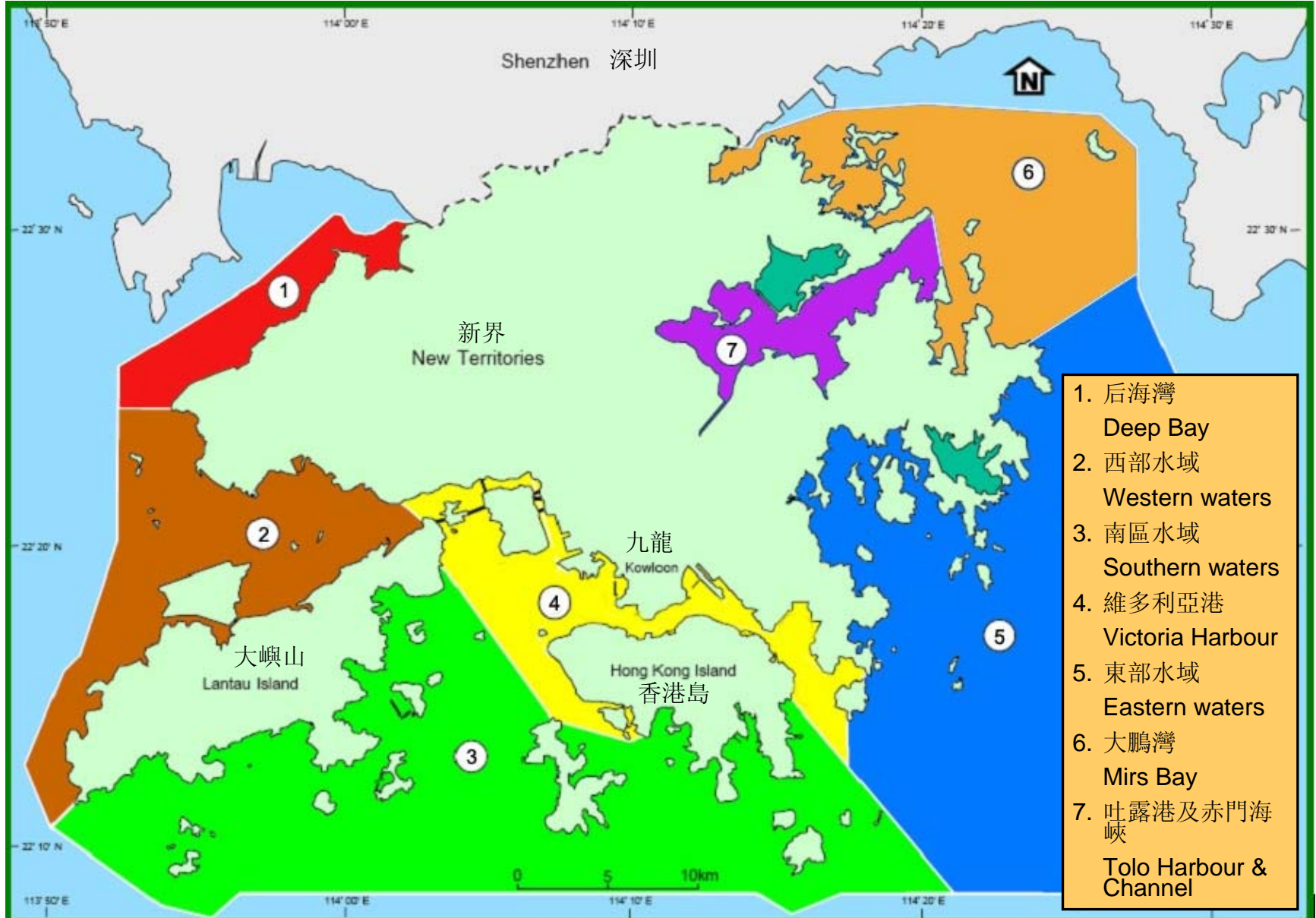
Influence from human activities

Low nutrient & turbidity

High salinity

Small seasonal and spatial variations

七個主要水體 Seven Major Water Bodies



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實益用途 Beneficial Uses

1. 海岸保護區、海岸公園、具特殊科學價值的地點、保育區/物種、瀕危物種
2. 供人類食用的魚類和海產養殖，產卵和繁殖地
3. 游泳、潛水和其他直接接觸康樂活動
4. 划船、釣魚和其他次級接觸康樂活動
5. 維持生態系統的完整性
6. 觀賞和一般康樂用途
7. 工業和沖廁供水
8. 航海與航運
9. 遊艇停泊處和避風塘
10. 污水排放和稀釋，卸泥

1. Marine reserves, marine parks, SSSIs, conservation sites/species, endangered species
2. Production of fish and seafood for human consumption, spawning & nursery grounds
3. Bathing, diving and other primary contact recreation
4. Boating, fishing and other secondary contact recreation
5. Maintenance of ecosystem integrity
6. Aesthetic enjoyment and general amenity
7. Industrial and flushing water supply
8. Navigation and shipping
9. Marinas and typhoon shelters
10. Reception and dilution of effluents, spoil dumping

高 High

General WQOs requirements
一般海水水質指標的要求

低 Low

敏感受體 Sensitive Receivers



珊瑚 Corals



海洋哺乳類動物 Marine mammals



海草 Seagrass



紅樹林
Mangroves

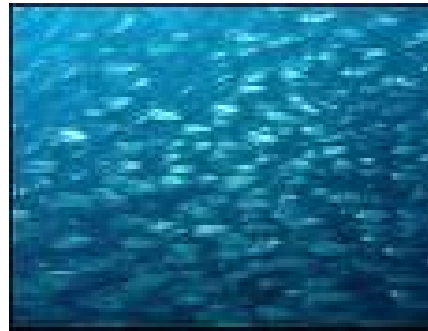
敏感受體 Sensitive Receivers



海產養殖
Mariculture



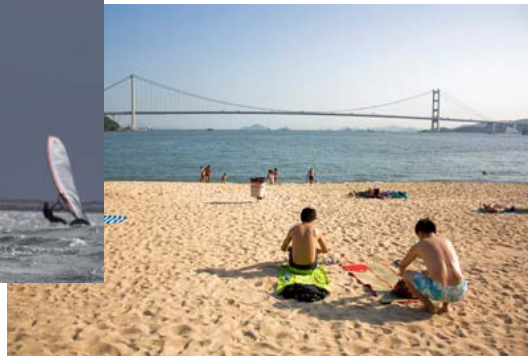
養蠔區
Oyster ground



產卵和繁殖地
Spawning and
Nursery grounds



海岸公園和海岸保護區
Marine parks and
reserves



游泳和次級接觸康樂活動
Bathing and secondary contact



具特殊科學價值的
地點
Sites of Special
Scientific Interest

不同實益用途的海水水質指標

Different WQOs for different Beneficial Uses



睡房
Bedroom



儲物房
Store room



廚房 Kitchen

支持不同海洋生態系統和
各類實益用途之可持續性
所需的海水水質要求可能非常不同

Water quality required to support the
sustainability of different marine
ecosystems and different types of
beneficial uses may be very different

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自然參數的海水水質指標

WQOs for Natural Parameters

- 自然參數包括溫度、鹽度、酸鹼值、混濁度、懸浮固體、透光度、溶解氧
Natural parameters include temperature, salinity, pH, turbidity, suspended solids, light penetration, dissolved oxygen
- 根據當地「參照水域」的基線數據，制定個別水域的百分位數 (例如第99、第95、第90和第80百分位數)
Generate site specific percentile values (e.g. 99th, 95th, 90th, 80th percentiles) based on baseline data at corresponding local reference sites)
- 澳洲、英國、歐盟和美國
Australia, UK, EU, US

有毒物質及化學物的海水水質指標

WQOs for Toxicants & Chemicals

完全保護方法 Full Protection Approach:

- 所有時間保護所有物種
Protect 100% of the species 100% of the time
- 根據最敏感物種的長期無毒害濃度及加上應用因數而推算最高濃度
Derive maximum values based on long-term No Observable Effect Concentration + Application Factor for the most sensitive species
- 加拿大
Canada

有毒物質及化學物的海水水質指標

WQOs for Toxicants & Chemicals

評估系數方法 **Assessment Factor Approach:**

- 從「**預估無毒害濃度**」加上「**應用因數**」以推斷數值
Extrapolate from **Predicted No Effect Concentration**
using Application Factors
- **歐盟、德國、英國**
EU, Germany, UK

有毒物質及化學物的海水水質指標

WQOs for Toxicants & Chemicals

風險評估方法 **Risk Assessment Approach:**

- 透過概率分佈來推算保護99%、95%、90%和80%物種的數值
Use probability distribution to determine values for protection of 99%, 95%, 90% and 80% of species
- 澳洲、美國
Australia, US

營養物的海水水質指標

WQOs for Nutrients

- 主要的目的是防止藻華/紅潮
Primary goal is to prevent algal blooms
- 大多數國家 (例如澳洲、歐盟、美國) 一般使用「參照條件」方法
The “Reference condition” approach is generally used by most countries (e.g. Australia, EU, US)
- 由參照區收集的大型數據集 (> 2年) 推算一個適當的百分位數 (通常是第80和/或第20百分位數)
An appropriate percentile (usually the 80th and/or 20th percentiles) is derived from a large data set (> 2 yr) collected from reference sites

泳灘的海水水質指標

WQOs for Bathing Waters

- 世界衛生組織 (WHO) 指引
World Health Organization (WHO) guidelines :
 - 建基於證據的審查和專家判斷
Based on review of evidence and expert judgements
 - 定量性海水水質指標 (大腸桿菌及/或腸道鏈球菌)
Numerical WQOs (*E. coli* and/or Enterococci)
- 多數國家均採用世界衛生組織的指引。某些國家以當地的流行病學資料作為補充
Many countries follow the WHO guidelines. Some further supplement with local epidemiological data

生物性標準的海水水質指標

WQOs for Biological Criteria

美國 USA

- 收集每種水體的基線生物狀態 (類型、存在、豐度、動物區系和植物區系的構成和變化)
Collect baseline biological conditions (type, presence, abundance, composition and diversity of faunal and floral groups) of each type of water body
- 將某水域的生物狀態與同類水體的基線狀態作比較
Compare the site specific biological conditions with the baseline condition for the same type of water body

生物性標準的海水水質指標

WQOs for Biological Criteria

歐盟 EU

根據物種的構成、豐度及生物量界定水生生態系統的結構和作用(高、良好和中等)

Define the structure and function of aquatic ecosystems (high, good and moderate) based on composition, abundance and biomass

海產養殖的海水水質指標

WQO for Mariculture

- 大多數海產養殖的海水水質指標是保護魚類的生長和繁殖，而並非保護食用者的健康
Mainly for protecting growth and reproduction of fish rather than protecting health of consumers
- 有些水質指標希望令水體的某些污染物/病原體水平不會使海產超過既定的食物標準 (例如美國、澳洲)
A few derive levels of contaminants / pathogens in water that would prevent mariculture products from meeting with established food standards (e.g. USA, Australia)

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建議檢討水質指標方法

Proposed Review Approaches

- 在高生態價值的水體使用「無損害功能模式」
Non-Degradation Approach to waters of high ecological value
- 在具有不同實益用途的水體使用「功能保護模式」
Use-Protection Approach for the various Beneficial Uses
- 使用「風險評估方法」保護至少80%物種和生態系統的完整性
Risk Assessment Approach to protect at least 80% of species and ecosystem integrity

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徵求你的意見 Advice Sought

1. 海水水質指標是否應以「實益用途」為主導？
Should WQOs be driven by “Beneficial Uses”?
2. 你對本港海域的實益用途和敏感受體有何意見？你認為在檢討中，還有其他實益用途和敏感受體需要被考慮嗎？
What are your views on the beneficial uses and sensitive receivers in Hong Kong waters? Any other beneficial uses and sensitive receivers that should be considered?
3. 就保護水域的各種實益用途和敏感受體而言，你認為保護的**優先次序**和**程度**應如何？
What are your views on the **priority** and **level** of protection for various beneficial uses and sensitive receivers?

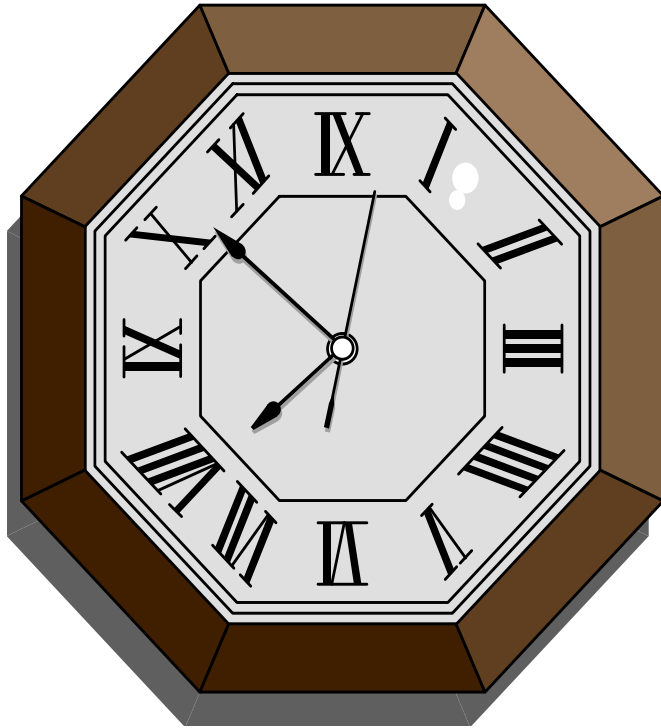
徵求你的意見 Advice Sought

4. 除實益用途外，我們應否以保護生態系統的完整性作為海水水質指標的最低要求？

Should we protect ecosystem integrity as the minimal requirement regardless of BUs?

5. 你對建議的水質指標檢討方法有何意見？

What are your views on the proposed review approaches?



謝謝

Thank you