



# Coastal Pollution Toolkit

Dr. Amelia Wenger

Water Pollution Program Lead, Wildlife Conservation  
Society

Senior Research Fellow, University of Queensland

**ASU** Arizona State University



 UK International Development  
Partnership | Progress | Prosperity





**A Guide for Pollution  
Assessment & Monitoring  
in Coastal Ecosystems**

Coastal Pollution Toolkit  
**Part 1**

**Factsheets on  
Approaches to Assessing &  
Monitoring Coastal Pollution**

Coastal Pollution Toolkit  
**Part 2**

**Factsheets on  
Methods for Collection of  
In-Situ Water Quality**

Coastal Pollution Toolkit  
**Part 3**



# 3. Getting started: initial assessment

The initial assessment can be broken down into three categories

## Who

Who are the key communities and organizations involved?

## What

What are the sources of water pollution, and are there any existing policies, legislation, or regulations in place to manage it?

## Where

Where are the pollution generating activities occurring, and where in the coastal and marine environment are pollutants ending up?

Partner, community, & stakeholder mapping should focus on identifying four main groups

- The people **Responsible for the pollution.**
- The people **Affected by pollution.**
- The people **Able to mandate and enforce change.**
- The people **Responsible for pollution management.**

Who

## The initial assessment can be quite short or more detailed, depending on information needs, and it can include one or a combination of the following components



### Desktop assessment – Mapping & collecting existing data

- Land-use and land cover mapping.
- Collation of existing data, such as government reports, scientific publications, research studies, etc.
- Wastewater and stormwater systems and infrastructure mapping.
- Regulatory, policy, and management assessment, and gap analysis.
- Partner, community, and other stakeholder identification.



### Physical inspection

- Examination of infrastructure, e.g., presence of leaking pipes.
- Observations of water and coastal areas for signs of pollution.
- Locating main sources of pollution.



### Formal and informal discussions with key informants & community members

- Are there concerns regarding pollution?
- Are there practices that could cause pollution?

**What & Where**



# 5. Deciding on your approach for data collection



**Direct, in-situ water quality measurements, observations, & samples**



**Ecological monitoring of bioindicators**



**Indigenous & local knowledge**



**Quantitative modeling**



**Biotic and abiotic sampling for further assessments**



**Remote sensing with satellite data**

# 5. Deciding on your approach for data collection

1.



**Information  
needs**

2.




**Trade-offs  
among different  
approaches**

3.



**Project  
logistics &  
constraints**



**Factsheets on  
Approaches to Assessing &  
Monitoring Coastal Pollution**

Coastal Pollution Toolkit  
**Part 2**





# 6. Collection of in-situ information

1.



A selection of the most appropriate parameters that could be measured to help answer your objectives/questions.

2.



The methods available to you based on your objectives, moderated by logistic constraints & available resources.



### Heavy metals

- Aluminum
- Arsenic
- Cadmium
- Chromium
- Copper
- Iron
- Mercury
- Nickel
- Lead
- Zinc



### Hydrocarbons

- Polycyclic aromatic hydrocarbons
- Total recoverable hydrocarbons
- Total petroleum hydrocarbons
- Polychlorinated biphenyls
- Dioxins



### Microbial organisms

- Enterococci (saltwater)
- Total coliforms
- Faecal coliforms
- *Escherichia coli* (*E. coli*) (freshwater)
- Faecal streptococci
- Bacteriophages
- Viruses, e.g., pepper mild mottle virus



### Nutrients

- Total nitrogen (the sum of all nitrogen forms)
- Nitrate
- Nitrite
- Ammonium
- Ammonia
- Inorganic nitrogen
- Total kjeldahl nitrogen
- Nitrogen isotopes -  $\delta^{15}\text{N}$
- Total phosphorus (The sum of all phosphorus forms)
- Phosphate
- Chlorophyll *a*
- Dissolved oxygen



### Organic matter

- Biochemical oxygen demand
- Chemical oxygen demand
- Dissolved oxygen



### Organohalide & organometallic compounds, & mineral acids

- Ethylmercury
- Tributyltin
- Organochlorine pesticides
- PCBs
- Nitric acid
- Sulfuric acid
- Perchloric acid



### Pesticides

- DDT
- Glyphosate
- Atrazine
- Chlorpyrifos



### Pharmaceutical & personal care products (PPCP)

- Caffeine
- Sucralose
- Triclosan
- Phthalates
- Diclofenac
- Carbamazepine
- Sulfamethazole
- Fluoroquinolones
- PFAS



### Per- & polyfluoroalkyl substances (PFAS)

- Perfluorooctanoic acid
- Perfluorooctane sulfonic acid
- Perfluorohexane sulfonic acid
- Perfluorononanoic acid



### Plastics

- Microplastic abundance/concentration
- Polybrominated diphenyl
- Phthalates
- Nonylphenols
- Bisphenol A



### Sediments

- Total suspended solids
- Water clarity as measured by a Secchi disk
- Turbidity — indicator of suspended solids
- Total dissolved solids



Agriculture



Deforestation & Land-Clearing



Landfills



Livestock & Invasive Mammals



Military Activities



Ports, Marinas, & Ocean-Based Industries



Aquaculture



Domestic Wastewater



Mining



Urbanization & Industrial Wastewater





# 6. Collection of in-situ information

- 1 Manual water sampling for laboratory analysis
- 2 Automated water sampling for laboratory analysis
- 3 Automated measurements with a data logger/sensor

- 4 Passive sampling
- 5 Manual water sampling and analysis with a water quality testing kit
- 6 Manual measurements with a handheld analog or digital instrument



Coastal Pollution Toolkit  
**Part 3**

**Factsheets on  
Methods for Collection of  
In-Situ Water Quality**



- **Site selection & sampling frequency**
- **Quality control & data management**
- **Analysis & communication of data**
- **Examples of common questions & approaches**
- **Frequently asked questions**







# Thank you

[WCS.ORG/OUR-WORK/SPECIES/CORAL/WATER-POLLUTION](https://www.wcs.org/our-work/species/coral/water-pollution)