

# world harbour project

Building resilient urban ports and harbours through globally integrated research and management

## The World Harbour Project

Many of the world's great cities such as New York, Rio de Janeiro and Shanghai are located on the coast, with working harbours that are part of the fundamental fabric of those communities.

The World Harbour Project (WHP) will tackle issues around the multiple uses of harbours by bringing together international institutions and agencies concerned with the increasing challenges they face.

The vision is to facilitate and link programs that have a focus on investigating and restoring ecosystem functioning and the development of management best-practices by means of four working groups – Water and Sediment Quality, Eco-Engineering, Conflict Resolution and Education.



### Working Group 1 (WG1): Water & Sediment Quality

As a result of residential and industrial development, harbour waters and sediments often become enriched with nutrients and are subject to sedimentation and elevated loads of pollutants such as particulate matter, heavy metals, metalloids and organic contaminants. Water quality is also often compromised by physical modifications and built infrastructure within harbours due to changes in hydrodynamics. WG1 currently has three streams to explore these complex issues:

#### a) Contaminants in global harbour sediments

Harbours in all parts of the globe have sediments contaminated with heavy metals and organic pollutants. Sources include: shipping activities (including anti-fouling paints, dry dock, loading and bunkering operations, and ship repair and building), industry (e.g. pyrogenic processes, spills and leaks), urbanisation (e.g. sewage outfall, urban run-off, stormwater inputs) and agricultural waste.



WG1 is investigating the distribution of contaminant enrichment in harbour sediments, the risk to benthic communities that these contaminants present and, where possible, the relationship between enrichment, risk and infaunal diversity. Data from Australia (Sydney, Darwin and Hobart), New

Zealand (Auckland), Hong Kong, Italy (Ravenna) and Spain (Vigo) will be mapped using existing data sets in ArcGIS.

#### b) Hydrodynamics, water quality, and sediment transport issues in ports and harbours

Increasingly, ports in Asia are growing and developing in their capacity and associated population pressures. Invariably these ports and harbours are challenged by water quality issues, such as sedimentation, eutrophication, hypoxia

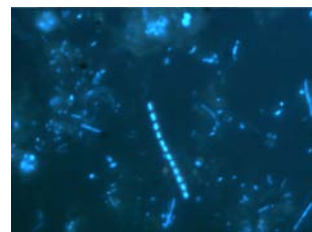


and changes to the circulation as a result of land reclamation and industrialisation. A group of physical

oceanographers, from a number of partner institutions, is focusing on the hydrodynamics, water quality, and sediment transport issues in ports and harbours (and associated shelf seas) in the Asia-Pacific region (at present Sydney, Darwin, Auckland, Hong Kong, Singapore, Shanghai and Qingdao).

#### c) Key microbial species/functional groups within harbour sediments

The structural and functional diversity of microbial communities are intricately linked with the presence and fate of pollutants and are therefore useful as bioindicators of ecosystem function.



Starting in 2016, WG1 aims to build a profile of microbial communities within sediments and the water column in multi-use harbours that are subject to multiple anthropogenic

stressors. The function and structure of these highly diverse microbial communities will be characterised using modern environmental sequencing – 'omics - techniques.

To learn more please visit:

[www.worldharbourproject.org](http://www.worldharbourproject.org)



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