



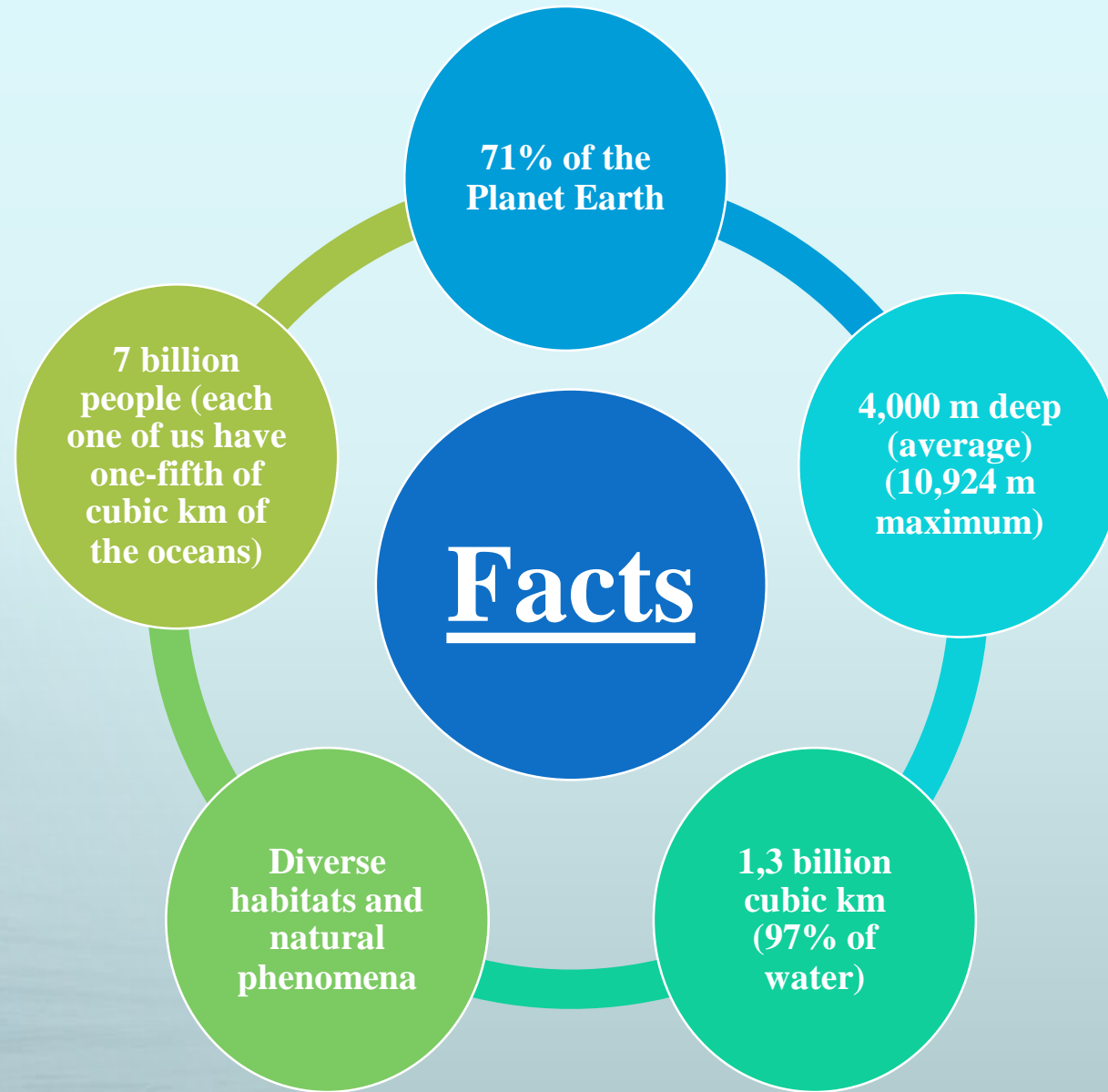
National Monitoring Programme for Marine Biodiversity and Non-Indigenous Species in Egypt

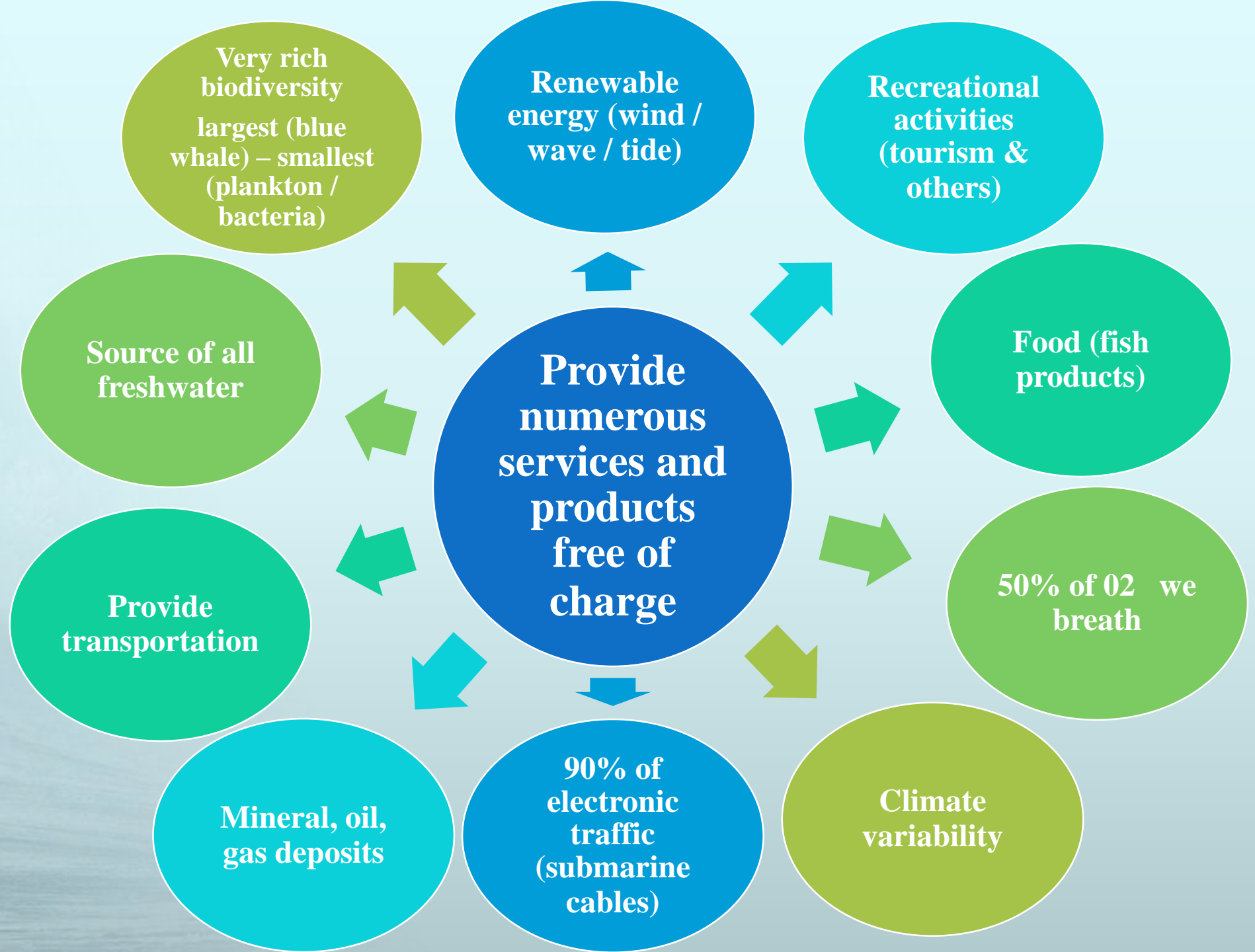
Professor Moustafa M. Fouda
October 2017
Cairo

National Monitoring Programme for Marine Biodiversity and Non-Indigenous Species in Egypt



Marine Environment

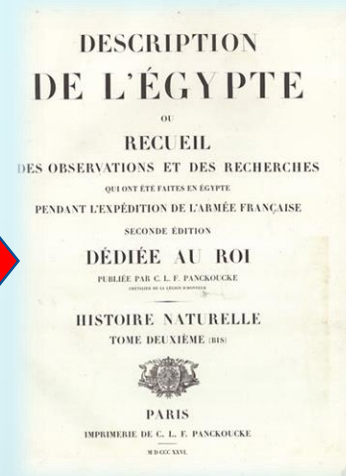




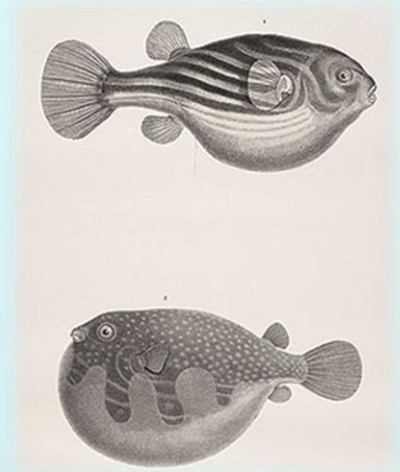
Marine Science in Egypt



Ancient Egypt



French campaign (1798)



Current Situation: Universities, Research Institutes, Ministry of Environment, Other Ministries.



Mohamed Ali Era (1805 - 1845),



Major Expeditions

- Hatshepsut (Ancient Egypt)
- Polas (Austria)
- Amiragola Mgnaghi (Italy)
- Meteor (Germany)
- Snelus (Holland)
- John Murry (U.K.)
- Mabahiss (Egypt)
- Atlantis I, II (USA)
- Calypso (France)
- Xarifa (Germany)



Egyptian Main Explorers

- King Fouad I
- Dr. Hussein Fawzi
- Dr. H. A. Gohar
- Dr. Anwar Abdel Aleem
- Dr. Youssif Halim
- Dr. Saad El-Wakeel
- Dr. Gamil Soliman
- Dr. Mohamed Dewidar
- Dr. Attaf Ezzat
- . Ahmad M. El Issawy



And many others till now (thousands of good marine scientists)

Ecosystem Approach (EcAp)

- A strategy for integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way
- A process aiming to achieve Good Environmental states (GES) through elaborated ecological objectives (11) and common indicators



How we are making it easier to achieve the good environmental status of marine waters



More flexibility
to concentrate
on problem
areas



More accurate
way to measure
achievement of
environmental
goals



Increased
regional and
sub-regional
cooperation



Enhanced
synergy with
existing EU
nature, water
and fisheries
legislation



Better
understanding
of human
impacts on
marine
environment

Mediterranean Basin

- Cover less than 1% of the world's Oceans and 0.3% of it's volume
- Most valued diverse sea
- 2.6 million km²
- 46000 km long
- 1500 m (average) depth
- 10000 – 12000 species: 8500 animal species, 1300 plant species, 2500 other taxonomic groups.
- 4 – 18% of marine species.
- High endemic species (20 – 30%).
- Species diversity increase from East to West.
- Total population about 500 million .

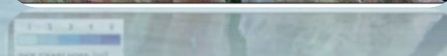


A vertical, narrow image showing a close-up of a green, textured surface, possibly a wall or a piece of fabric, with a dark, irregular shape at the top.

Coastal development (urbanization / tourism)

Habitat loss and degradation

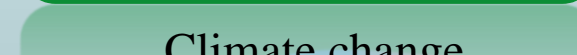
Pollution



relieve erosion / destabiliza



Overfishing / by-catch



Climate change



Invasive species

Barcelona convention adopted EcAp



In Athens 2016, 19th Meeting of the contracting Parties to Barcelona convention adopted “Integrated Monitoring and Assessment Programme (IMAP) through a participatory process (contracting parties, scientific community, other relevant stakeholders).



Barcelona convention roadmap for EcAp implementation (7 steps):

- 1- Definition of **ecological vision**
- 2- Setting common **strategic goals**
- 3- Identification of important ecosystem properties and assessment of **ecological status and pressures**
- 4- Develop **ecological objectives**
- 5- Derivation of **operational objectives, targets and indicators**
- 6- Revision of **existing monitoring Programme** for ongoing assessment and regular
updating of targets
- 7- Development and review of **relevant action plan and programmes**

Assignment objective:



- Develop a national monitoring programme for biodiversity (EQ1) and non-indigenous species (EQ2) in Egypt.

It should include:

- Representative areas / sites to be monitored
- National reference list of habitats, and species to be monitored.
- Monitoring Programme by common indicators



Common Indicators

- 1- Habitat distribution range.
- 2- Condition of the habitat's typical species and communities.
- 3- Species distribution range for marine mammals, seabirds and turtles.
- 4- Population abundance for (mammals, seabirds, turtles).
- 5- Population demographic for (mammals, seabirds, turtles).
- 6- Trends in abundance, temporal occurrence and spatial distribution of non-indigenous species (NIS).



Approach

- IMAP and related criteria.
- All relevant decisions of Barcelona Convention (2008 – 2017).
- Marine monitoring programmes of several countries, including Egypt.
- Personal contacts with experts.
- Consultation with available literature on monitoring marine biodiversity.
- Current state of knowledge on marine biodiversity in Egypt.



Ecological Vision

A healthy Mediterranean with marine and coastal ecosystems that are productive and biologically diverse for the benefit of present and future generation.



Ecological objectives

➤ Ecological objective 1

Biological diversity is maintained or enhanced

➤ Biological objective 2

Non – indigenous species introduced are at levels that do not adversely alter the ecosystem.

➤ Ecological objective 3

Populations of selected commercially exploited fish; shellfish are within biologically safe limits, exhibiting a population age and size distribution that is indicative of a healthy stock.



Monitoring Marine Environment (April 2016, Montreal, Canada)

- Existing marine assessments lack quantitative data on trends (marine + human use)
- Need for baseline, standardized monitoring / improved data availability / accessibility to meet Aichi Targets + SDGs
- Existing monitoring programmes provide opportunities to work together (governments, academics, etc.)
- Monitoring systems designed to respond to societal needs
- 3 knowledge (scientific, local, traditional)
- Link monitoring with ecosystem services
- Monitoring (bottom up approach)
- Regular review of monitoring
- Capacity to access information
- Marine technology transfer
- Rapidly changing marine environment needs quick actions (including monitoring)



Contacts with Experts

Key challenges in monitoring

- What to monitor / what for? By whom / cost / time frame.
- Do they reflect national policies or management
- (programmes document ONLY decline in biodiversity and do not lead to substantive change).
- Little coordination / link between monitoring and managers (need and integrated monitoring framework).
- Compatibility of data collection (methods), and accessibility.
- Conflicts between government (ecosystem approach-health) and individuals (species approach).
- How to monitor change / its cause?



Institutional / Regulatory Aspects

- Egyptian **constitution** (2014):
 - Environmental Protection
 - International / Regional conventions
- Law 4 / 1994 (amended by Law 9 / 2009)
- Law for Protected Areas (102 / 1983)

(Vision, mandate, policies for planning and management including
monitoring management performance)

- Many other laws of governmental agencies



Scientific Aspects

- Egyptian Marine Biodiversity Knowledge:

- Ecosystems

- Habitats (natural / modified)

- Fauna

- Flora



Projects

- BioNET (>4 million records)
- Marine Protected Areas
- Impacts of climate change
- Biodiversity of EEZ
- Invasive species
- SAP BIO
- Aquaculture / Fisheries
- Others



Existing Monitoring Programmes

- History since ancient times
- Institutions
 - EEAA (NCS)
 - NIOF
 - GADFR
 - Universities
 - Research Centers



Existing Monitoring Programmes

- But...
- Scattered data in institutions
- Can not be used to implement EcAP / objectives
- Mostly old data
- Difficult to know trends in environment health (good / or bad)
- Marine environment is changing rapidly
- Need for planning and development of a monitoring programme.

Standard Monitoring Programmes

- It determine the extent of compliance with a predetermined standard or the degree of deviation from an expected norm:
 - Standard (baseline position) is a maintenance of the existing area / habitat / species
 - Features (habitats / species)
 - Attributes (area / number / structure)
 - Target state (standard that is to be monitored)



Standard Monitoring Programmes

- Monitoring for conservation should be linked to site management
- It should not be confused with research (aiming to investigate ecological processes)
- Monitoring can:
 - establish whether standard are being met;
 - detect changes / trigger responses
 - contribute to causes of changes
 - assess successful actions
- Monitoring is substantive arrangement for each ecological objective



Common Indicators

- It is a measure that summarize data into a simple standardized and valuable information to decision makers (GES)
- **Key principles for IMAP**
 - Adequacy
 - Coordination and coherence
 - Data architecture
 - Adaptive
 - Risk-based approach (priorities)
 - Precautionary principle



Common Indicators for IMAP

- Focus on “representative sites” with criteria for selection:
 - Where pressures / risks on biodiversity
 - Where most information / historic data available
 - Where well established monitoring is undertaken
 - Sites of high biodiversity importance / conservation
 - Expert opinion



Sustainable Development Goals - SDG 14

Targets

- 14.1 Prevent / reduce marine pollution
- 14.2 Restore / achieve sustainable marine ecosystems
- 14.3 Minimize effects of ocean acidification
- 14.4 End overfishing
- 14.5 Conserve 10% of marine areas
- 14.6 Reform fisheries subsidies
- 14.7 Increase benefits to small island developing status



2017 Quality Status Report

Ecological Objective (EQ1) on Biodiversity

➤ Common Indicators 1, 2

- 50% habitats (data deceit)
- Remaining ones: threatened, endangered, vulnerable (algal communities, soft-bottom, rocky with muscle / oyster beds)
- Decline in extent and quality
- Need for coordination / standardization



2017 Quality Status Report

➤ Common Indicator 3

- 12 mammals species, threats due to anthropogenic pressures.
- Sea birds (patchy, often lacking); increase in diversity from south east to south west.
- Loggerheads in eastern and central Green turtles in eastern region.

➤ Common Indicator 4

- Not fully assessed; low estimates for mammals
- Seabirds abundant in north / west
- Turtles have scattered or stable populations, mostly in Greece / Turkey



2017 Quality Status Report

➤ Common Indicator 5

- Data scarce / fragmented, hence renders very difficult
- Fin whale / common bottle nose dolphin: 50% decline in mortality

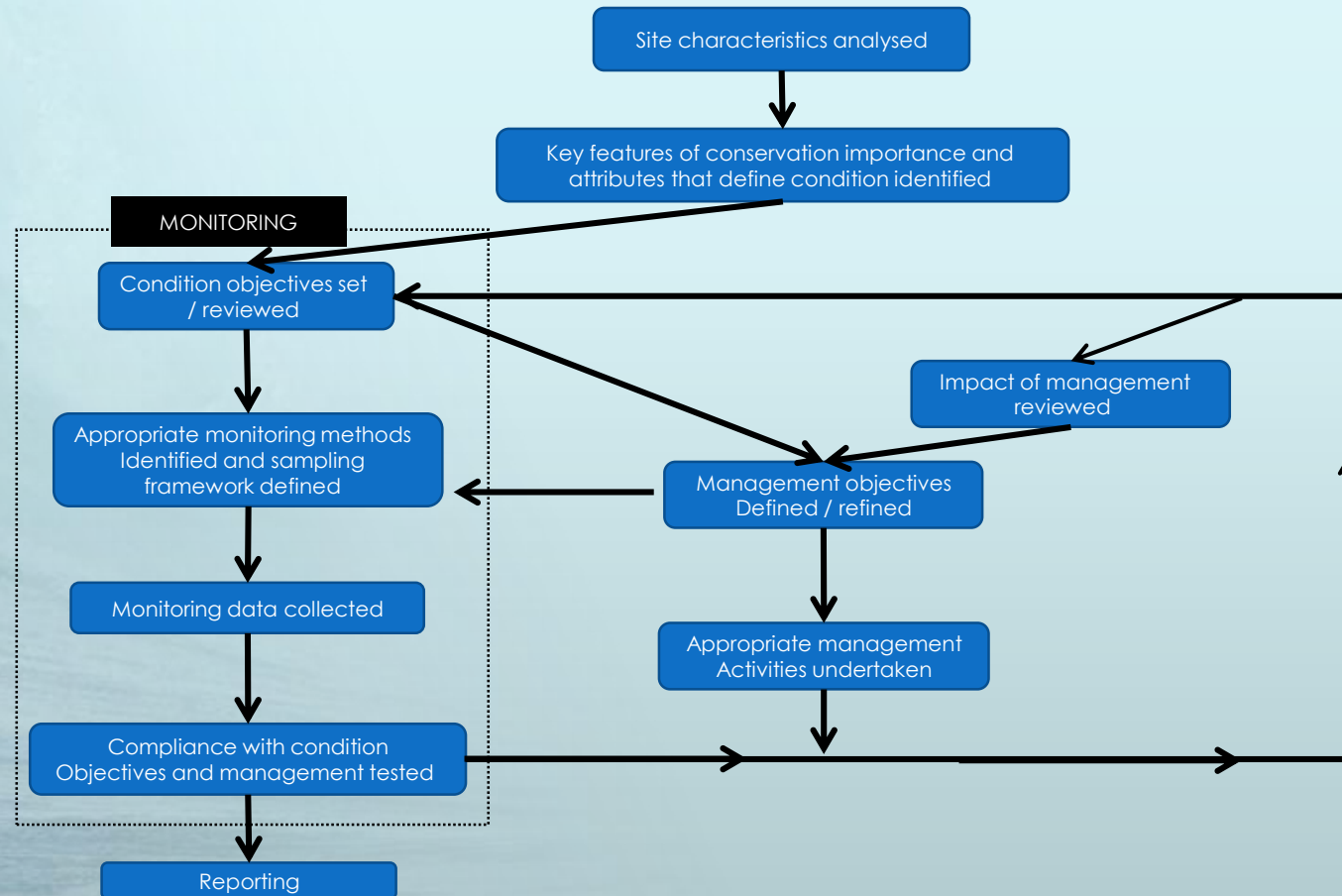
➤ Common Indicator 6

- Sub-regional variation
- Eastern region has an increase in trend by 30.7 species / decade; last decade 200 new species!!!

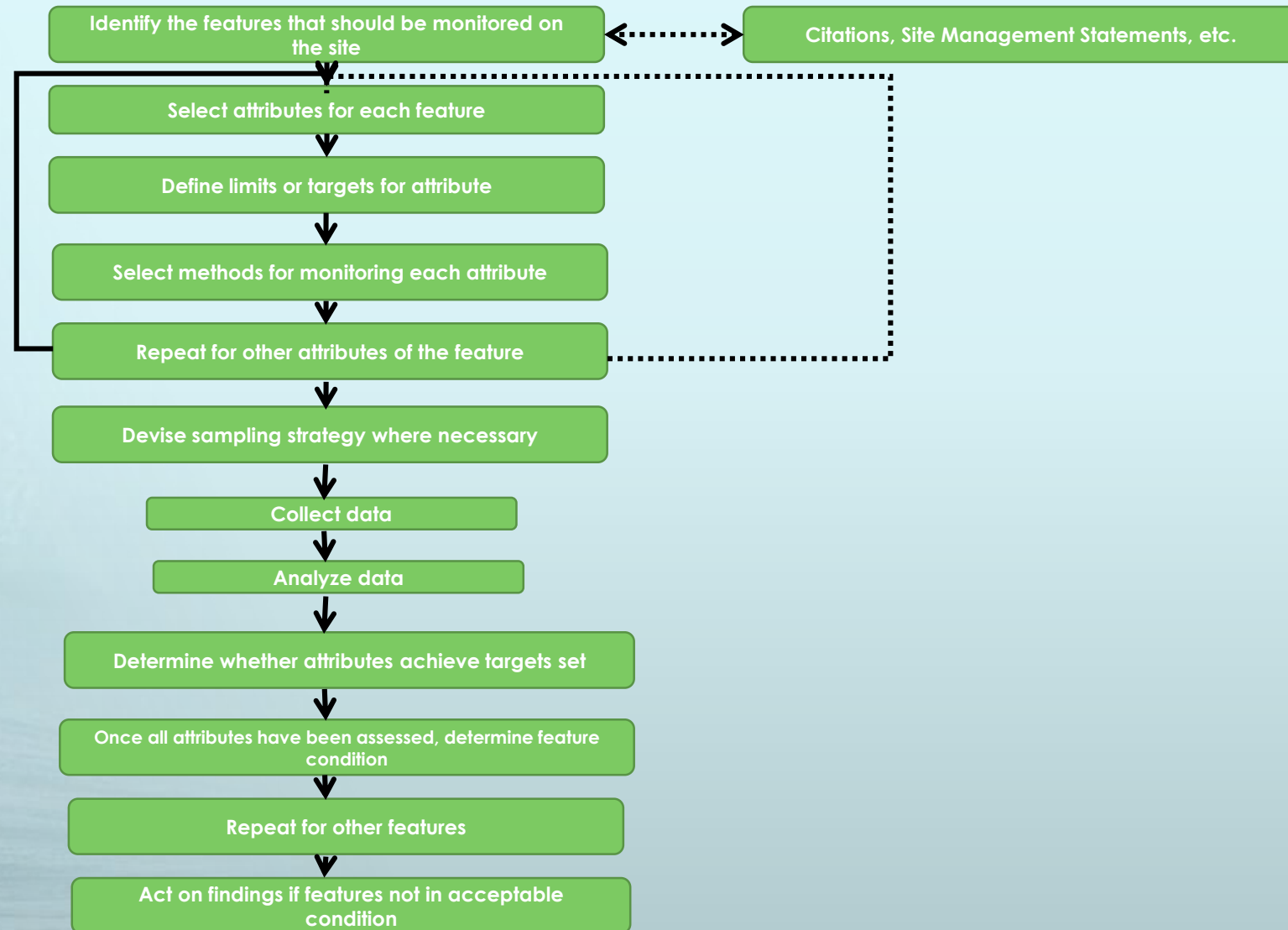
Planning / Development of A Marine Monitoring Programme

- What is monitoring?

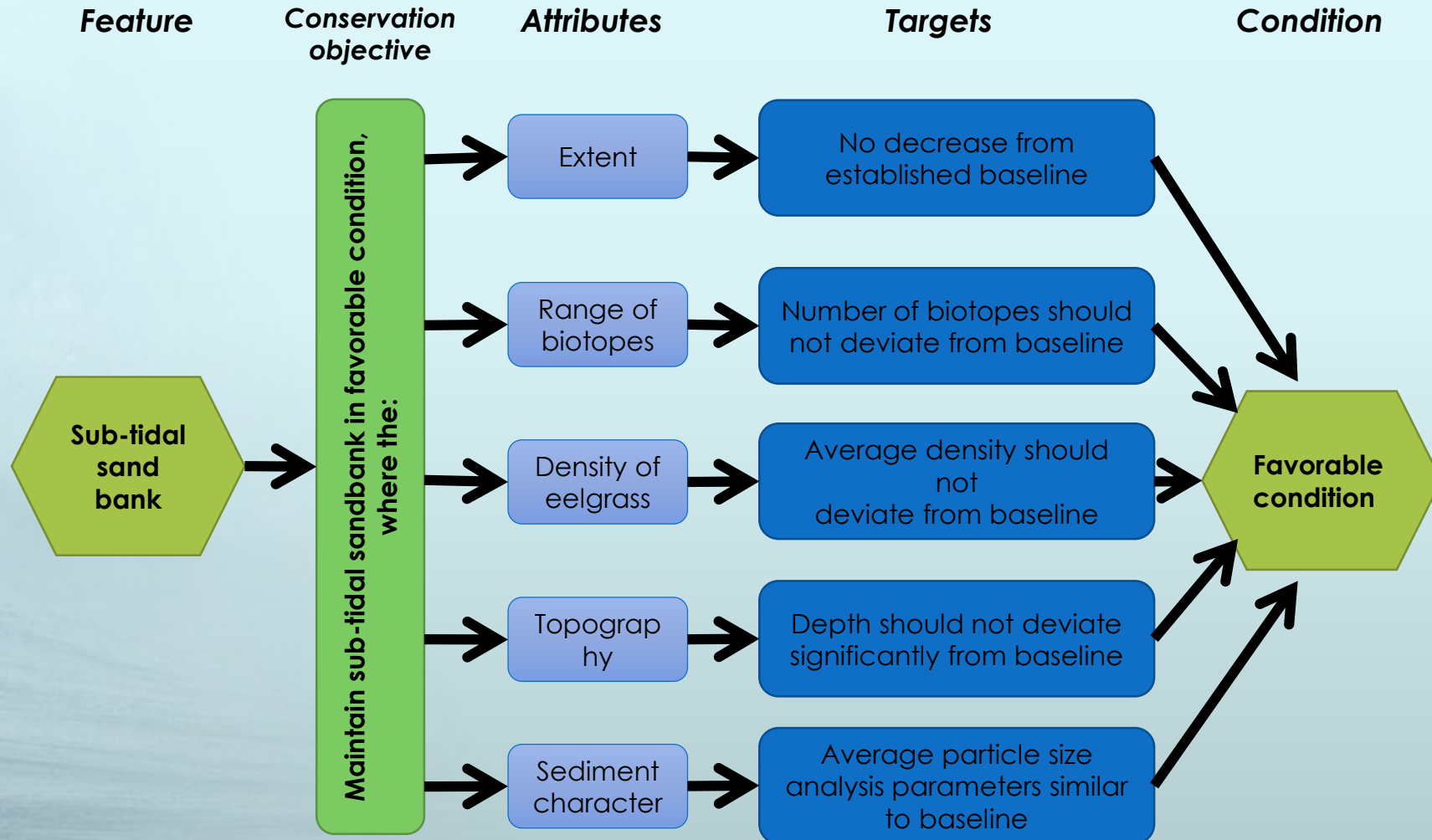
A programme of repeated surveys using standardized procedures



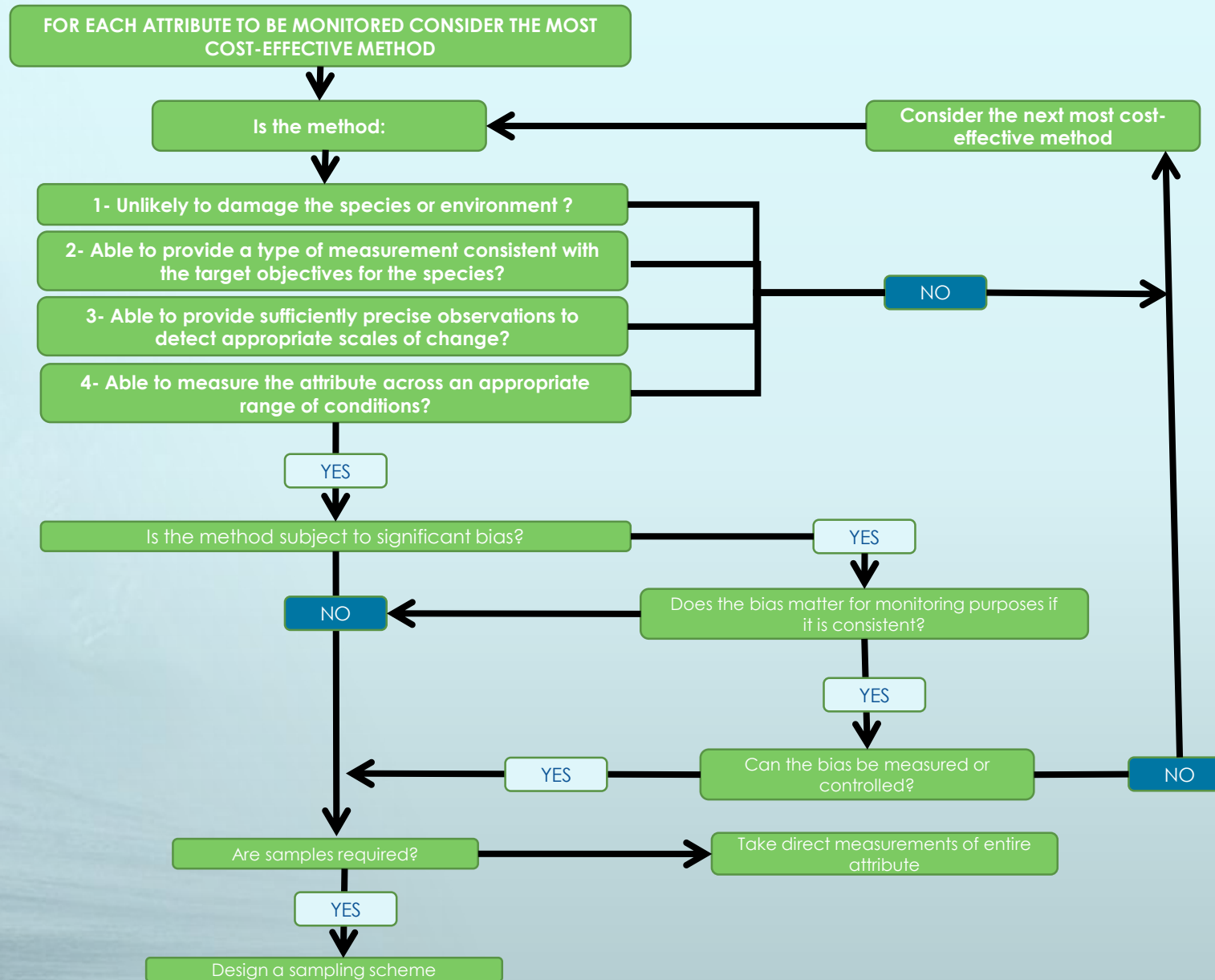
Schematic diagram of the steps involved in a monitoring programme.

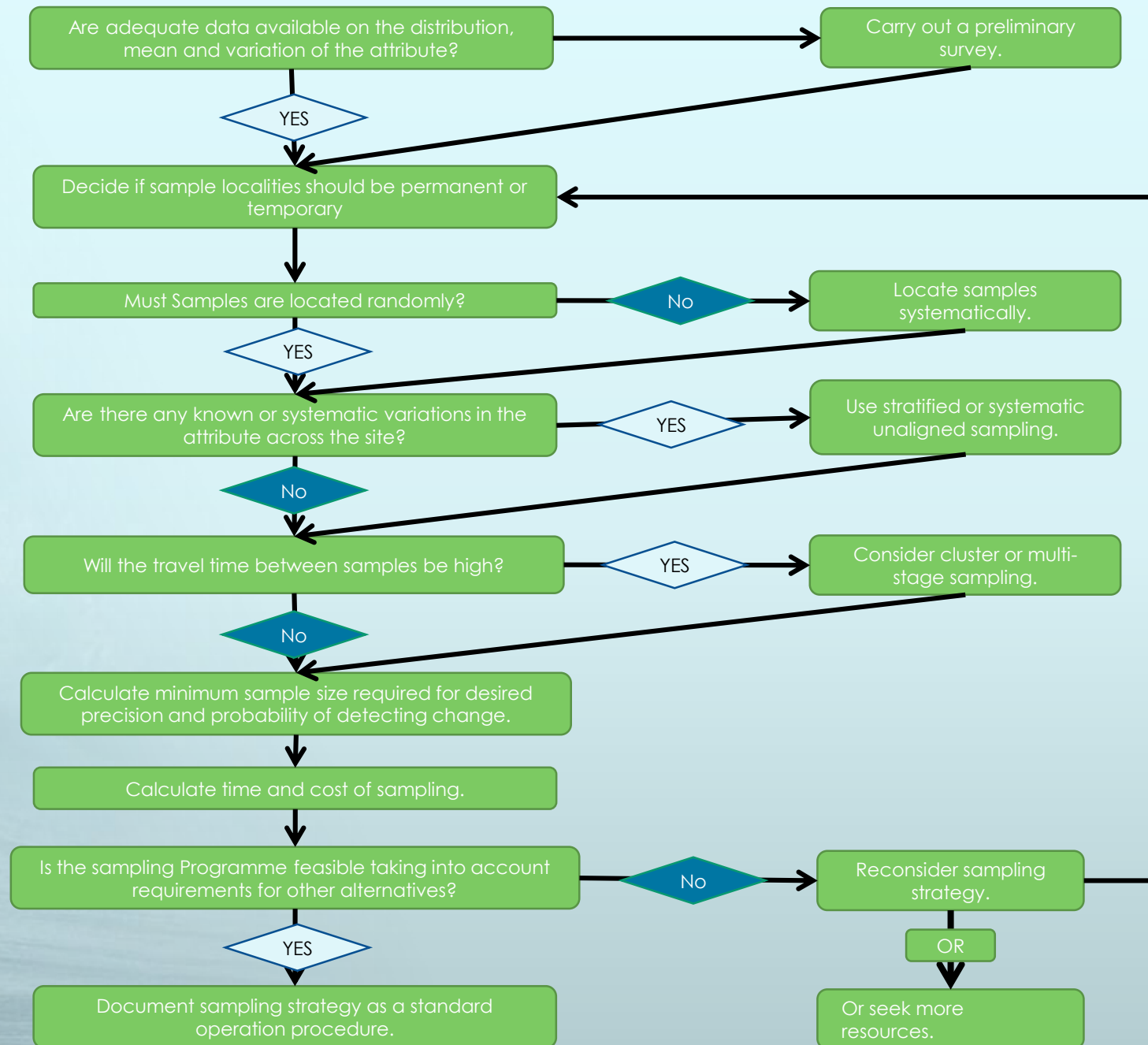


Diagrammatic representation of the Prepared approach to setting a conservation objective for a marine feature

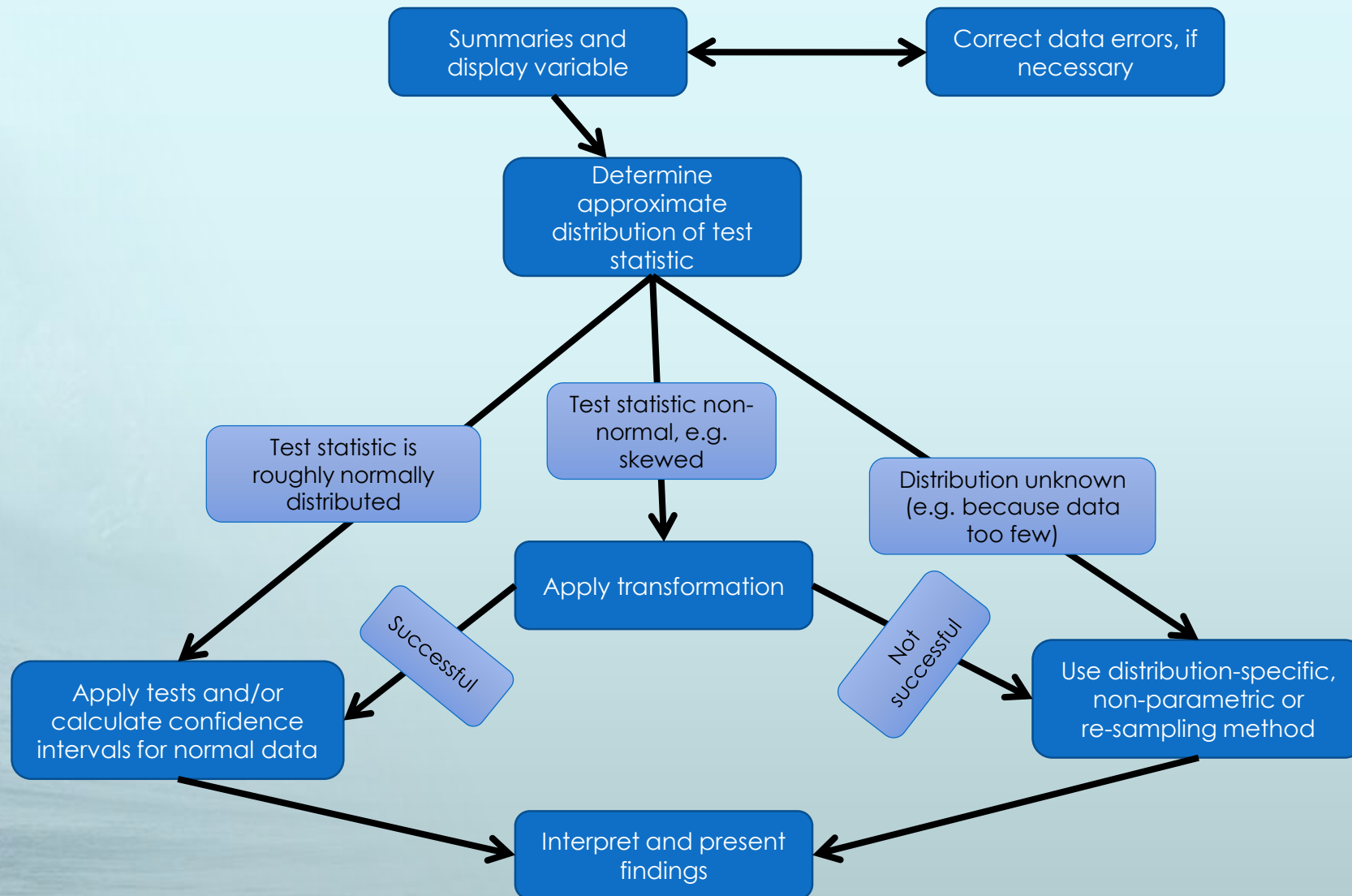


Selection of methods for monitoring each attribute

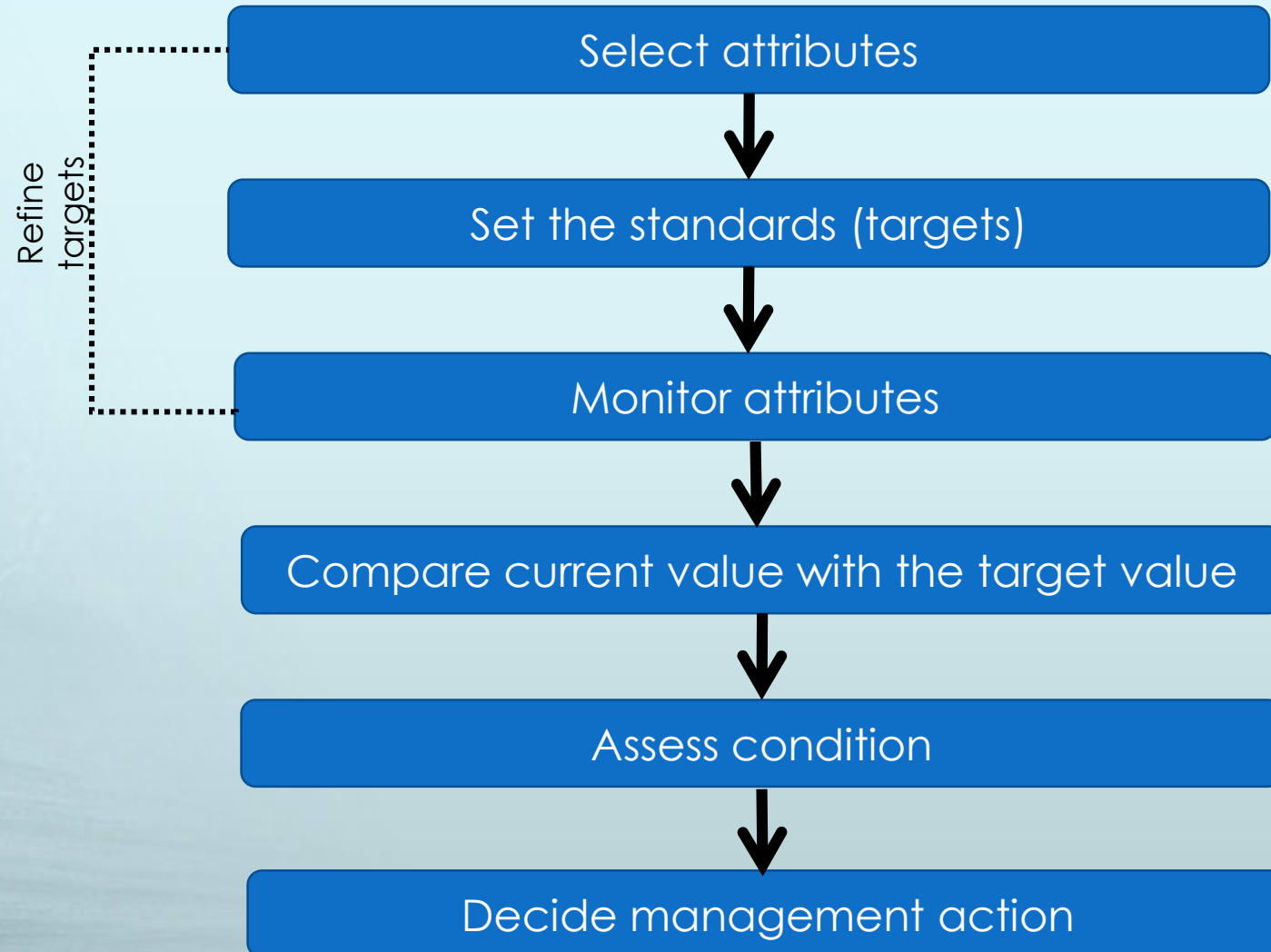




Flow diagram outlining the steps involved in data analysis, for each variable of interest



Summary of the SAC monitoring process





Summary

- Biodiversity monitoring provides guidelines for decisions on how to manage biodiversity in terms of production and conservation
- It determines status of biodiversity at one or more ecological levels / asses changes over time and space
- Used to determine the ability of the area to continue to add value to society overtime
- Needs for a strong governance
- It should respond to societal needs
- Rapidly changing marine environment needs quick actions
- It requires integrated policy making for sustainable development.



Suggested Monitoring Programme

- Vision
- Goals
- Ecological objectives

should be in accordance with IMAP of Barcelona convention

Habitat Mapping Programme

Marine Mammals Programme

Marine Turtles Programme

Seabirds Monitoring Programme

Non-Indigenous species Monitoring Programme



Habitat Mapping Programme

- Habitats (natural, man-made, or modified)

- Where?

Littoral / sub-littoral, sea grass beds, sandy / rocky shores, underwater soft / hard bottom habitat, islands, open sea / deep sea habitats.

Examples: Sallum MPA, Alexandria, Nile Delta Fan (when possible),

- Why?

General Goal:

- Develop habitat mapping for specific areas of biodiversity importance, as well as an economic and social importance.

Habitat Mapping Programme

Specific Goals:

- Prepare an inventory for all biological components in each site;
- Mapping be effective, easy to use, fairly cheap and reliable
- Agree on standardized methods
- Integrate habitat mapping indicator with other common indicators.

Implementation

I- Habitat distribution range

II- Conditions of habitat's typical species and communities

III- Species Distribution Range

IV- Population Abundance of selected species

V- Population Demographic Characteristics



Habitat Mapping Programme

I- Habitat distribution range

- 3 main sites
 - Sallum MPA
 - Nile Delta coast (Alexandria)
 - Zaranik PA
- In each site, benthic / pelagic habitat, be mapped using different methods.
- East habitat will be evaluated in terms of areal extent, human activities to generate vulnerability maps.
- Efforts will be made to be cost-effective (each site will be used for other common indicators).

II- Conditions of habitat's typical species and communities

- Be complemented with environmental data as well as human pressures



Habitat Mapping Programme

III- Species Distribution Range

- A minimum information standards, using different methods (location for each species, special breeding grounds for fish and invertebrates).
- Assessment will be annual

IV- Population Abundance of selected species

- Inventory of all species
- Occurrence of each species
- Species composition
- Select dominant species for each habitat
- Determine population size of selected species, its
- Population density, breeding season, migration patterns and other biological parameters, based on recommendations of IMAP.



Habitat Mapping Programme

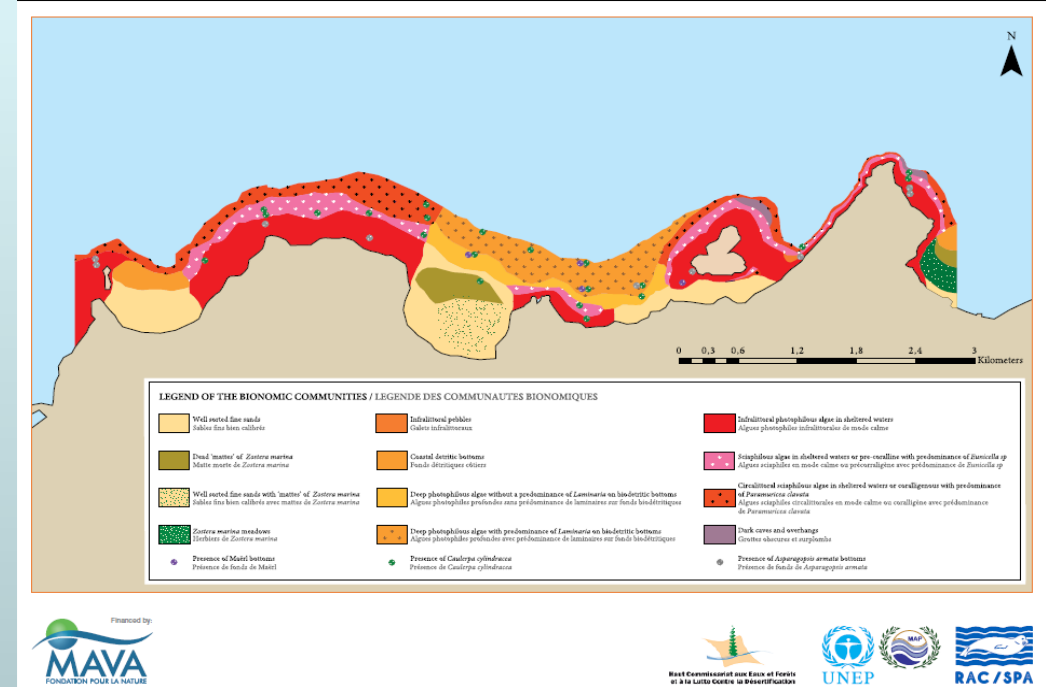
V- Population Demographic Characteristics

- Selected habitats and species be used to determine body size, age structure, sex ratio, fecundity and mortality (MKH / UNEP / MAP / RAC/SPA 2016).

Habitat Mapping Programme

Methodology

- Depth limit
- Characterization of species and habitats, using different methods;
- Mapping of habitats
- Set a monitoring system for key habitats:
 - Posidonia
 - Coralligenous assemblages
 - Others





Habitat Mapping Programme

Resources Needed (**need to be revised**)

- A research vessel
- Scuba diving
- Adequate equipment: (DGPS, long line transects, Quadrates, camera, video, core sampler)
- Laboratory infrastructure
- Qualified personnel for field, data processing, taxonomy, etc.



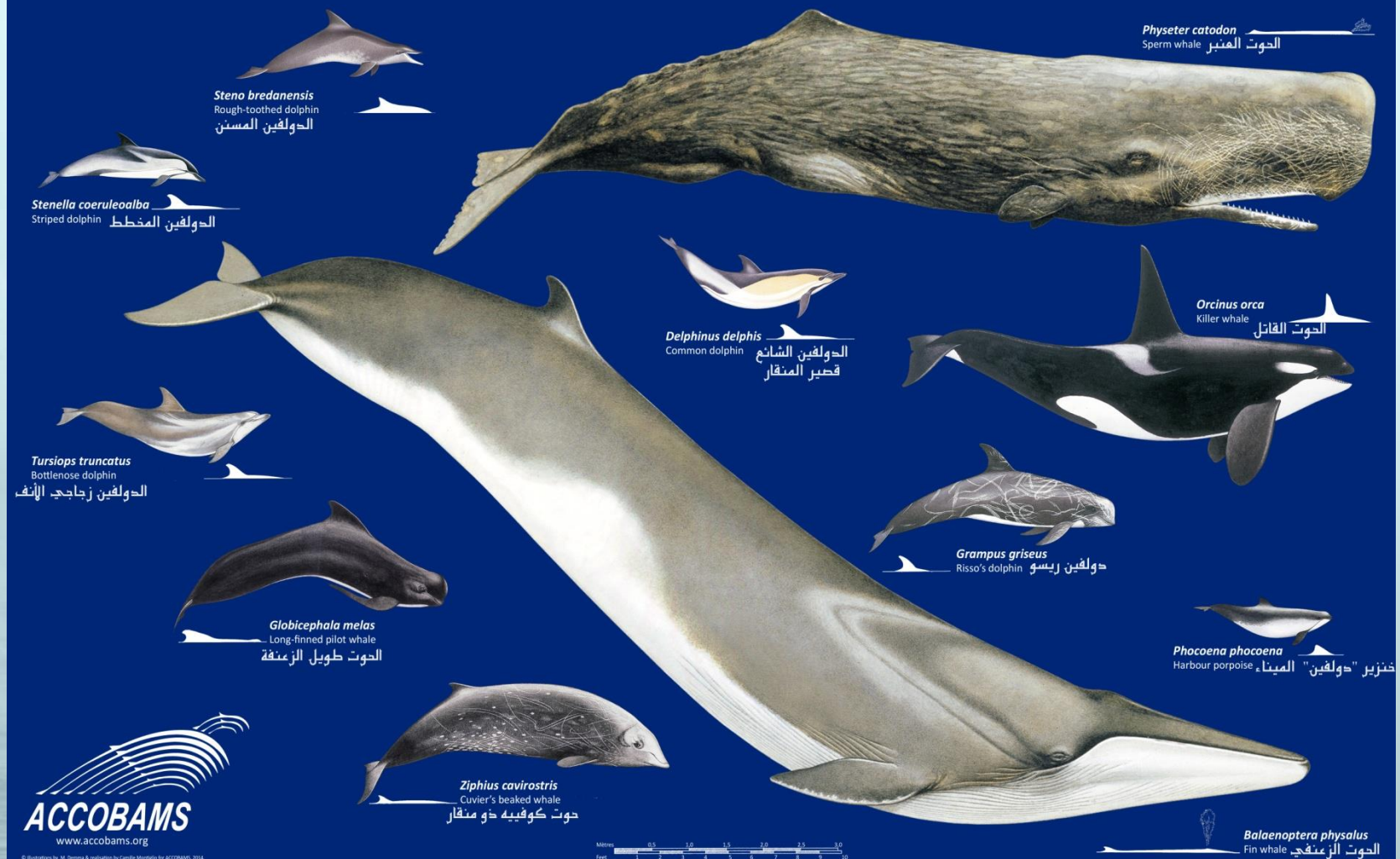
Suggested Marine Mammals Programme

- **Aim:** provide data to assess status, abundance, trends, distribution and health of marine mammals
- **Methods:** (RAC / SPA / UNEP / MAP / Med PAN / ACCOBAMS)
 - Incidental sighting / stranding
 - Land-based monitoring
 - Platforms of opportunities
 - Boat surveys
 - Photo-identification
 - Acoustic monitoring
 - Biopsy sampling
 - Spatial modeling
- **Applications of the 5 common indicators for mammals:** (Habitat distribution range, Conditions of habitat, Species Distribution Range, Population Abundance of selected species, and Population Demographic Characteristics)
- **Frequency:** 2 surveys / year
- **Resources needed:** (see above)

Suggested Marine Mammals Programme

Cetaceans of the Black and Mediterranean Seas

الحوتيات في البحر المتوسط والبحر الأسود





Suggested Marine Turtles Programme

- 3 turtle species in Mediterranean

➤ **Main Goals**

- Establish a tagging programme
- Establish a long-term monitoring Programme (nesting beaches)
- Data collection methods on stranding.
- Setting up a standing network
- Agree on methodologies to estimate demographic parameters

➤ **Sites:** Zaranik PA / Bardawil, Sallum,...

➤ **Applications of the 5 common indicators for mammals:** (Habitat distribution range, Conditions of habitat, Species Distribution Range, Population Abundance of selected species, and Population Demographic Characteristics.

- **Frequency:** one survey / year
- **Resources Needed:** (see above)



Suggested Seabirds Monitoring Programme

- 25 seabirds species (Annex II of SPA/BD protocol)

➤ **Goal:** Same as RAC / SPA 2009

Maintain and / or restore the population levels of bird species in SPA Protocol, Annex II to a favorable conservation status.

➤ **Priorities**

- Identify important areas
- Inventory / critical habitats
- Monitor colonies
- Impact of fisheries
- Population size and trends

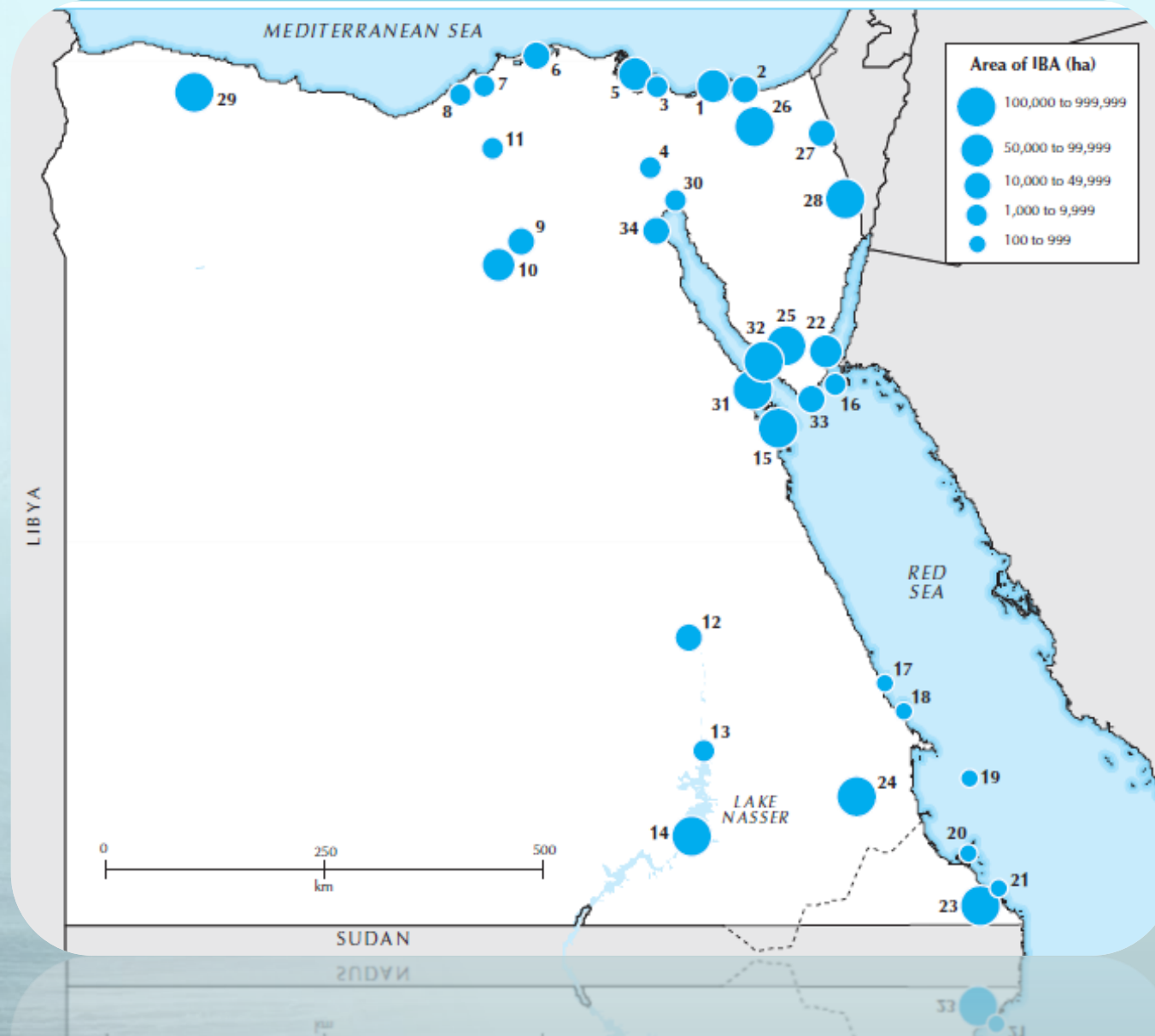
➤ **Methods:** RAC / SPA 2009 and others (Birdlife International)

➤ **Applications of the 5 common indicators for mammals:** (Habitat distribution range, Conditions of habitat, Species Distribution Range, Population Abundance of selected species, and Population Demographic Characteristics.

- **Frequency:** ??

- **Resources Needed:** (see above)

Suggested Seabirds Monitoring Programme



Suggested Seabirds Monitoring Programme

N	Scientific name	English name	Status
1	<i>Calonectris diomedea</i>	Scopoli's Shearwater	migrant, very rare
2	<i>Puffinus yelkouan</i>	Yelkouan Shearwater	migrant, very rare
3	<i>Puffinus mauretanicus</i>	Balearic Shearwater	migrant, very rare
4	<i>Hydrobates pelagicus melitensis</i>	Mediterranean Storm-petrel	migrant, rare
5	<i>Phalacrocorax aristotelis desmarestii</i>	Mediterranean Shag	WV, rare
6	<i>Phalacrocorax pygmeus (Microcarbo pygmaeus)</i>	Pygmy Cormorant	migrant, rare
7	<i>Pelecanus onocrotalus</i>	White Pelican	WV, rare
8	<i>Pelecanus crispus</i>	Dalmatian Pelican	WV, very very rare
9	<i>Phoenicopterus roseus</i>	Greater Flamingo	WV & FB, uncommon
10	<i>Pandion haliaetus</i>	Osprey	WV & FB, uncommon
11	<i>Charadrius leschenaultii columbinus</i>	Greater Sand Plover	WV & could be MB
12	<i>Charadrius alexandrinus</i>	Kentish Plover	RB & WV, common
13	<i>Numenius tenuirostris</i>	Slender-billed Curlew	WV, very rare
14	<i>Sterna albifrons (Sternula albifrons)</i>	Little Tern	MB & WV, common
15	<i>Sterna nilotica (Gelocheidon nilotica)</i>	Gull-billed Tern	RB & WV, common
16	<i>Sterna caspia (Hydroprogne caspia)</i>	Caspian Tern	WV, common
17	<i>Sterna sandvicensis (Thalasseus sandvicensis)</i>	Sandwich Tern	WW, common
18	<i>Sterna bengalensis emigrata (Thalasseus bengalensis)</i>	Lesser Crested Tern	PV, rare
19	<i>Larus genei</i>	Slender-billed Gull	RB & WV, common
20	<i>Larus melanocephalus</i>	Mediterranean Gull	WV, , uncommon
21	<i>Larus audouinii</i>	Audouin's Gull	PV, rare
22	<i>Larus armenicus</i>	Armenian Gull	WV, uncommon
23	<i>Halcyon smyrnensis</i>	White-throated Kingfisher	RB & WV, common
24	<i>Ceryle rudis</i>	Pied Kingfisher	RB & WV, very common
25	<i>Falco eleonora</i>	Eleonora's Falcon	PV, rare

Status of bird at Egyptian Mediteranain coast is based on persoanl suurvey from 2009 till 2016

Abreviation :RB, Resendent breeder , WV, winter visitor , PV, passage visitor , , MB, migrant breeder , FB, former breeder



Suggested Non-Indigenous Species Monitoring Programme

➤ **Goals:**

Monitor trends in abundance, temporal occurrence and spatial distribution

➤ **Sites:**

- Shores around Port Said and Alexandria
- Fish markets
- Survey Ports / Marines
- Underwater surveys

➤ **Protocols / techniques**

- (IUCN Guidelines)
- Citizen scientists
- Pathways of introduction
- Reference list of species / habitats

• **Frequency:** ??

• **Resources Needed:** (see above)

Suggested Non-Indigenous species Monitoring Programme

Sub-Regional Pilot Study for the Eastern Mediterranean on Non-Indigenous Species in Relation to Fisheries Background Paper , Athens, 20 – 21 September 2017



Etrumeus teres
(Herring)



Fstularia commersonii
(Flutemouth)



Hemiramphus far
(Halfbeak)



Upeneus moluccensis
(Goldband Goatfish)



Upeneus pori
(Goatfishes)



Iagocephalus sceleratus
(Silver-cheeked Toadfish)



Nemipterus randallii
(Golden Threadfin Bream)



Pempheris rhomboidea
(Sweepers)



Plotosus lineatus
(Striped Eel Catfish)



Pterois miles
(Lionfish)



Stephanolepis diaspros
(Reticulated Filefish)



Sargocentron rubrum
(Redcoat)



Saurida lessepsianus
(Lizardfish)



Scomberomorus commerson
(Mackerel)



Siganus luridus
(Rabbitfish)



Siganus rivulatus
(Rabbitfish)



Implementation / Operation Plan

- Workshop of experts for information sharing
- Training of staff
- A group for each indicator (5)
- Logistics
- Equipment for each programmed
- Laboratory Infrastructure
- Human Resources (30 – 35 personnel)
- Programme coordination / secretariat
- GIS specialists
- Skilled taxonomists
- Laboratory specialists
- Data collection, analysis, interpretation and reporting.



Recommendations



**Thank you for
your attention**