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***For information by circulation***

# Beach, Marine and River Water Quality of Hong Kong in 2023

## PURPOSE

The Environmental Protection Department (EPD) conducts long-term routine monitoring of the water quality of our gazetted beaches, marine and river waters, and publishes relevant annual reports. This paper is to keep members informed of the key findings of the 2023 beach, marine and river water quality reports released in April and October 2024 by the EPD (https://www.epd.gov.hk).

## KEY HIGHLIGHTS

2. Since the full commissioning of the Harbour Area Treatment Scheme (HATS), the water quality of Victoria Harbour has substantially improved. The overall compliance rate of Water Quality Objectives (WQOs) for Victoria Harbour has reached over 90% in recent years. The annual Cross Harbour Race, which was suspended for years due to poor water quality, was resumed in 2011 and has returned to its traditional route in the central area of Victoria Harbour since 2017. With further measures taken by the Government to clear several major pollution sources along the coastal areas of Tsim Sha Tsui and Hung Hom, many swimmers who participated in the 2023 Cross Harbour Race expressed their great enjoyment after the race with credits going to the significantly improved harbour water quality.

3. To further ameliorate the odour problems and environmental conditions at seafront on both sides of Victoria Harbour, the Chief Executive has announced in the 2022 Policy Address that the Government will regularly monitor the pollution load in the vicinity of stormwater drain outlets and rectify misconnections of sewer pipes. The target is to reduce the pollution load at identified outfalls along Victoria

Harbour, including Tsuen Wan, Sham Shui Po and Kowloon City by half before end-2024. Through the Government's untiring efforts to extensively survey and rectify sewer misconnections, the overall pollution load has been reduced by about 80% at the identified outfalls, resulting in a significant improvement in the near-shore water quality and odour conditions particularly at some hot spots such as Tsuen Wan Bay, To Kwa Wan Typhoon Shelter and Yau Ma Tei Typhoon Shelter.

## BACKGROUND

### *Beach Water Quality*

4. The EPD conducts weekly water quality monitoring at all 42 gazetted beaches to assess their water quality during bathing season from March to October. Beach water quality is assessed through a ranking system, under which the beaches are rated as "Good", "Fair", "Poor" or "Very Poor" according to the level of *E. coli* bacteria, corresponding to swimming-associated health risks.

5. Beaches with annual geometric mean of *E. coli* levels at or below 24 per 100 mL are ranked as "Good", between 25 and 180 per 100 mL as "Fair", between 181 and 610 per 100 mL as "Poor", and above 610 per 100 mL as "Very Poor". Beaches receiving a "Good" or "Fair" ranking meet the bacteriological WQO for bathing waters. For beaches ranked as "Very Poor", their *E. coli* levels correspond to a swimming-associated illness rate of more than 1.5%, and they are generally considered not suitable for swimming.

### *Marine Water Quality*

6. The EPD monitors the marine water quality of Hong Kong at 76 monitoring stations in open waters of ten Water Control Zones (WCZs) on a monthly basis. Marine water quality is assessed through the overall marine WQO compliance rate which is calculated based on the overall average of the compliance rates for all monitoring stations of the four key parameters, namely dissolved oxygen (DO), total inorganic nitrogen (TIN), unionised ammonia nitrogen ($NH_3$-N) and *E. coli* bacteria.

### *River Water Quality*

7. The EPD's river monitoring programme currently covers 82 monitoring

stations at 30 watercourses. Five key parameters, including pH, suspended solids (SS), DO, 5-day biochemical oxygen demand ($BOD_5$) and chemical oxygen demand (COD), are used to assess compliance with the WQOs applicable for individual monitoring stations in various WCZs. The EPD has been using the Water Quality Index (WQI) to indicate the general state of health of a river, which is rated as "Excellent", "Good", "Fair", "Bad" and "Very Bad" according to the levels of DO, $BOD_5$ and ammonia nitrogen ($NH_4$-N).

## LATEST DEVELOPMENT

### *Beach Water Quality*

8. In 2023, all 42 gazetted beaches continued to fully comply with the bacteriological WQO for bathing waters. Among them 26 beaches (or 62%) were ranked as "Good" and 16 beaches (or 38%) were ranked as "Fair" (see **Figures 1** and **2** in **Annex**). No beaches were ranked as "Poor" or "Very Poor". The record of full compliance with the bacteriological WQO has been steadily maintained for 14 consecutive years since 2010.

9. Despite the satisfactory beach water quality in general, there was a slight decrease in the number of beaches ranked as "Good" in 2023 as compared with that in 2022 (a slight decline from 27 to 26 as shown in **Figure 3** in **Annex**). The change was primarily attributed to the extreme weather in September with an unusually high monthly rainfall record of 1 067 mm[1]. Consecutive heavy rainstorms have washed off pollutants on land to the sea, causing rapid elevation of *E. coli* levels in the bathing water. Nevertheless, these beach water quality fluctuations were generally transient and still within the normal range of fluctuations.

10. Over the past three decades, there has been progressive improvement in beach water quality with an increase in the bacteriological WQO compliance rate from 74% in 1986 to a steady 100% since 2010 (see **Figure 3** in **Annex**). The achievement is attributable to the Government's continuous efforts and extensive

[1] Mainly attributing to the heavy rain associated with Typhoon Saola and troughs of low pressure in the first half of the month, the Hong Kong Observatory recorded an all-time high September rainfall of 1 067.1 millimetres, more than three times of the September normal of 321.4 millimetres, and easily breaking the previous record of 844.2 millimetres set way back in September 1952. (Source: Hong Kong Observatory).

resource dedicated to implement various pollution control and environmental improvement measures, including the enforcement of the Water Pollution Control Ordinance (Cap. 358) (WPCO) and Livestock Waste Control Scheme (LWCS) under the Waste Disposal Ordinance (Cap. 354), extension of the sewerage network to the beach hinterlands, implementation of the HATS, and upgrade of existing sewage treatment facilities.

11. To enhance our services to the public, we successfully launched the Beach Water Quality Forecast System on 15 August 2023 to provide daily water quality forecasts for all gazetted beaches that are open for swimming in Hong Kong. Making use of a sophisticated computer model, the forecast system supplements the existing beach water quality monitoring programme by providing forecasts on short-term beach water quality fluctuations arising from changes in hydro-meteorological conditions (e.g. heavy rainstorm). Members of the public can obtain the latest daily water quality forecasts and beach grading information for all beaches open for swimming through the webpage of EPD's Environmental Protection Interactive Centre at www.epd.gov.hk/en/BWQForecast.

***Marine Water Quality***

12. In 2023, our marine waters attained an overall WQO compliance rate of 89%, sustaining the long-term general improving trend observed in the past decade when the compliance rate was only close to 80% in 2014 (see **Figure 4** in **Annex**). Among the four key WQO parameters, both $NH_3$-N and *E. coli* bacteria maintained 100% compliance for all applicable WCZs. The compliance rate for DO was 92%, while that for TIN was 70% which was largely attributed to the influence of the high background levels in the Pearl River Estuary.

13. The water quality of Victoria Harbour continued to show noticeable improvements along with the staged implementation of the HATS (see **Figure 5** in **Annex**). The parameters that show significant improvements in 2023 as compared with those levels before the introduction of the HATS (1997-2001) include *E. coli* bacteria (reduced by 90%), $NH_3$-N (reduced by 60%) and TIN (reduced by 24%).

14. Among the ten WCZs, six WCZs, namely the Mirs Bay WCZ, Port Shelter WCZ, Eastern Buffer WCZ, Junk Bay WCZ, Western Buffer WCZ and Victoria Harbour WCZ, fully achieved the WQOs in 2023. They are closely followed by the North Western WCZ which achieved 89% compliance. The WQO compliance rates for the remaining three WCZs, namely Deep Bay WCZ (53%), Tolo Harbour

and Channel WCZ (71%) and Southern WCZ (73%), were generally within their normal fluctuations as observed in the past few years.

15. The WQO compliance rates for Tolo Harbour and Channel WCZ and Southern WCZ were mainly ascribed to the natural phenomenon of lower DO levels due to water column stratification in summer, and high background TIN levels under the influence of seasonal estuarine discharges, respectively. With the measures taken progressively by the governments of Hong Kong and Shenzhen, there has been a significant improvement in the water quality of Deep Bay. The overall WQO compliance rate for Deep Bay WCZ had been improved from an average of 47% in 2009-2018 to 53% in 2023. The untiring efforts by both governments to pursue pollution control measures, including the extension and improvement of sewerage infrastructures, would effectively help reduce pollution loads entering these waters and sustain the noticeable improvement in water quality.

16. In 2023, there were 13 red tide incidents reported in Hong Kong waters, as compared to an average of 10 incidents in the past five years (2018-2022) (see **Figure 6** in **Annex**). These natural incidents were caused by nine phytoplankton species, most of which are not harmful to marine lives. No red tide related fish kill in Hong Kong waters was recorded in 2023.

***River Water Quality***

17. The overall water quality of Hong Kong's rivers continued to perform satisfactorily in 2023. In terms of key WQOs, the overall compliance rate in 2023 was 87%, which has registered a significant improvement over that of 48% back in 1987 (see **Figure 7** in **Annex**).

18. With regard to the WQI which indicates the general state of health of the watercourses, 79% of the river monitoring stations were graded as "Excellent" or "Good" in 2023, as compared with only 26% in 1987. These more pristine watercourses are mainly located in Lantau Island, Eastern and Southwestern New Territories and Kowloon.

19. The high WQO compliance rates and WQI gradings were the result of effective pollution control measures taken under the WPCO and the LWCS, as well as the progressive extension of sewerage network to more villages under the Sewerage Master Plans, despite the fact that the population in the New Territories where most of the rivers lie has doubled in the last three decades.

20. The water quality of a few monitored rivers in the western part of the New Territories showed slower improvement trends as compared to other rivers in the New Territories. These rivers were adversely affected by runoff from unsewered village houses, expedient connections in old districts and illegal discharges from livestock farms. For example, Yuen Long Creek and Kam Tin River maintained the WQO compliance rate at about 50% with WQI grading of "Bad" for monitored stations. The Government will continue to step up law enforcement actions against illegal discharges in these areas, and enhance the sewerage infrastructure by upgrading sewage treatment facilities, extending sewerage network, installing dry weather flow interceptors at appropriate locations, etc. for seeking further improvement in the river water quality.

**WAY FORWARD**

21. Our environmental water quality continued to perform well in 2023 with an overall WQO compliance rate for gazetted beaches, marine and river waters at 100%, 89% and 87% respectively. At present, all urban areas across Hong Kong have been provided with public sewerage systems, and over 94% of the overall population in the urban and rural areas has access to public sewers, which is comparable to the coverage rate of the countries and regions at top rankings. In districts with odour nuisance at seafront, we have proactively investigated and traced the major pollution sources in the stormwater drainage systems and engaged government departments including the Drainage Services Department and Buildings Department to follow up on the rectification of sewer misconnections.

22. In the coming years, we will further strengthen our water quality management capability and focus on tackling pollution problems encountered in the nearshore waters of Victoria Harbour and pollution-prone rivers in the New Territories. Leveraging on the smart technology, we will keep up our efforts in identifying and rectifying sewer misconnections so as to maintain the improvement trend and enhance the environmental conditions of our harbourfront. We are confident that the water quality would fully meet the standards required for the National Games' competition events to be held in Hong Kong in 2025.

**Environmental Protection Department**
**December 2024**

**Annex**

**Figure 1 Annual ranking of gazetted beaches in 2023**

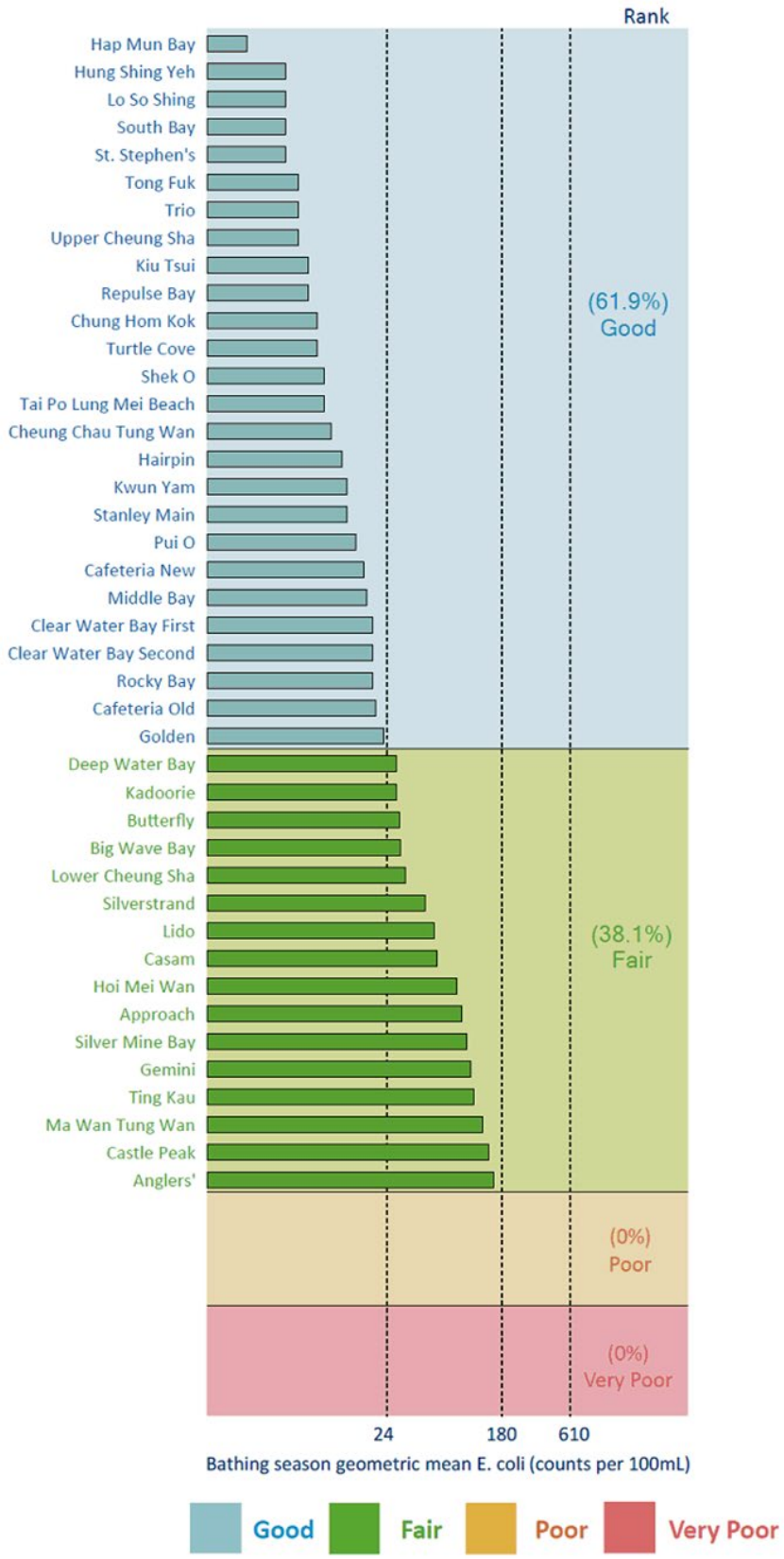
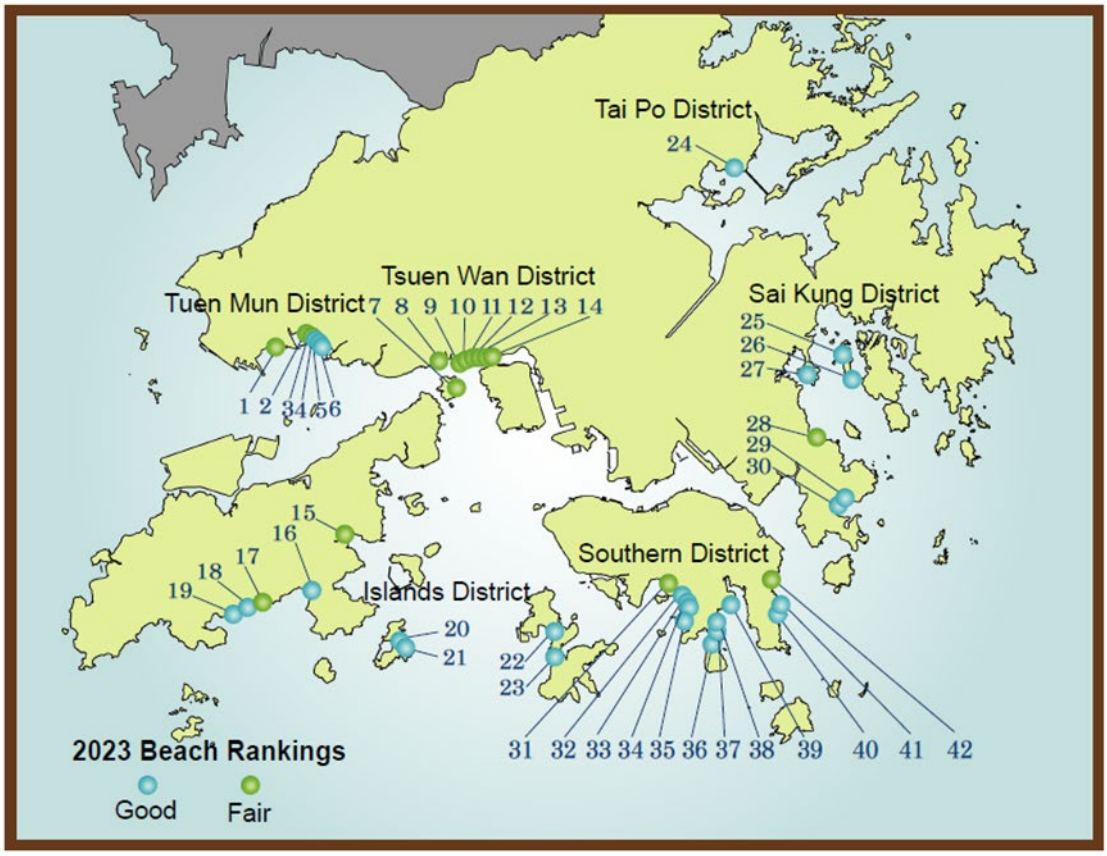


**Figure 2 Distribution of gazetted beaches and their annual ranking in 2023**




**Tuen Mun District**

1. Butterfly
2. Castle Peak
3. Kadoorie
4. Cafeteria Old
5. Cafeteria New
6. Golden

**Tsuen Wan District**

7. Ma Wan Tung Wan
8. Anglers' *
9. Gemini *
10. Hoi Mei Wan
11. Casam
12. Lido
13. Ting Kau
14. Approach

**Islands District**

15. Silver Mine Bay
16. Pui O
17. Lower Cheung Sha
18. Upper Cheung Sha
19. Tong Fuk
20. Cheung Chau Tung Wan
21. Kwun Yam
22. Hung Shing Yeh
23. Lo So Shing

**Tai Po District**

24. Tai Po Lung Mei

**Sai Kung District**

25. Kiu Tsui
26. Hap Mun Bay
27. Trio
28. Silverstrand
29. Clear Water Bay First
30. Clear Water Bay Second

**Southern District**

31. Deep Water Bay
32. Repulse Bay
33. Middle Bay
34. South Bay
35. Chung Hom Kok
36. St. Stephen's
37. Stanley Main
38. Hairpin *
39. Turtle Cove
40. Shek O
41. Rocky Bay *
42. Big Wave Bay

* Beaches not open for swimming (no lifeguard service provided by Leisure and Cultural Services Department)

**Figure 3 Annual ranking of gazetted beaches from 1986 to 2022**

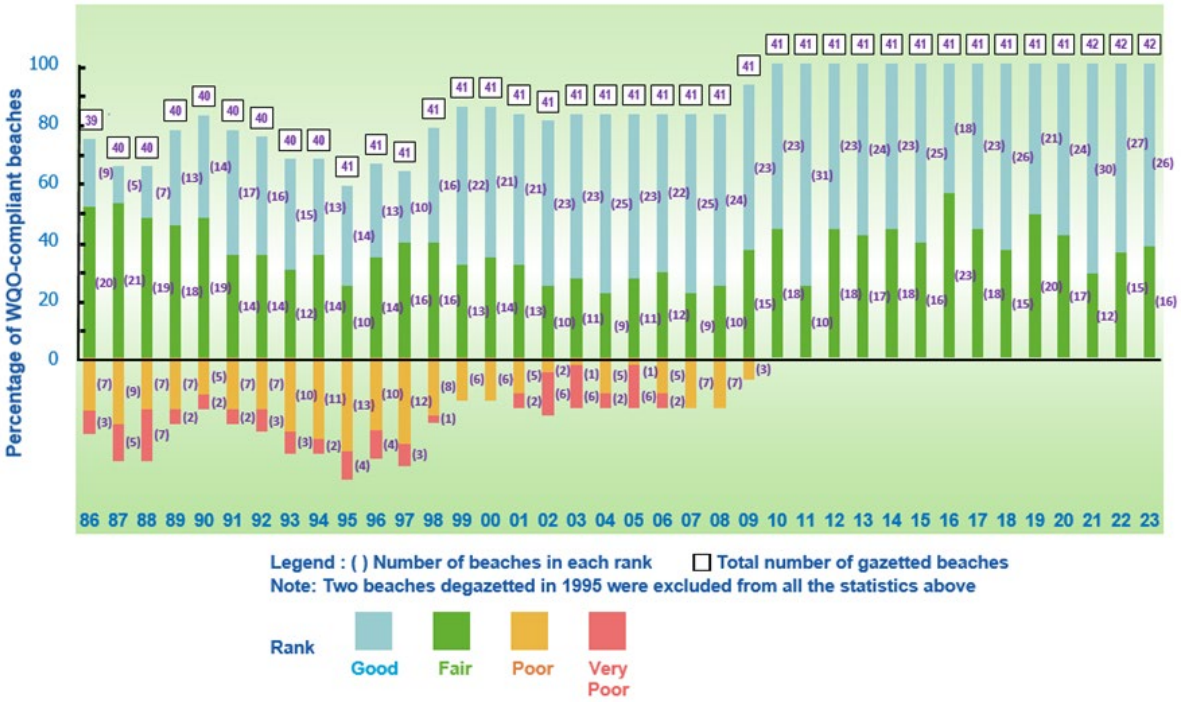



**Figure 4 Overall marine WQO compliance rates of Hong Kong, 1986-2023**

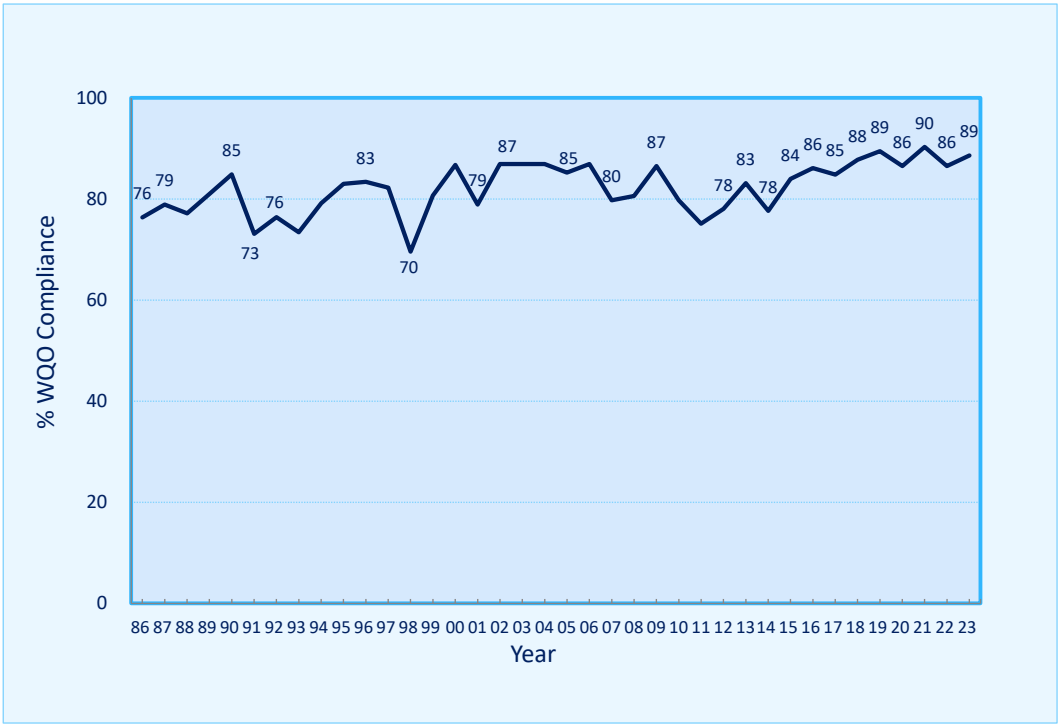


**Figure 5 Water quality improvement in Victoria Harbour since the implementation of Harbour Area Treatment Scheme (HATS)**

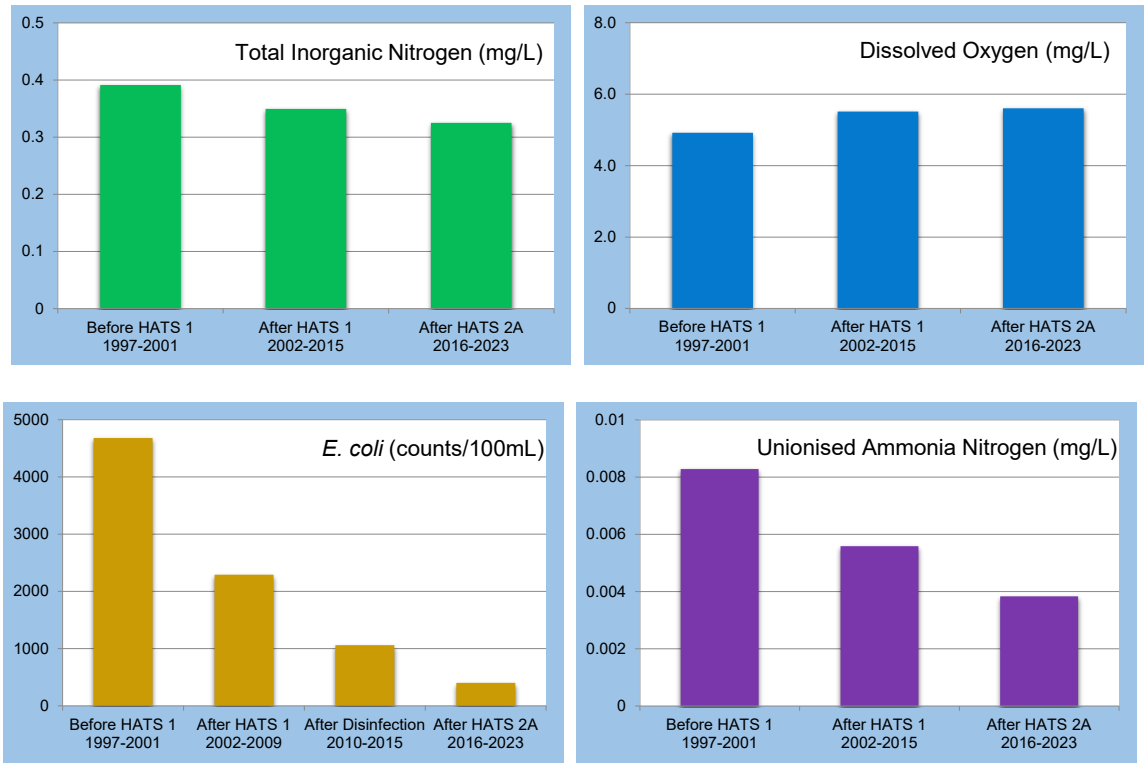



**Figure 6 Occurrence of red tides in Hong Kong waters, 2000-2023**

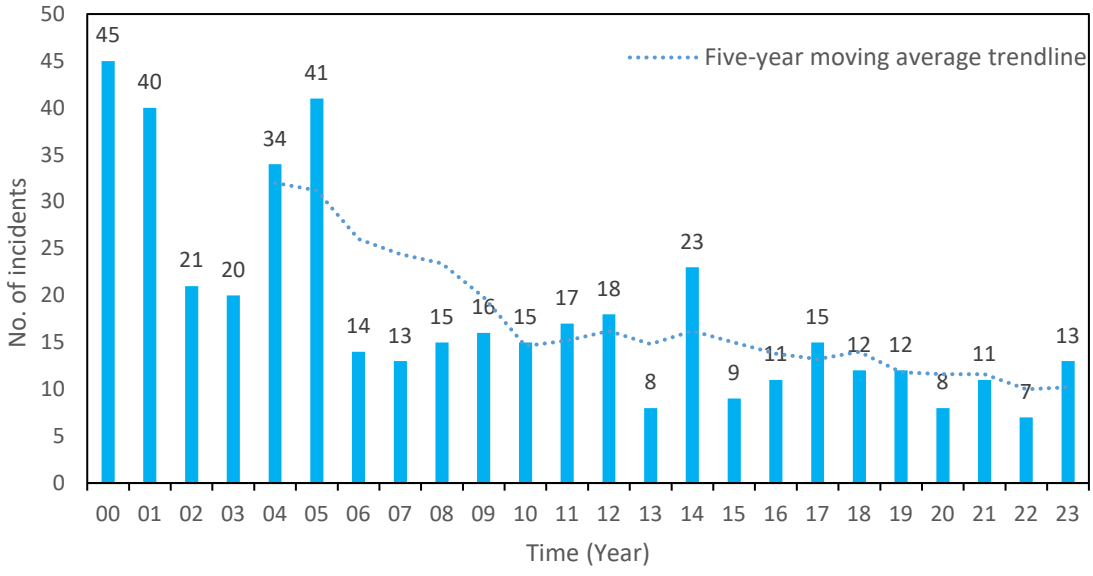


**Figure 7 Overall river WQO compliance rates of Hong Kong, 1987-2023**