A Strategic Framework for Coastal and Marine Water Quality Management in Western Indian Ocean Region

Workshop with Regional Representatives
November 2021

Workshop Structure

- ❑ Background
- ❑ Strategic Framework for Coastal & Marine Water Quality Management (C&MWQM) in WIO Region

  Group Discussion
- ❑ Guidelines for Setting Environmental Quality Targets
  - ➢ Context
  - ➢ Overview of Setting Quality Targets

  Group Discussion
- ❑ Monitoring and Assessment
  - ➢ Baseline Assessments
  - ➢ Long-term Monitoring Programmes

  Group Discussion
- ❑ Recommendations for Way Forward

Group Discussion & Closure

Background

Project under Nairobi Convention linked to Protection and Management of **Coastal & Marine Environment in WIO Region**

- Contracting Parties agreed on need for regional & national actions to address stresses on marine environment, including **water quality**
- To harmonise monitoring and management – decided to Develop **Strategic Framework for Marine & Coastal Water Quality Management** (M&CWQM)
- Including **Guidelines to set Environmental Quality Objectives and Targets**

Supported by WIOSAP and WIO LME SAPPHIRE(funded by GEF), as well as ACP-MEA Phase III (funded by EU)

Strategic Framework for Coastal and Marine Water Quality Management

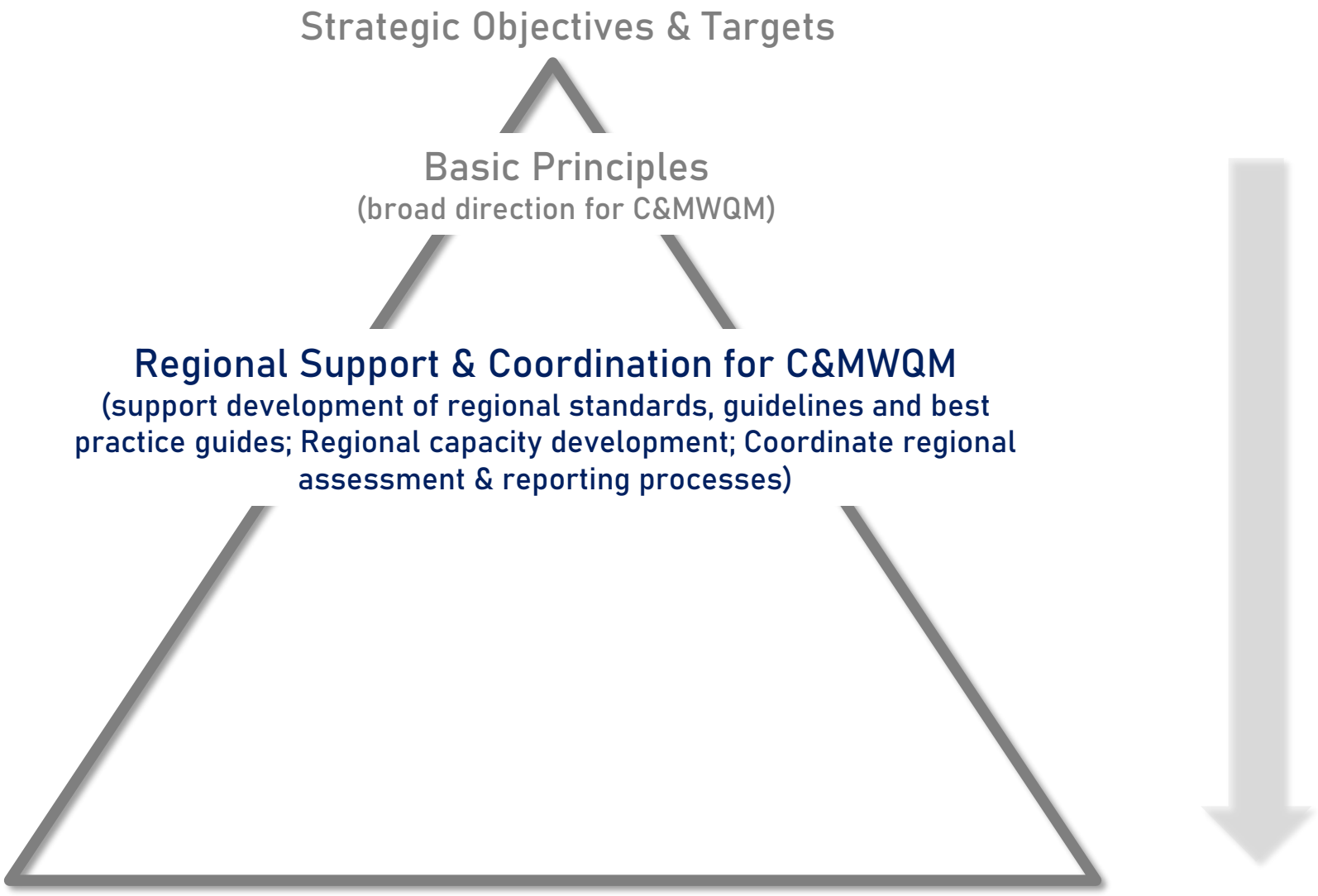
Structure of Strategic Framework

Structure of Strategic Framework

Basic Principles

- Principle 1: Pollution prevention, waste minimisation & precautionary approach
- Principle 2: Receiving water quality objectives approach
- Principle 3: Integrated, adaptive assessment approach
- Principle 4: Polluter pays principle
- Principle 5: Participatory approach

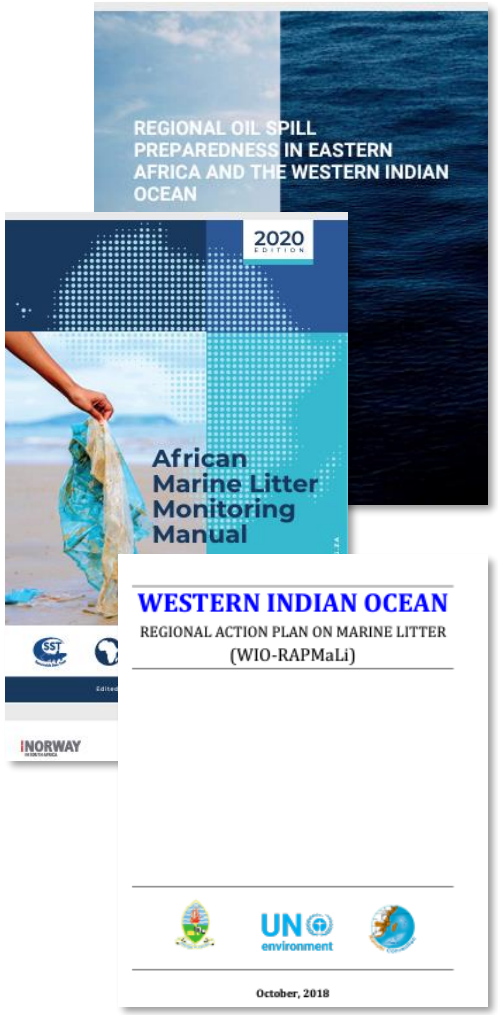
Structure of Strategic Framework



Regional Support & Coordination…

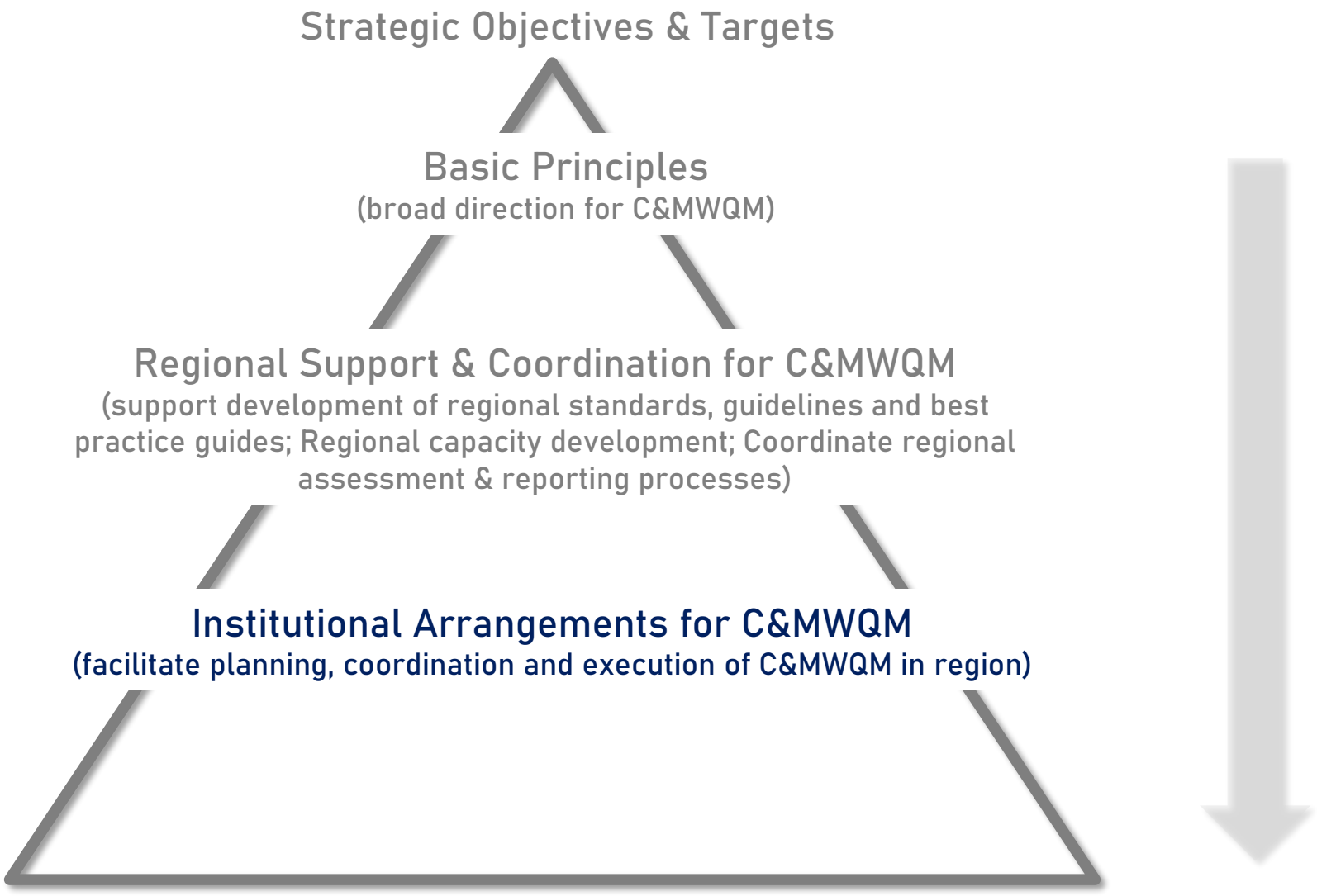
Examples of Regional support mechanisms for C&MWQM:

- ❑ Land Based Sources and Activities (LBSA) Protocol of the Convention (UNEP 2010)
- ❑ WIO Action Plan on Marine Litter (UN Environment 2018)
- ❑ African Marine Litter Monitoring Manual (African Marine Waste Network, Sustainable Seas Trust (Barnardo and Ribbink 2020)
- ❑ WIO Marine Highway development and Coastal and Marine Contamination Prevention Project (2020)
- ❑ Regional oil spill preparedness in eastern Africa and WIO (UNEP et al. 2020)

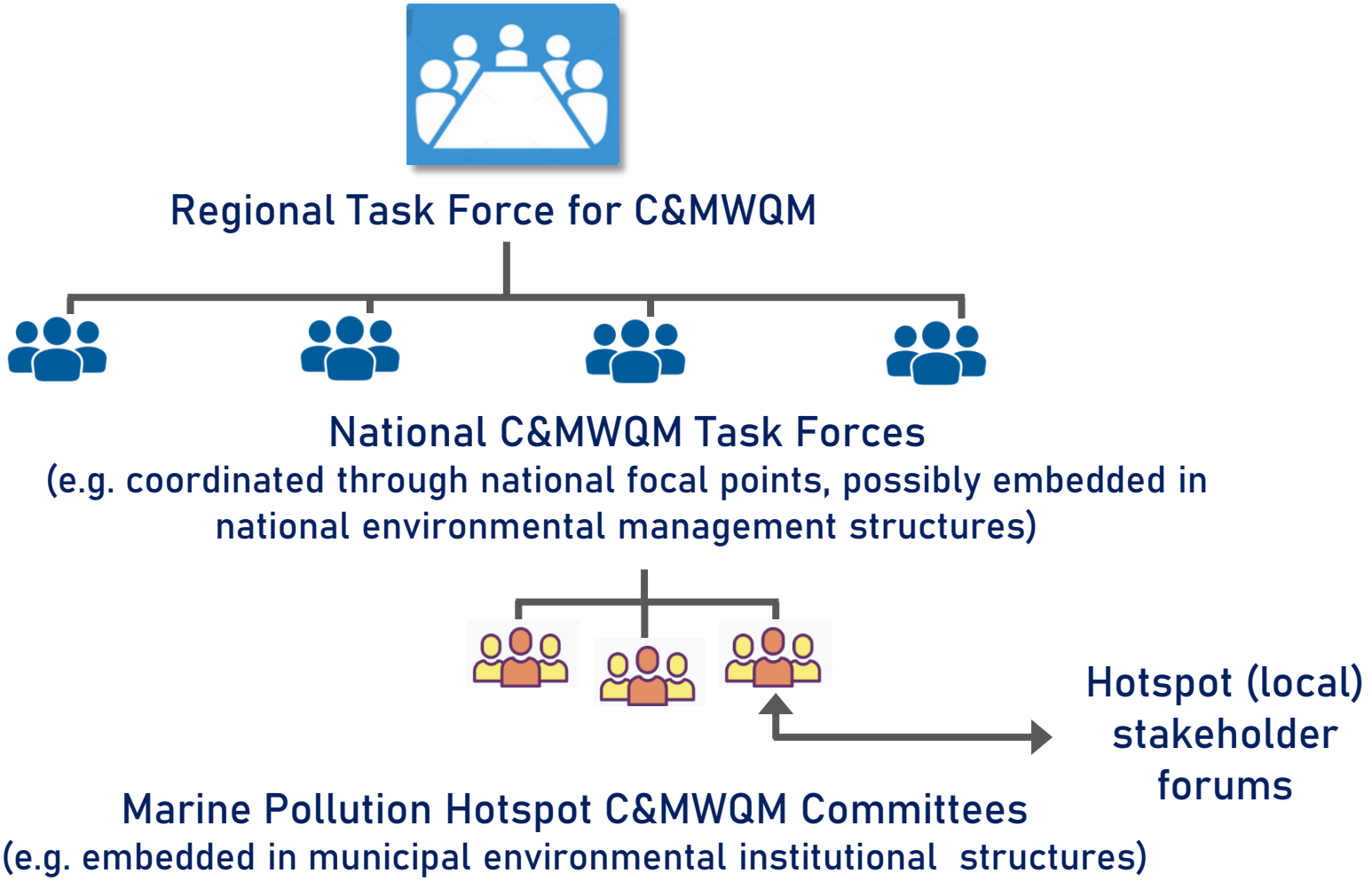


- ❑ This Strategic Regional Framework for M&CWQM, including Guidelines…

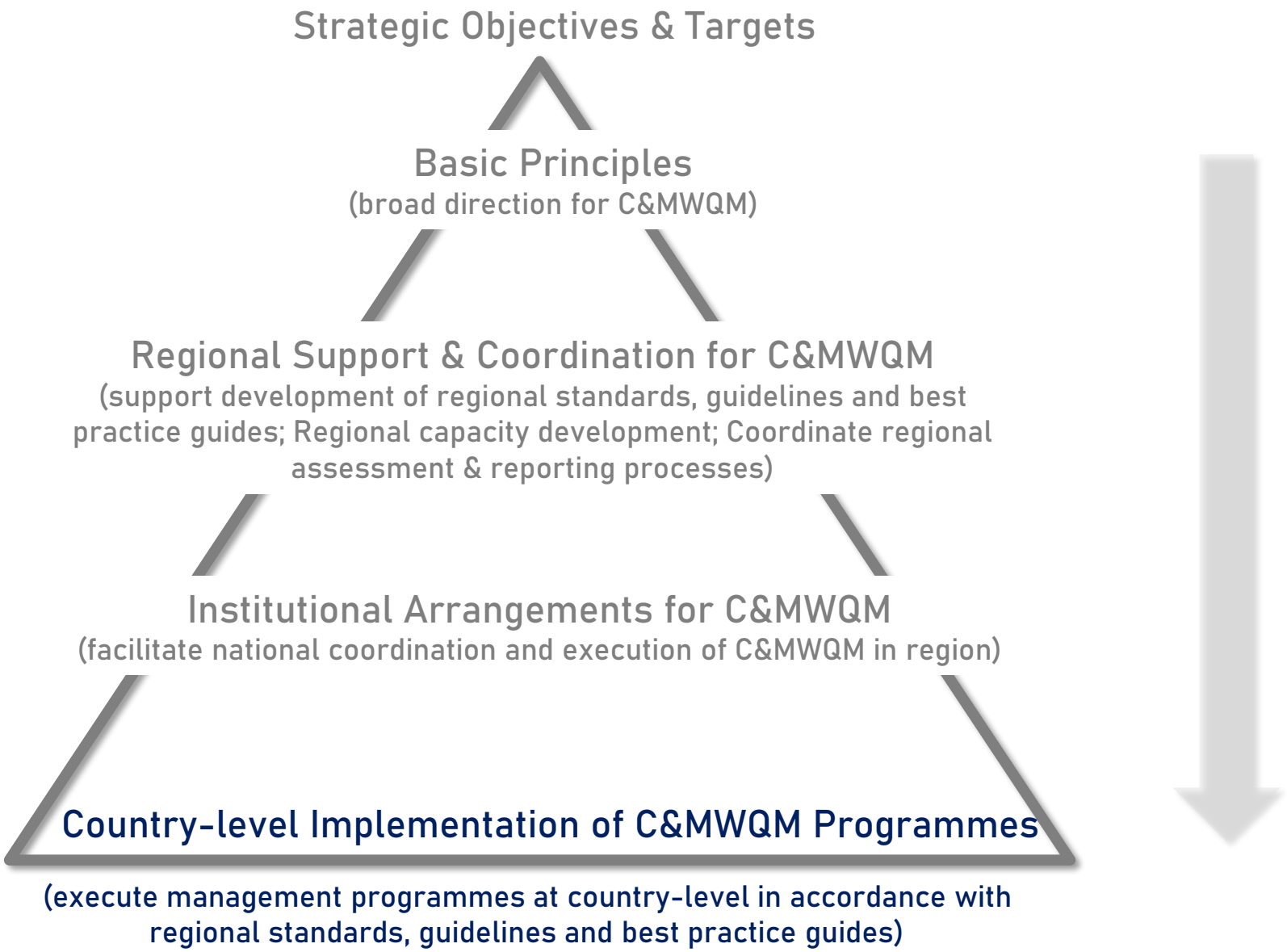
Structure of Strategic Framework



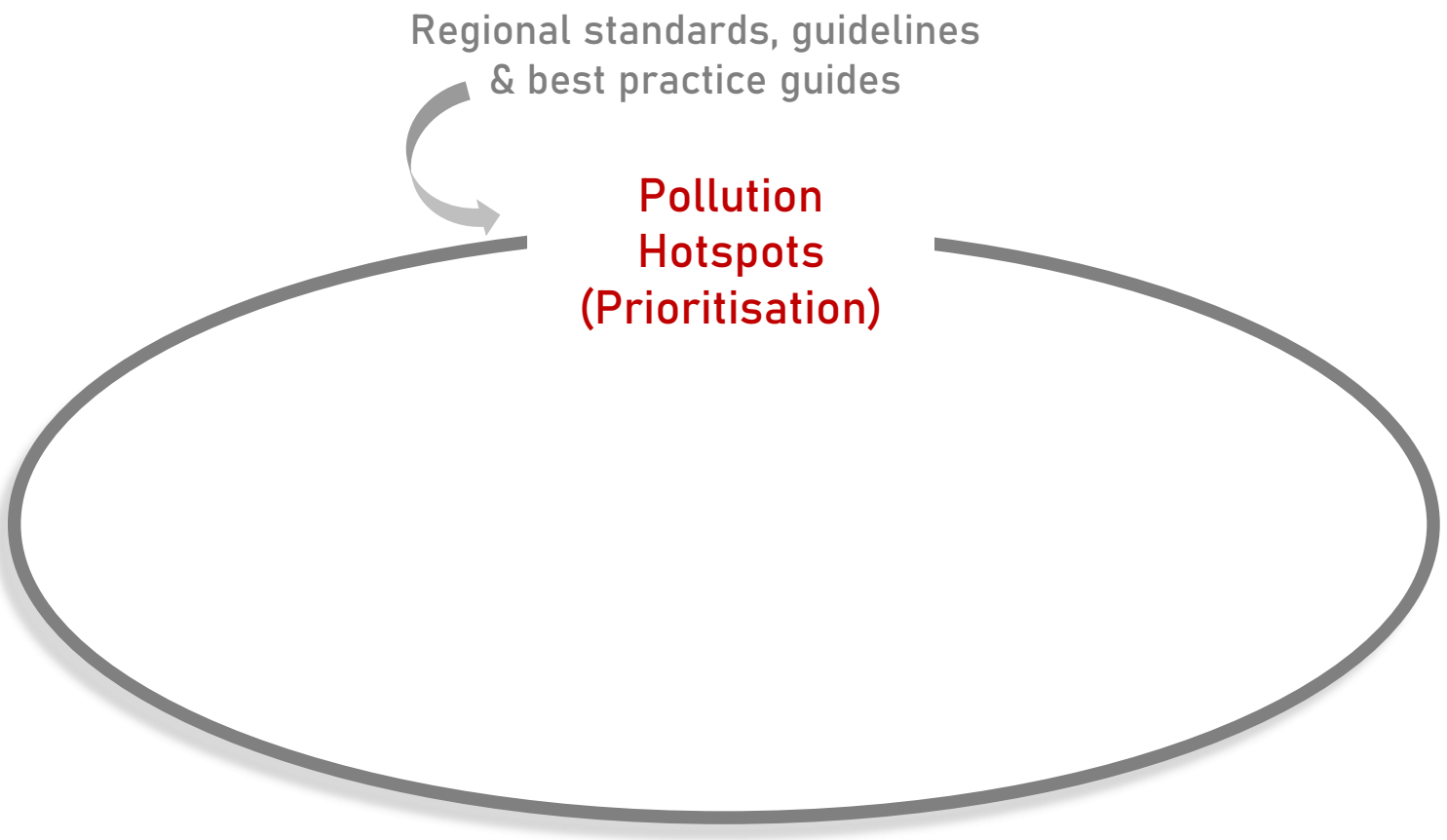
Institutional Arrangements



Structure of Strategic Framework

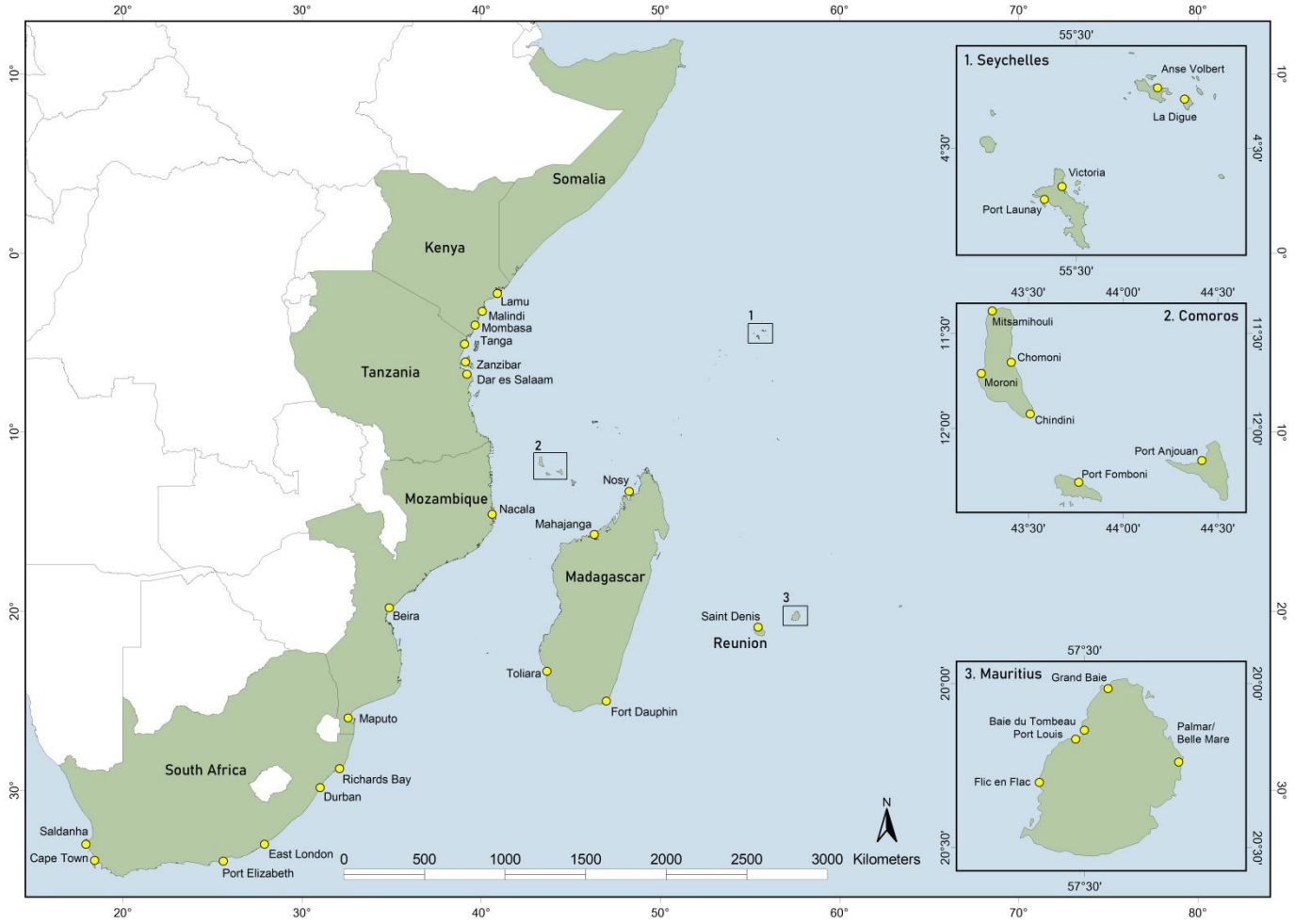


Proposed Implementation Framework

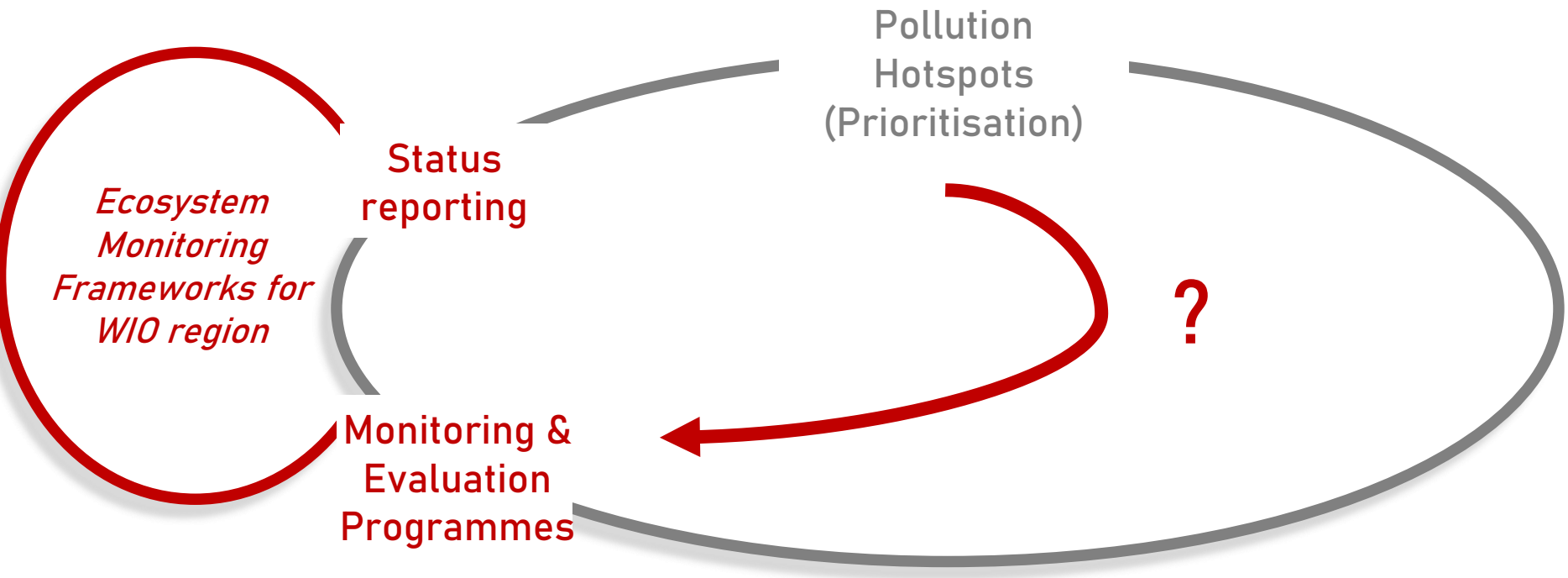


Marine Pollution Hotspots…

Priority areas that require management intervention as a result of **pollution pressures** (e.g., urban and industrial nodes) e.g.

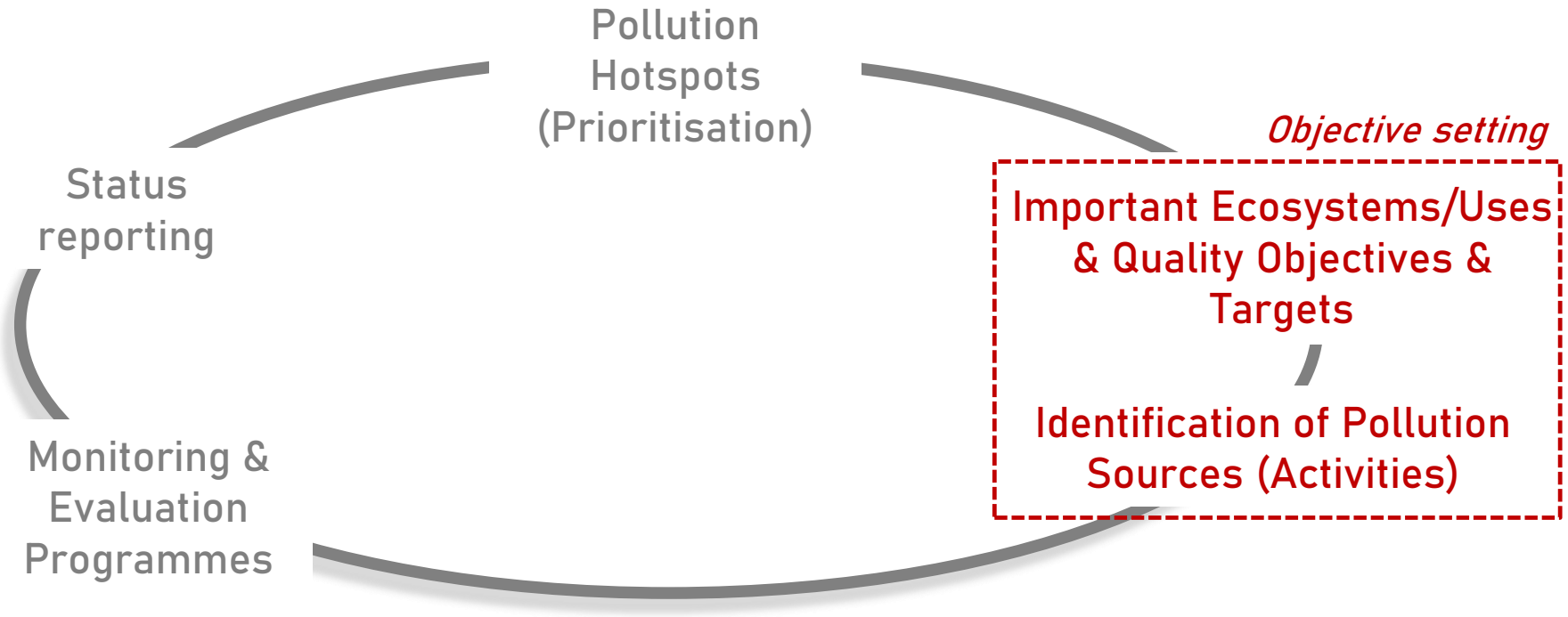


Proposed Implementation Framework

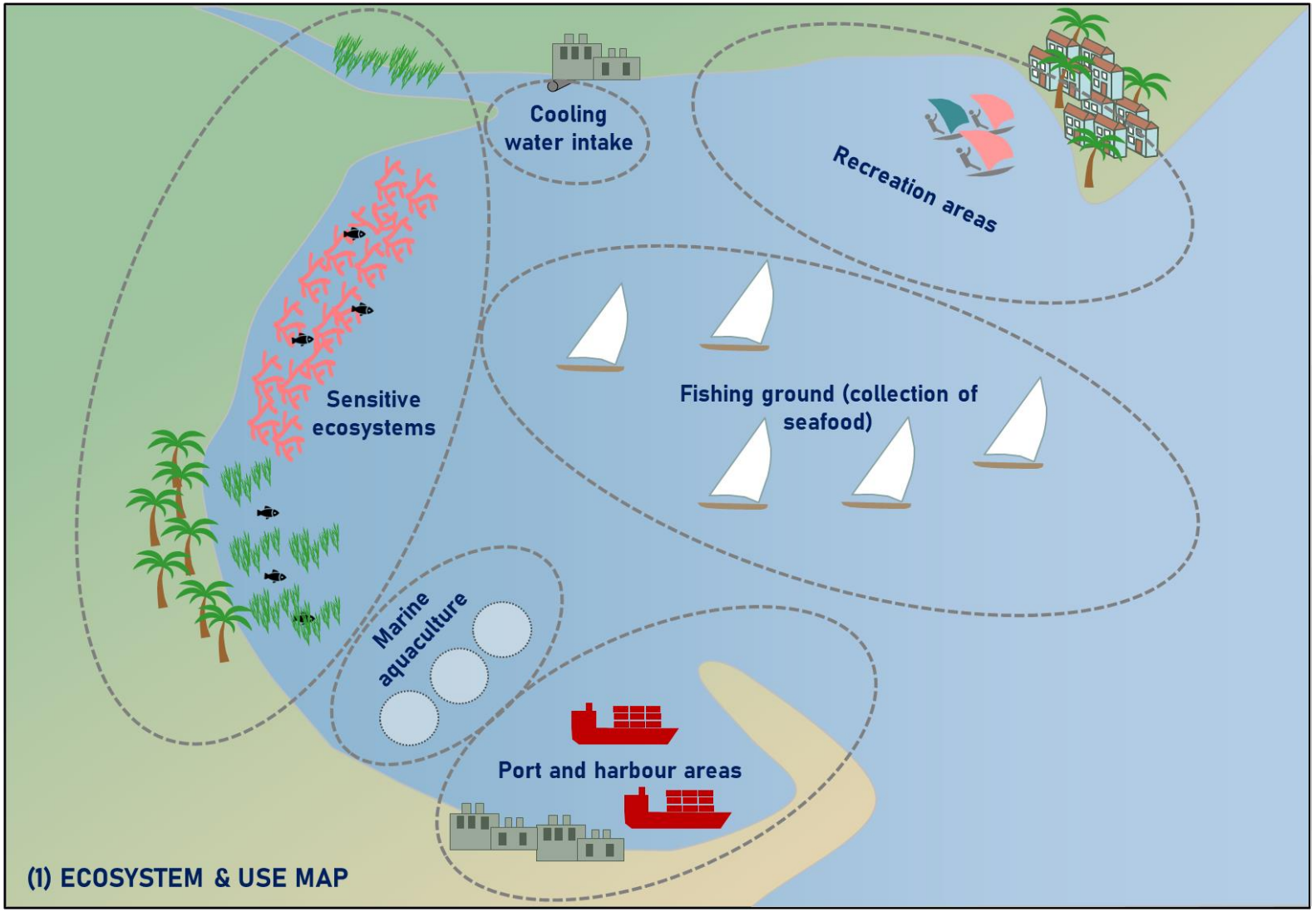


To be useful for C&MWQ management needs some context…

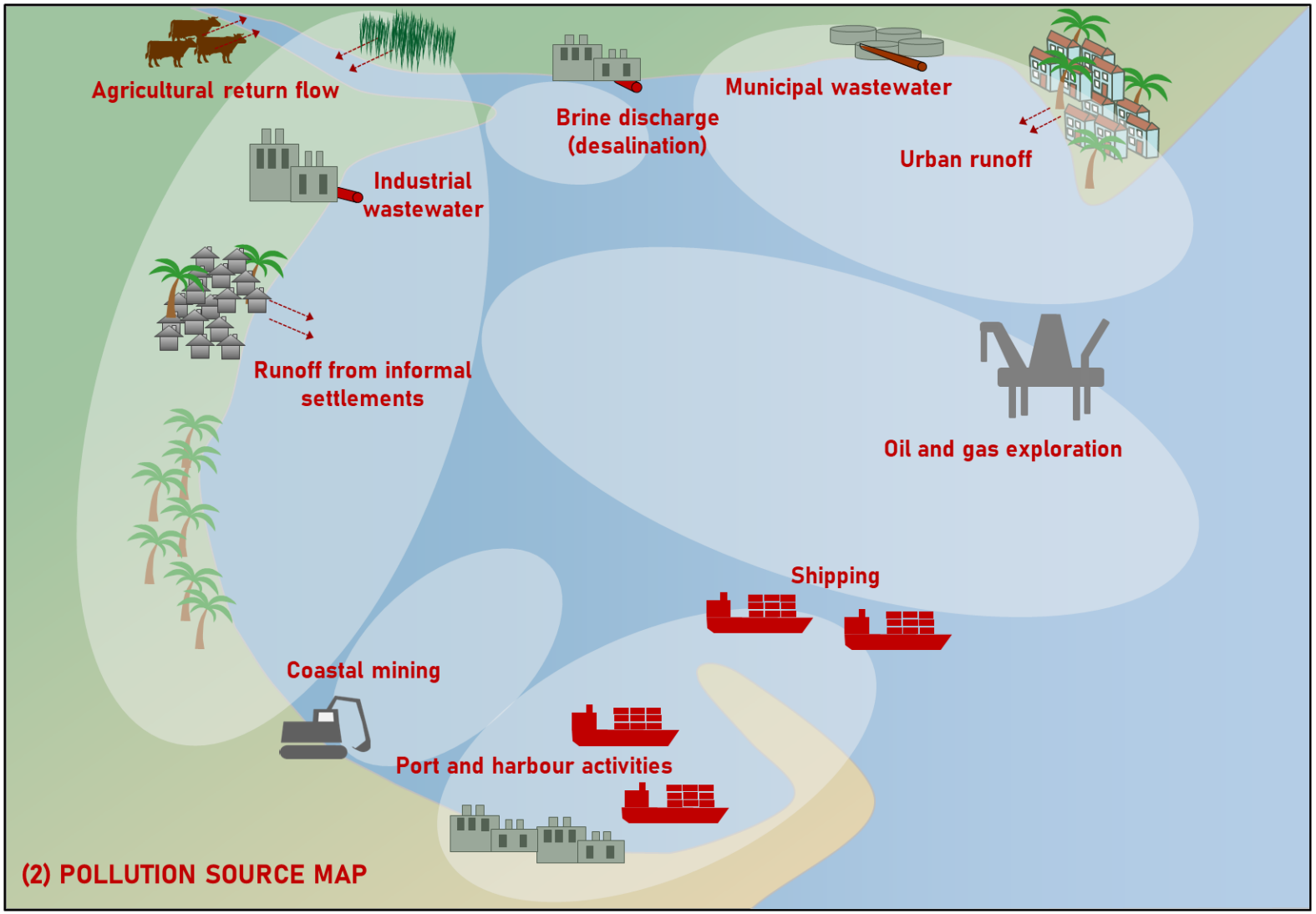
Proposed Implementation Framework



Objective Setting Phase: Important Ecosystems and Uses…



Objective Setting Phase: Pollution Sources…



Objective Setting Phase: Setting Site-specific Quality Targets…

- Cannot always monitor all possible

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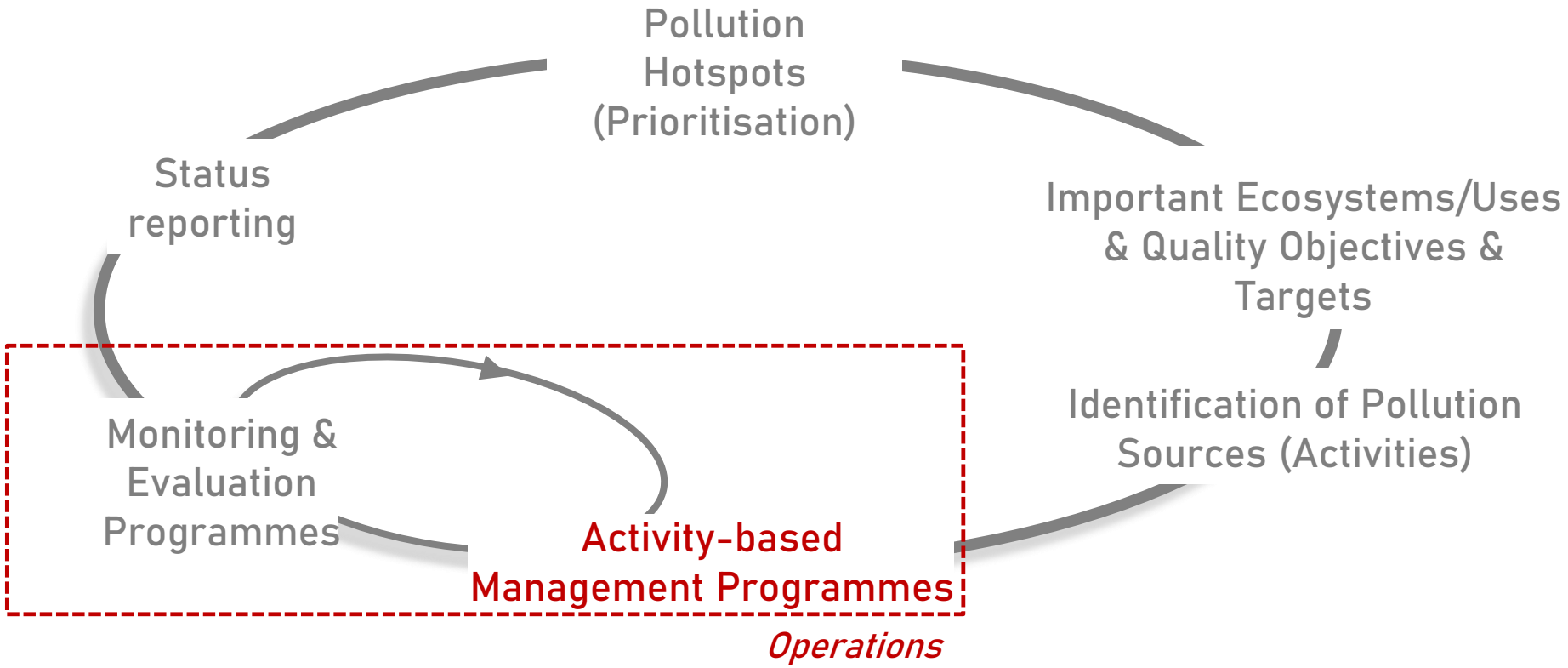
Guidelines for Setting Water and Sediment Quality Objectives & Targets for Coastal and Marine areas in WIO Region

PARAMETERS		PROTECTION OF AQUATIC ECOSYSTEM	RECREATION	MARINE AQUACULTURE	INDUSTRIAL USE
Water	Objectionable matter	Recommended Environmental Quality Targets (EQTs) to assist with compliance management of environmental quality			
	Physico-chemical properties				
	Nutrients				
	Toxicants				
	Microbiological indicators				
	Tainting substances				
Sediment	Toxicants				

Proposed Implementation Framework

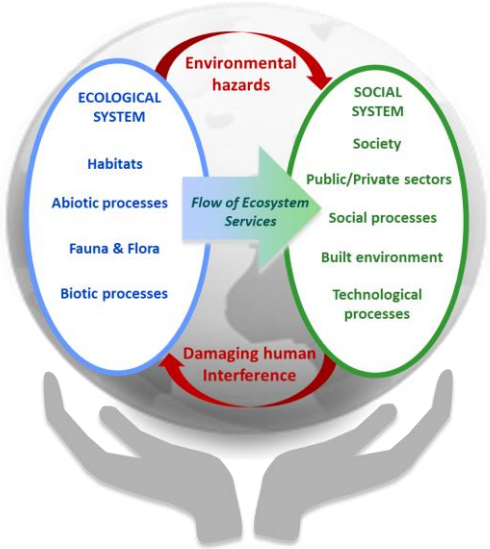


Activity-based Management Programmes…

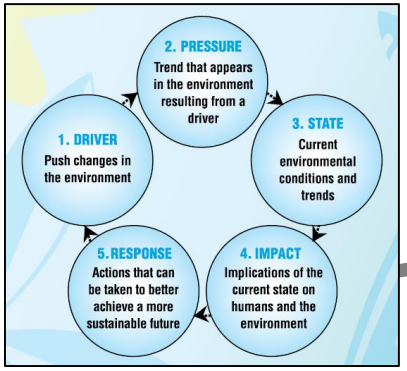
*'the environment cannot be managed, it's **activities, products and services** that need to be managed to prevent undesired environmental change'*

Experience has shown effective activity-based management - within broader ecosystem-based approach - largely dependent on:

- **Formal (activity-based) legislation -** provide legal avenue to enforce compliance, although not to exclude incentives to improve
- **Standards, Guidelines and Best Practice Guides -** assist decision-makers and managers with practical execution of pollution control, but also enforcing sustainable environmental best practice
- **Resource Planning –** identify activity-based interventions/action, ensure sufficiently skilled and motivated personnel to perform, equipped with appropriate material and financial resources
- **Contingency Planning -** pre-emptive planning to mitigate and control potentially detrimental impacts



Proposed Implementation Framework



Status reporting

Pollution Hotspots (Prioritisation)

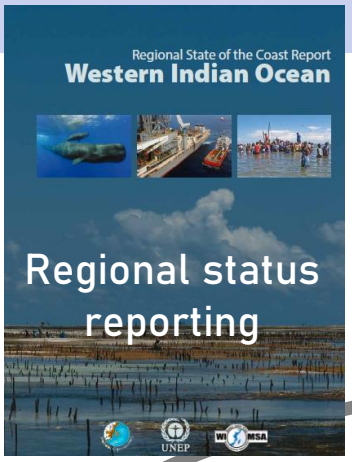
Important Ecosystems/Uses & Quality Objectives & Targets

Identification of Pollution Sources (Activities)

Activity-based Management Programmes

Monitoring & Evaluation Programmes

Proposed Implementation Framework



Pollution Hotspots (Prioritisation)

Important Ecosystems/Uses & Quality Objectives & Targets

Identification of Pollution Sources (Activities)

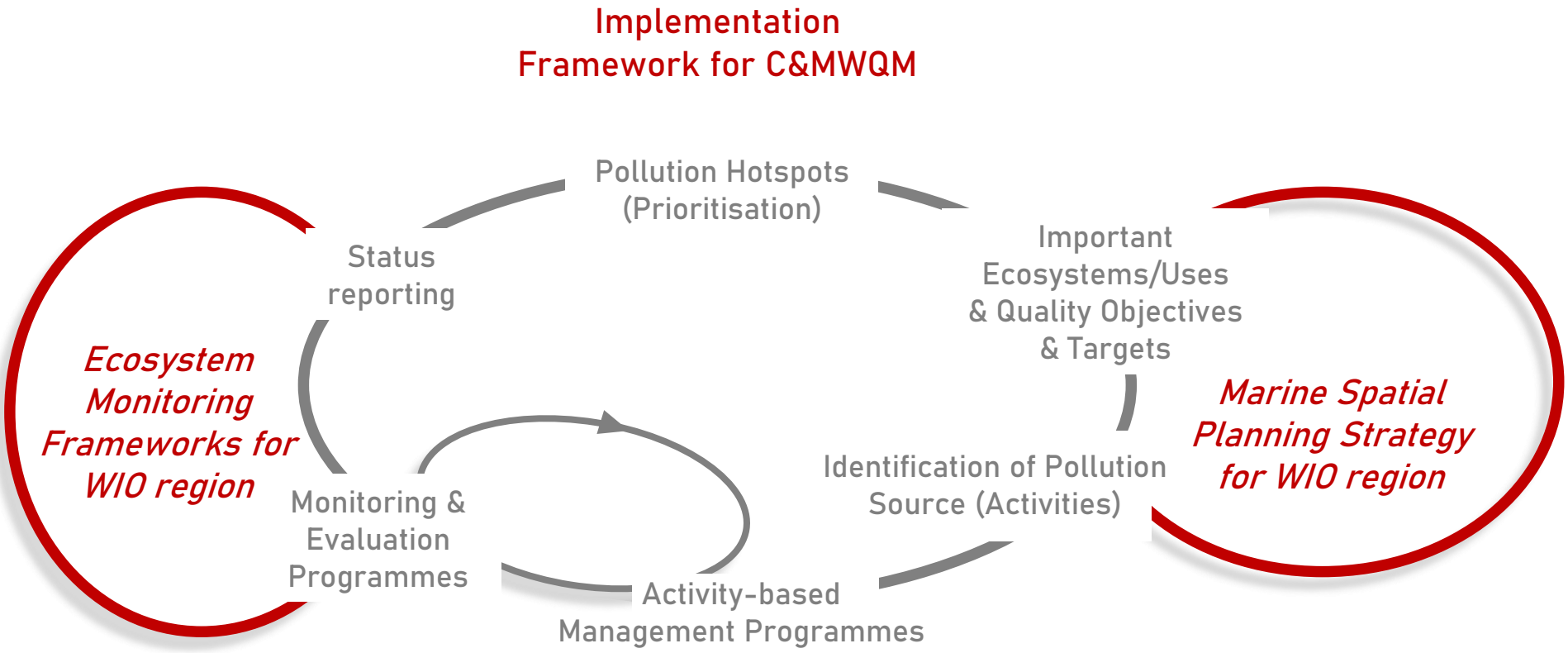
Activity-based Management Programmes

Monitoring & Evaluation Programmes

Status reporting

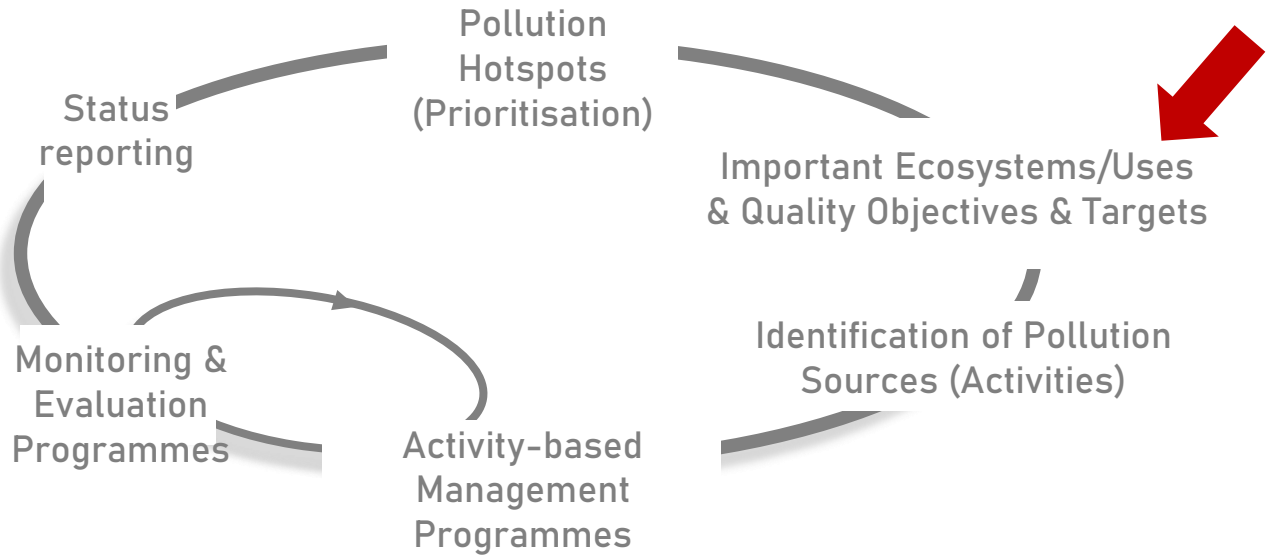
Adaptive management cycle

Links to other WIO Region Strategies



Group Discussion: Clarification, Anticipated Challenges, Sharing Experience…

Guidance on Setting Environmental Quality Targets



What is Environmental Quality?

"Environmental Quality" primarily refers to **chemical characteristics** of coastal & marine waters and sediments (for recreation and collection/culture of seafood **microbiological** parameters also are relevant)

- System variables, e.g.

  Salinity
  Temperature
  pH
  Suspended solids/turbidity
  Dissolved oxygen

- Nutrients, e.g.

  Nitrate
  Ammonium
  Phosphate
  Silicate

- Toxic substances, e.g.

  Metals
  Agrochemicals (e.g. pesticides)
  Petrochemicals (e.g. hydrocarbons)
  Pharmaceuticals

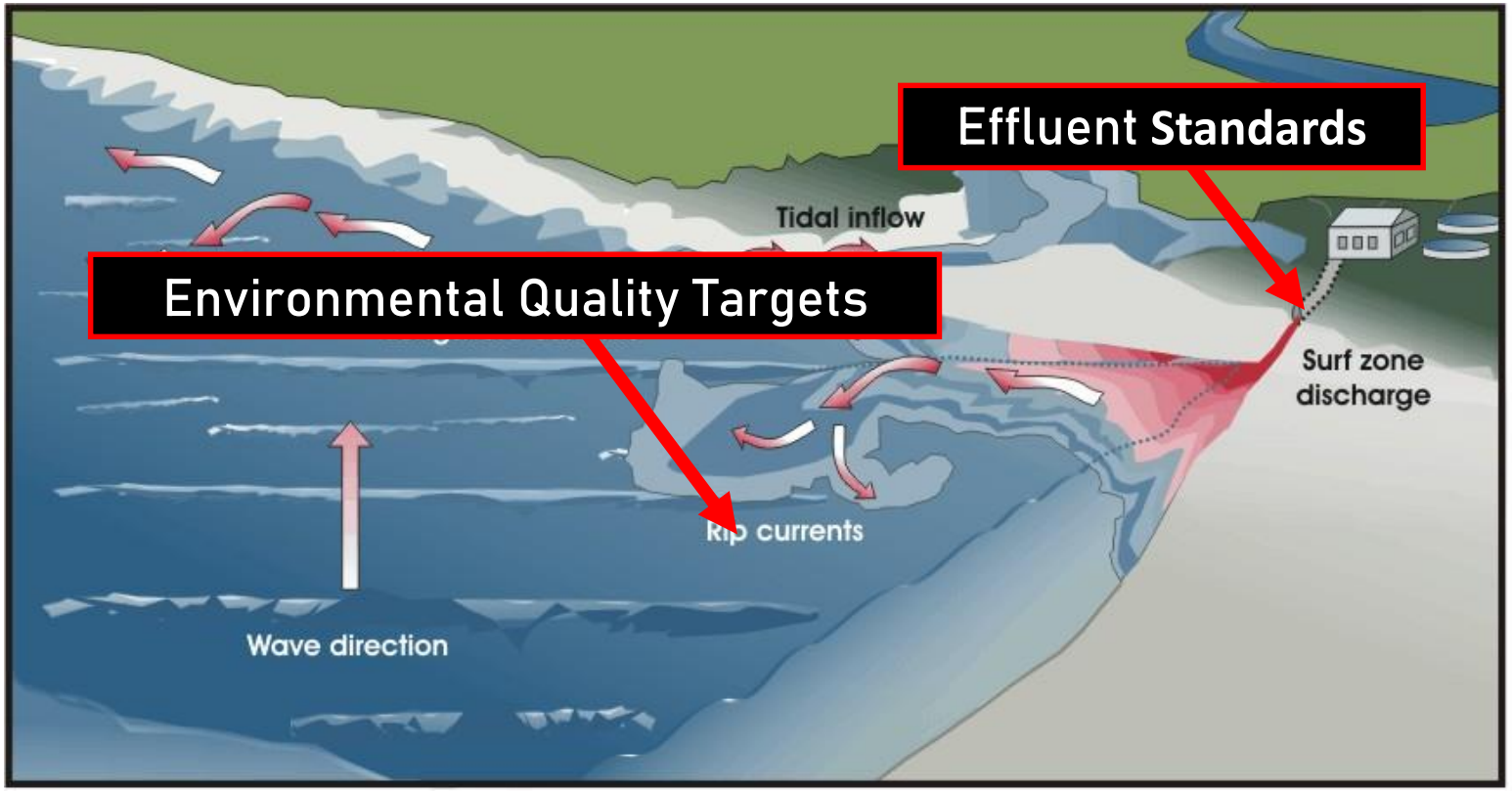
- Microbiological parameters, e.g.

  E. coli
  Enterococci

What are Environmental Quality Targets?

- **Provide recommend target values** for water and sediment quality parameters in **receiving marine environment**

- Different from **effluent standards** (set for wastewater streams **before** entering marine environment)



Need for Environmental Quality Targets

Important to protect **Ecosystems** from human activities…

but also other **Ecosystem Services** depending on suitable environmental quality, such as:

- ❑ Recreation
- ❑ Eco-tourism
- ❑ Marine Aquaculture
- ❑ Subsistence (basic) needs

Setting Environmental Quality Targets

Therefore, environmental quality targets for coastal and marine environments typically are set for **ecosystem protection** and important **beneficial uses**, e.g.:

- Protection of **marine aquatic ecosystems**
- **Recreational use**
- **Marine aquaculture** (including fishing/ harvesting of seafood)
- **Industrial uses** (e.g. intake for fish processing and cooling water)

Setting Quality Targets…

QUALITY TARGET		PROTECTION OF AQUATIC ECOSYSTEMS	MARINE AQUACULTURE	RECREATION	INDUSTRIAL USE
Water	Objectionable matter (Litter)	●	Protection of Aquatic Ecosystems	●	Base on specific requirements of industry
	Physico-chemical variables	●		Refer to Drinking Water quality Guidelines	
	Nutrients	●			
	Toxic substances	●			
	Microbiological parameters		●	●	
	Tainting substances		●		
Sediment	Toxic substances	●	Protection of Aquatic Ecosystems		

Setting Quality Targets…

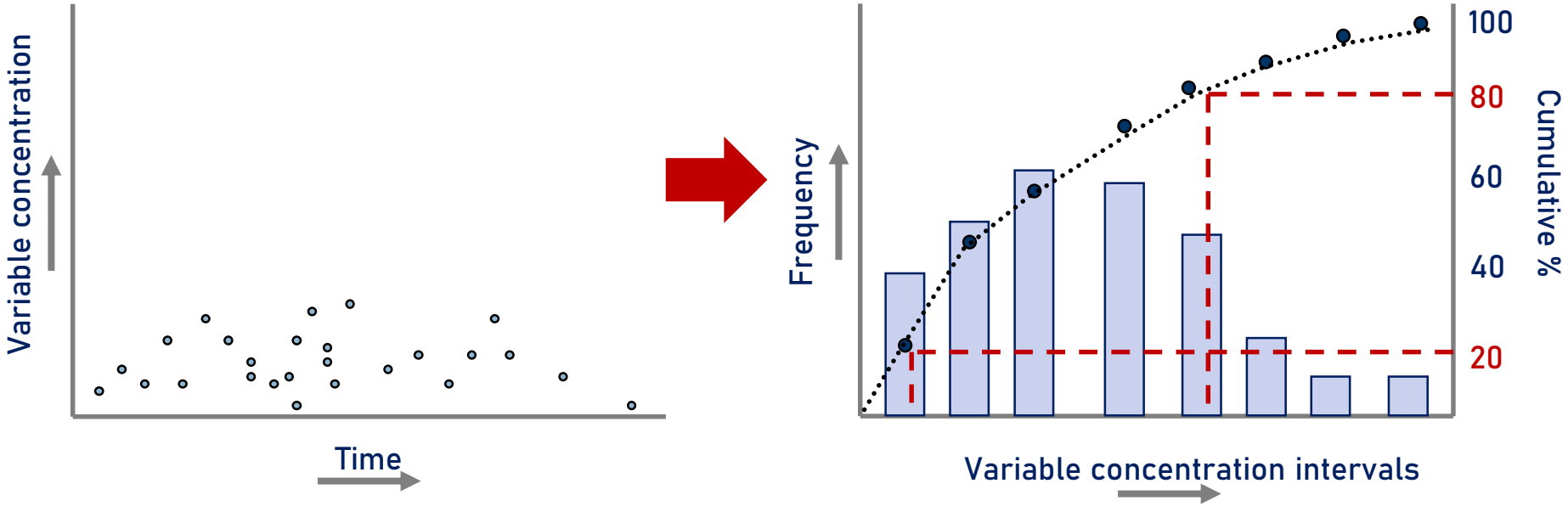
Objectionable matter (usually narrative), e.g.

"Waters free from objectionable floating matter, Non-natural matter, suspended or settling to bottom and submerged objects or subsurface hazards" – marine litter

Setting Quality Targets…

Physico-chemical variables (e.g. pH, turbidity) and **Nutrients** (N & P)

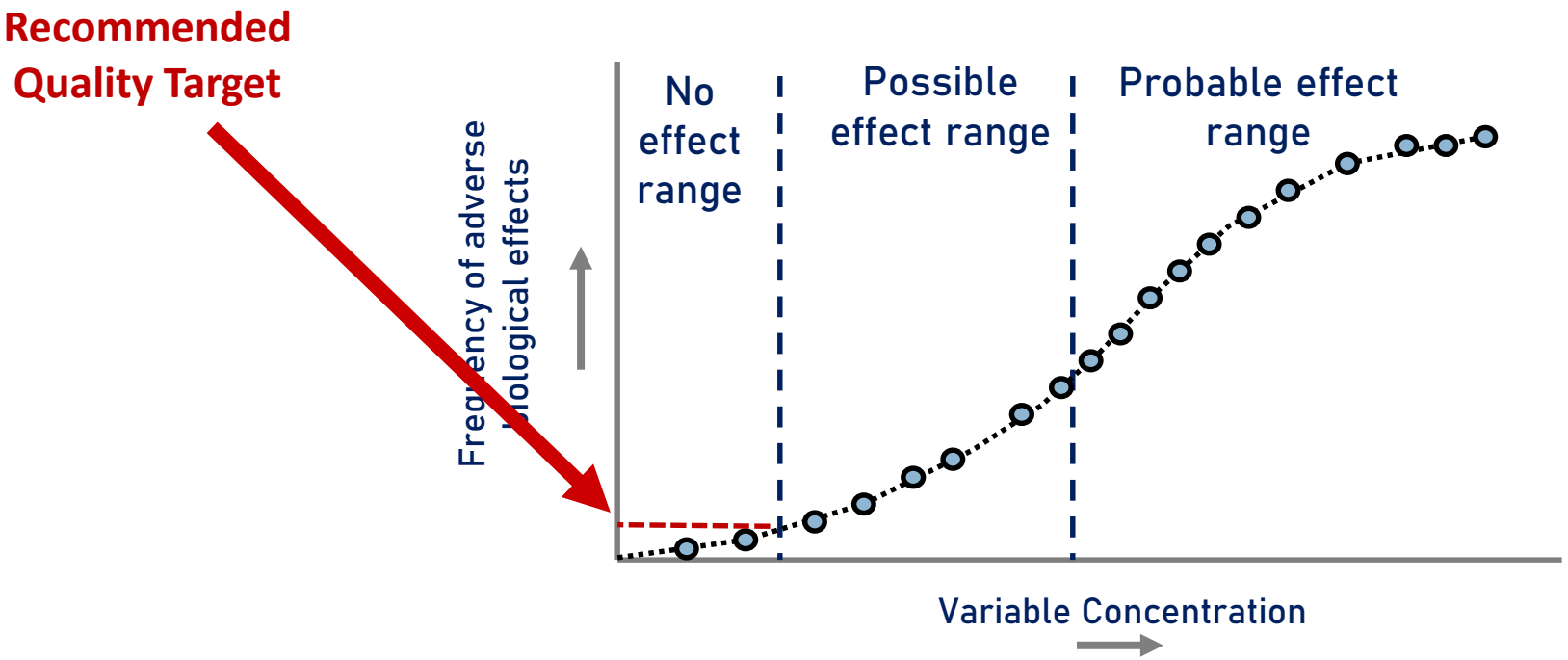
- Characteristics of marine water are **site-specific** and subject to large **natural variability**
- Most popular method applied internationally **Reference system data** approach using 20th and/or 80th percentile:



Setting Quality Targets…

Toxic substances (e.g. metals, agrochemicals, petrochemicals)

- Setting appropriately generic targets for toxicants require **large sets of ecotoxicological data** – often lacking so use international guidelines derived from comparable databases
- Internationally, sediment targets mostly originate from **National Status and Trends Program of NOAA** (USA)



Setting Quality Targets…

Microbiological indicators (recreational waters)

- **Classification system** (e.g. WHO and EU):

CATEGORY	ESTIMATED RISK PER EXPOSURE	ENTEROCOCCI (Count per 100 ml)	*E. coli* (Count per 100 ml)
Excellent	2.9% gastrointestinal (GI) illness risk	≤ 100 (95 percentile)	≤ 250 (95 percentile)
Good	5%	≤ 200 5percentile)	≤ 500 (95 percentile)
Sufficient	8.5% GI illness risk	≤ 185 (90 percentile)	≤ 500 (90 percentile)
Poor (unacceptable)	>8.5% GI illness risk	> 185 (90 percentile)	> 500 (90 percentile)

Recommended (minimum) Quality Target

- Also good to conduct a **Sanitary Inspection** of issues that may pose additional health and safety risks, e.g. proximity of pollution discharges, industries, waste dumps, etc.

Setting Quality Targets…

Microbiological indicators (marine aquaculture)

- Target for **receiving water** in **shellfish growing areas**, e.g.

Faecal coliform:	**Median** concentrations should not exceed 14 Most Probable Number (MPN) per 100 ml with not more than **10% of the samples** exceeding 43 MPN per 100 ml for a 5-tube, 3-dilution method

- Shellfish growing areas typically **classified for suitability**:

Approved	**Free of pollution** and shellfish from such areas suitable for direct human consumption
Conditionally approved/restricted	Subjected to **intermittent pollution**. However, must be suitable for reasonable time and factors must be known and predictable Open = meet requirements of 'Approved'; Restricted = meet requirements of 'Restricted' ; Closed = 'Prohibited'
Restricted	Areas subjected to limited pollution. However, levels of pollution is such that shellfish fit for human consumption after **relaying or depuration**
Prohibited	No comprehensive studies conducted; Adjacent to sewage outfalls Unpredictable non-point pollution sources; Affected by algal bio-toxins Subject to poisonous substances

Important to Remember…

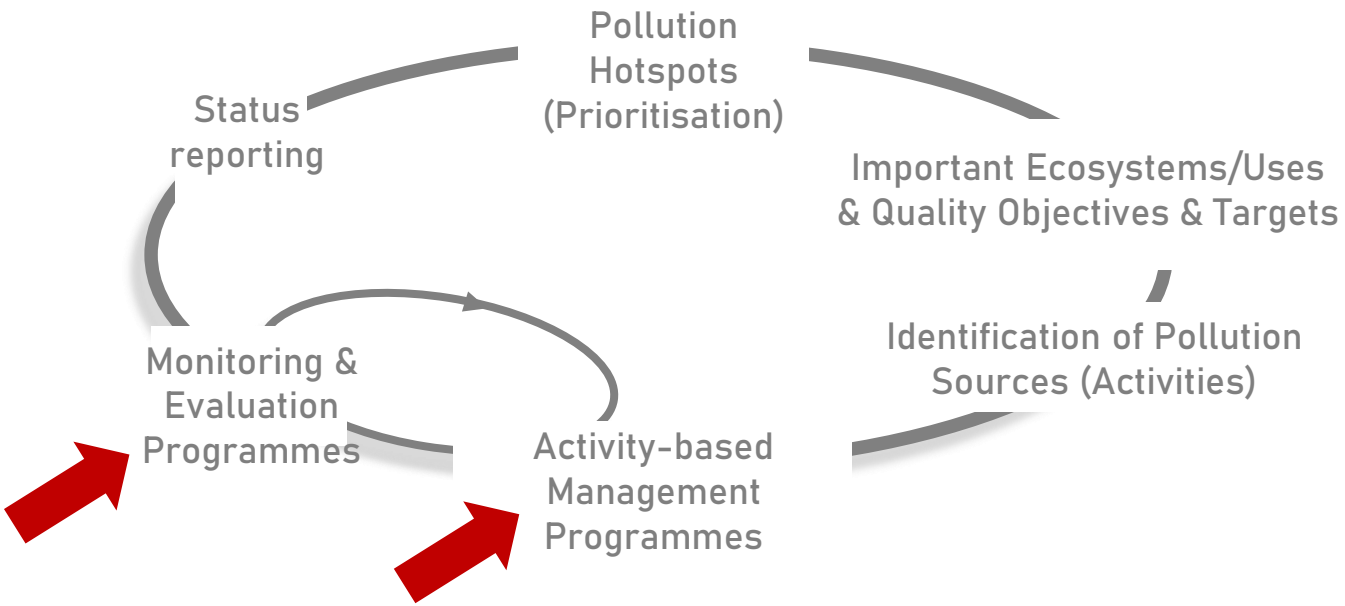
NB: Existence of quality targets does not imply that environment should by default **be degraded** to those levels in C&MWQM…

Following principles should always be considered aimed at **maintaining highest quality:**

- ❑ Precautionary approach
- ❑ Pollution prevention
- ❑ Waste minimization
- ❑ Re-cycle and re-use
- ❑ Best available/best attainable technologies

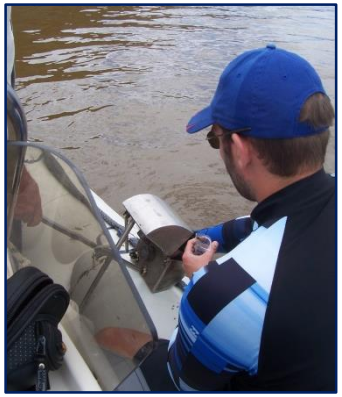
Group Discussion: Clarification, Anticipated Challenges, Sharing Experience…

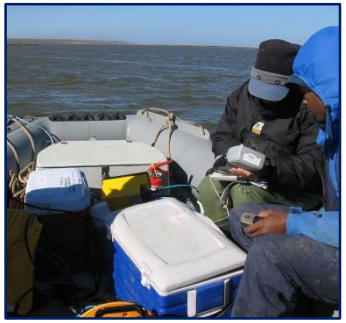
Environmental Quality Monitoring & Assessment



Context of Monitoring & Assessment

Differentiate between **baseline assessments** and **long-term monitoring** programmes





- **Baseline assessments - shorter-term, intensive investigation** on wide range of environmental parameters to obtain **understanding of ecosystem processes and functioning**

- **Long-term monitoring - ongoing data collection** programmes to continuously evaluate compliance and effectiveness of management actions using **key indicators**

Baseline Assessments

Baseline assessments usually include wide range of parameters to obtain better understanding of ecosystem functioning (usually in response to potential effects from specific activities/uses – **Environmental Impact Assessment Studies**)

Marine Ecology






Sediment processes

Environmental (water/sediment) Quality

Hydrodynamics

Abiotic Processes

Baseline Assessments…

Typical data collected for baseline assessments:

- **Physical processes** (e.g., water circulation and sedimentation processes) influencing transport and fate of pollutants

  Bathymetry, tides, currents, waves, salinity, temperature, stratification, sediment structures

- **Chemical processes**, natural chemical patterns, extent of existing pollution and behaviour of pollutants

  System variables, nutrients, trace metals, hydrocarbons, etc.

- **Marine Ecology**, characterising biota potentially impacted by EQ

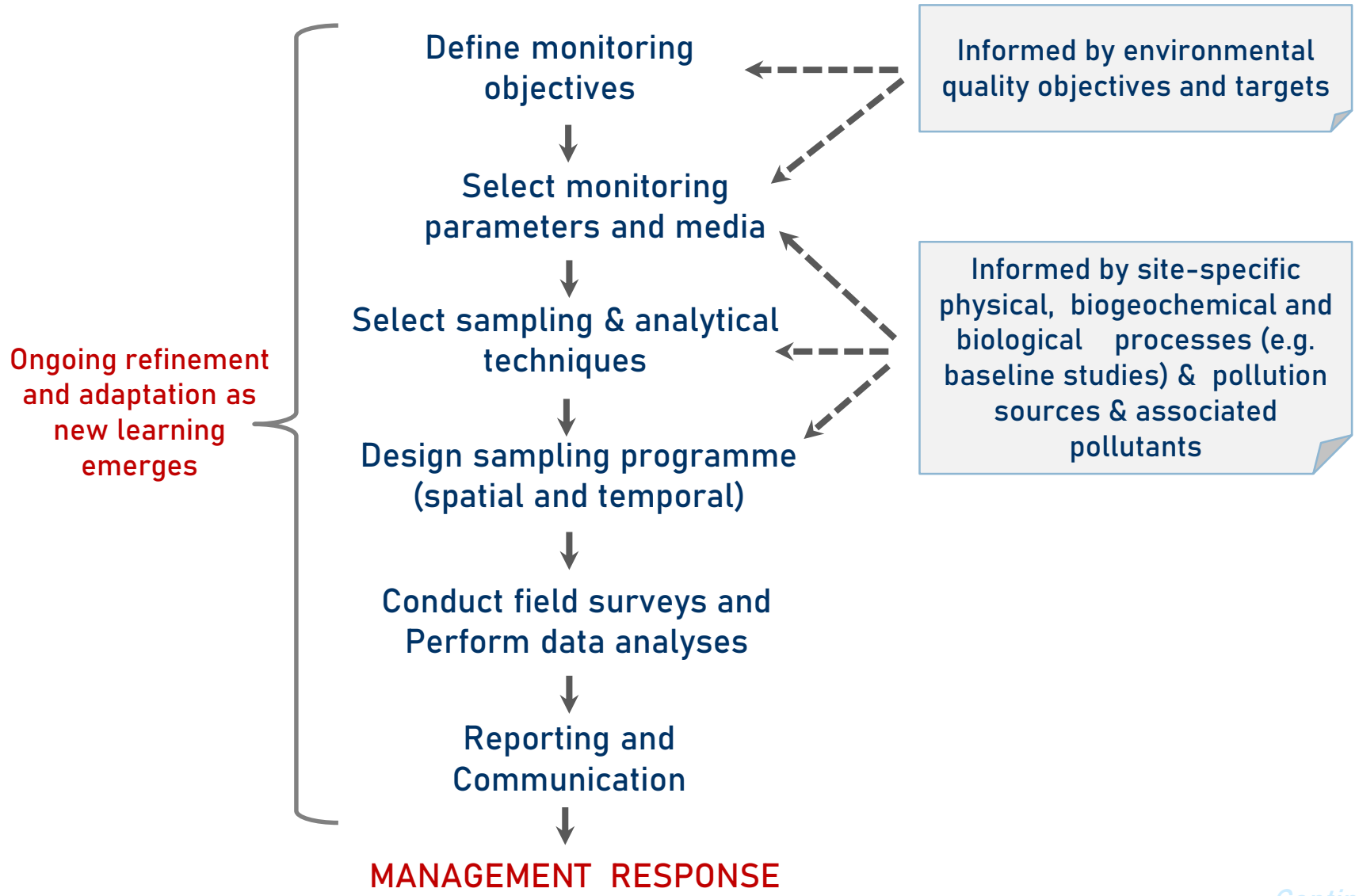
  Habitat types (e.g., reefs, kelp beds, sandy/ rocky areas bottoms), community structures, Dominant species, Species of particular conservation importance and species targeted for exploitation

Long-term Monitoring Programmes

Long-term/compliance monitoring - ongoing data collection programmes to evaluate continuously effectiveness of management strategies/actions, e.g.:

- Monitoring of **specific pollution sources** (e.g., effluent discharges) and status of receiving marine environment (compliance)
- **Beach water quality** - assess suitability for recreational use)
- **'Mussel Watch'** programme - long-term trends in toxicant accumulation
- **Marine litter** monitoring - e.g., *African Marine Litter Monitoring Manual* (2020)
- **Dredge monitoring** – assess toxicant composition to inform disposal practice (e.g., linked to London Convention)

Design of Long-term Monitoring Programmes…



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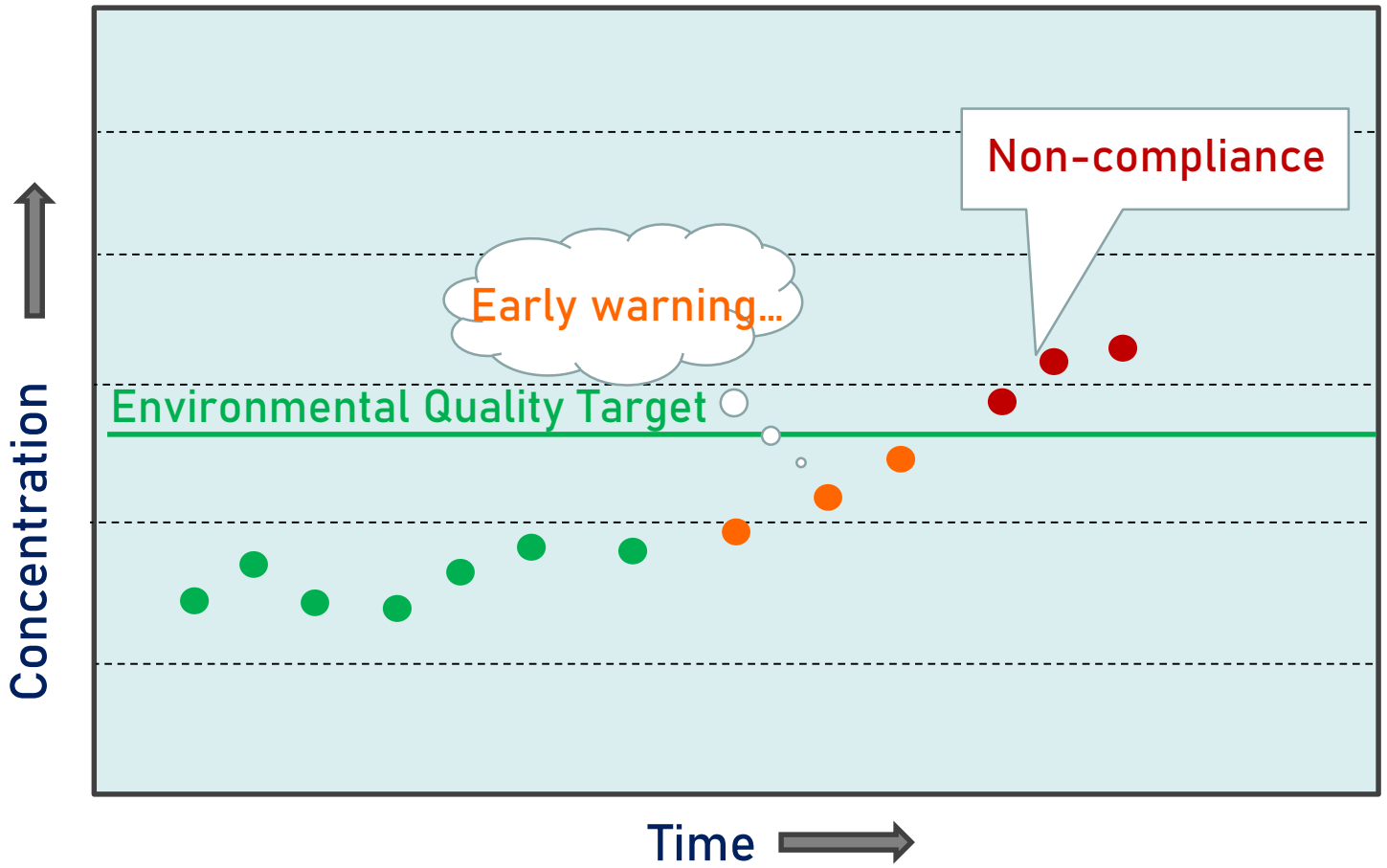
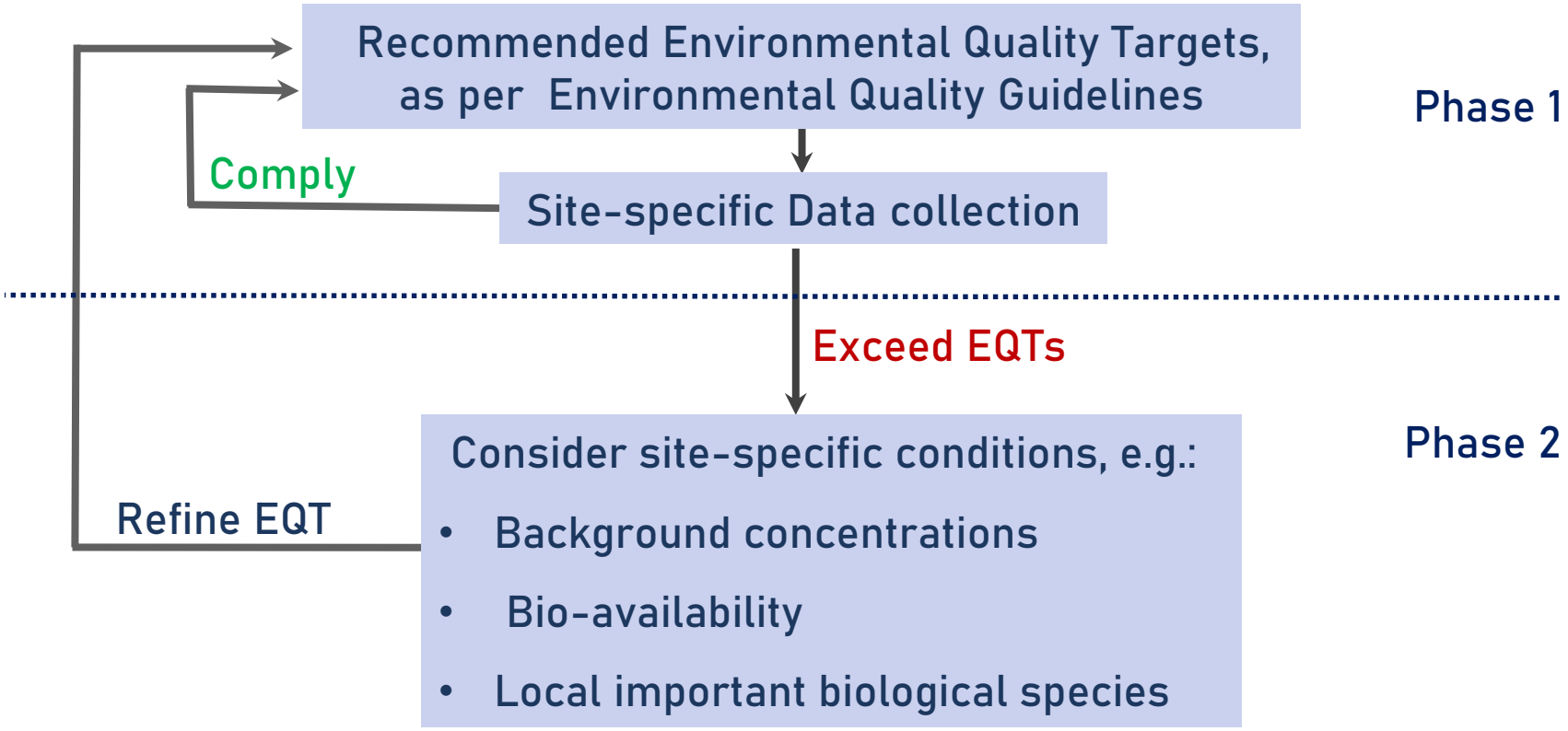
Using Quality Targets in Monitoring Programmes …

Example…

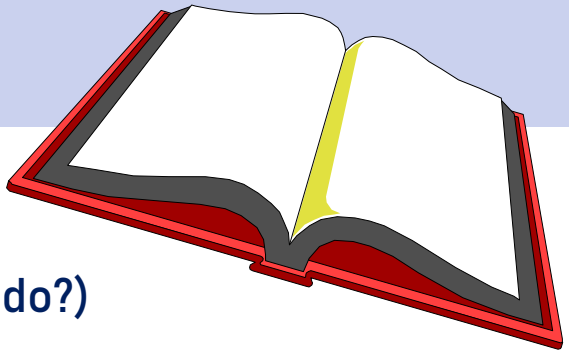


Refining Quality Targets in Monitoring Programmes …

May need to refine generic Quality Targets (e.g. toxicants) based on site-specific characteristics:



Reporting on Long-term Monitoring Programmes…



Typical Content of Monitoring Report:

- List of **monitoring objectives** (what are we trying to do?)
- **Design of programme** (indicating relationship between indicators & monitoring objectives)
- **Evaluation** in relation to monitoring objectives
- **Statement on compliance** to monitoring objectives, if non-compliance possible reasons
- **Management strategies & actions** to address non-compliance
- **Recommendations** on refinements of programme
- **Appendices** - laboratory reports, raw data and other relevant background information

Data Management for Long-term Monitoring Programmes…

Data Management & Storage System (Data is Expensive!)

- Essential to have reliable system and procedures for **capturing and storing** monitoring data
- Procedures for systematic **screening and validation** of data (quality control)
- **Secure storage** of information
- Simple to **retrieve data** (no use we have data but can't access it!)
- **Flexibility** to accommodate additional information (meta data)

Useful Templates provided in Documents

- ❑ Preparation of C&MWQ Management Plans (e.g., for specific pollution hotspots)
- ❑ Preparation of Action & Resource Planning (e.g., who is responsible for what?)
- ❑ Template for Monitoring Reports
- ❑ Water Quality Sampling Log Sheets (recreational WQ monitoring)
- ❑ Preparation of Contingency Plans (e.g., key tasks and responsibilities)
- ❑ Template for Status Reports (using DIPSR approach)

Useful Template…

Template for Pilot Testing Implementation Framework, including regional Quality Objectives and Targets:

- Context
- Information requirements of pilot site/s, e.g.:
  - Zoning of beneficial uses and sensitive ecosystem
  - Zoning of pollution sources
- Use recommended Quality Targets to start (interim QT)
- Information gathering on site-specific Water and Sediment Quality Data
- Evaluate data against interim QTs for compliance
- Key Findings and refinement of QTs for pilot site/country

Group Discussion: Clarification, Anticipated Challenges, Sharing Experience…

Recommendations for Way Forward

Policy & Technical Recommendations…

Policy:

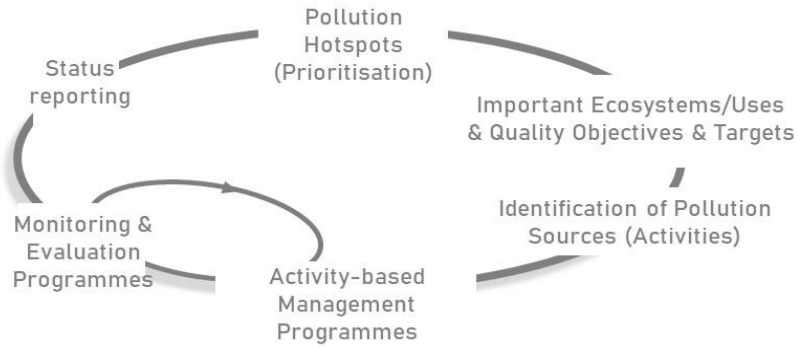
- Contracting Parties (CP) adopt **Regional Strategic Framework for C&MWQM**, including **Guidelines Environmental Quality Targets**
- CP adopt **Framework & Guidelines at Country-level**, as appropriate
- CP **formally establish Regional Task Force** for C&MWQM (currently project-level task force under WIOSAP)
- CP establish **National C&MWQM Task Forces** to facilitate and coordinate C&MWQM and status reporting at country-level
- Consider establishment of **Local C&MWQM Committees** to oversee execution of 'hotspot' implementation programme

Technical:

- Secretariat work with partners to develop **capacity building programmes** in support of effective implementation of Strategic Framework C&MWQM in WIO Region

Country-level Pilot Studies…

- Tackle in bit sizes…
- Select a **country champion to drive pilot implementation**
- Confirm countries **marine pollution hotspots and decide on a pilot site** to test practical country-level implementation framework and guidelines



Use Templates in C&MWQ Documents and Templates as Guides

- Start with mapping **important ecosystems and uses** & **pollution sources**
- Identify problem areas and key **"problem pollutants"**
- **Develop a custom monitoring programme** for important ecosystem & use areas (focusing on key "problem pollutants")
- Use generic Quality Target values to compare, and refine as needed….

Follow-up Capacity Building Workshops…

- Recommend Nairobi Secretariat facilitate **follow-up regional capacity building workshops** (linked to technical recommendation)
- Countries bring **progress on pilot studies to share** amongst one another
- **Advisors (e.g. CSIR) assist countries with guidance on improvements**, where required
- Countries **share problems experienced** and further **support** needs
- Identify **possible regional-level support mechanisms** to assist countries

- Consider **annual capacity building workshops –** provide regional platform for continuous support, sharing and learning as pilot studies on Coastal & Marine WQ Management programmes are rolled out to other marine pollution hotspots in countries

Group Discussion & Closure

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