

Identification of Important Coastal and Marine Biodiversity Areas (ICMBA) to strengthen the Marine Protected Areas Network in India

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Existing Marine Protected Areas (MPAs) in India

18 Marine Protected Areas
cover 6158 km²

MPAs form 3.85% of total area
under PAs in India and 4.97%
of coastal zone of peninsular
India



Why identify Important Coastal and Marine Biodiversity Area (ICMBA) in India?

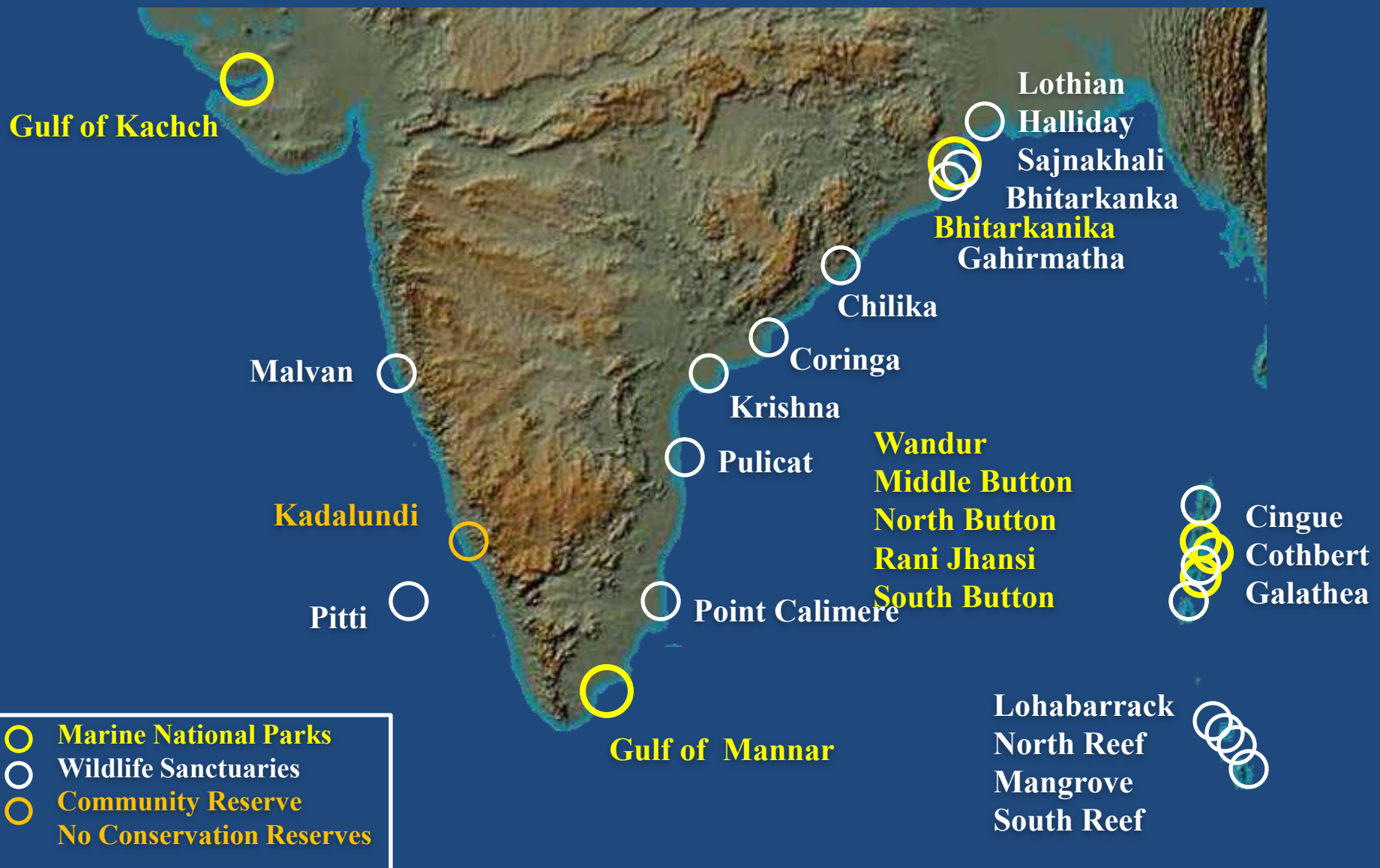
- **Poor representation of coastal and marine biodiversity areas in the Protected Area Network of India**
- **Lack of detailed studies on**
 - a. Estuaries**
 - b. Backwaters**
 - c. Sand Dunes**
 - d. Intertidal zones**
 - e. Rocky shorelines**
 - f. Seagrass meadows**
 - g. Lagoons**
 - h. Intermediate open sea**

resulting in the need for identification and prioritization of potential sites

Overall objectives of ICMBA study

- **To examine all coastal and marine biodiversity areas along coastline of India**
- **To develop ICMBA criterion**
- **To identify ICMBAs based on the criteria and assign the sites as possible conservation / protection category**
- **To prioritize ICMBAs which requires immediate inclusion into a conservation category**

Existing Marine Protected Areas in India



METHODOLOGY

Part I

Literature survey, gathering of secondary information about biodiversity values and finalization of criteria for identification of ICMBAs in India using similar existing global and national criteria

Part II

Primary data collection through field surveys in 350 potential sites all along Indian coasts

Application of newly developed criteria for identification of ICMBAs from 350 sites surveyed

Methods: Part I

Review on existing methodologies to identify ICMBAs in India

Global (macro-level) priority setting approaches for biodiversity conservation

Biodiversity hotspots

Habitat based, e.g., rain forests
(Myers, 1988)

Major tropical wilderness areas

Ecosystem based, e.g., high biodiversity tropical areas
(Myers, 1990; Mittermeier, 1990)

Mega-diversity countries

Country based biodiversity assessment method e.g.,

Existing micro-level approach for India

Available methodology in India

- **Untawale, 2000**
 - based on threatened taxa status
- **Singh et al., 2000**
 - both on taxa and habitat types
 - suggested 12 sites along Indian coastline

Additional options consulted for ICMBA Identification

- **Important Bird Areas (IBAs) – Birdlife International**
- **Key Biodiversity Areas (KBAs) – Birdlife International**
- **Special Area Conservation (SAC) – EU’ s Habitat Directive**
- **Marine Ecoregions – WWF & Nature Conservancy**
- **&**
- **Important Coastal & Marine Biodiversity Areas (ICMBA)**

Criteria for identification of ICMBAs

Six following “Conservation amplifiers” were picked up from standard methods for criteria development

- 1. Ecosystem resilience**
- 2. Ecosystem function**
- 3. Biodiversity uniqueness**
- 4. Cultural, Religious & Aesthetic significance**
- 5. Socio-economic potential**
- 6. Land tenure**

CRITERION 1

Coastal ecosystem resilience

Indicators

1. Considerable area

2. Ecosystem contiguity

3. Habitat diversity (mangrove, mud flat, coral, seagrass, sand beach etc)

4. Adequacy of the site to maintain ecosystem level processes (nutrient flow, salinity changes)

5. Wildlife corridor (connected by vegetation, water or others)

CRITERION 2

Ecosystem functions

Indicators

1. Freshwater discharge/ recharge function
2. Coastal erosion control
3. Carbon sequestration value
4. Natural protection against disaster

CRITERION 3

Biodiversity uniqueness

Indicators

1. Presence of Globally threatened species
2. Presence of Regionally threatened Species (IWPA 1972)
3. Presence of restricted range species
4. Presence of flagship species
5. Presence of endemic species
6. Nursery and Breeding site provisions for species of conservation significance
7. Congregation area for species of conservation significance
8. Congregation area for migratory species

CRITERION 4

Cultural, Religious & Aesthetic significance

Indicators

- 1.Cultural value
- 2.Religious value
- 3.Historical value
- 4.Aesthetic value

CRITERION 5

Socio-economic potential

Indicators

1. Renewable natural resource extraction opportunity
2. Ecotourism prospects
3. Support for agriculture
4. Aquaculture and Fisheries

CRITERION 6

Land tenure

Indicators

1. Government ownership or other private ownership

Methods: Part II

Survey methodology for identification of ICMBAs

How were sites chosen?

- **Collected Secondary information from**
 - a. State Forest Departments,**
 - b. Institutions and**
 - c. NGOs**
- **All 350 potential sites were visited and rapid assessment on certain taxon groups have been carried out.**
- **All sites were surveyed minimum twice and maximum thrice**

Survey for identification of ICMBAs

Number of sites visited and examined

Coast	States	Coastal Length (Km)	Number of sites surveyed and examined *
West	Gujarat	1610	44
	Maharashtra	720	32
	Goa	120	10
	Karnataka	280	46
	Kerala	590	75
East	West Bengal	210	16
	Orissa	480	25
	Andhra Pradesh	1014	42
	Tamil Nadu & Pondicherry	950	60
	Total	5974	350

* within 5 km on the landward side

Scoring system for identification of ICMBA

- **Collected information from 350 sites were used to prepare a Data Matrix against 26 indicators spread over 6 criterion**
- **Binary coding method was followed to score sites against each indicator**
- **The candidate site must fit to at least 1 indicator for each criterion and should score the minimum of 13**

Criteria	Indicators	Threshold	Points
Coastal ecosystem resilience	Total area (km²)	<5 sq.km	0
		5-10	1
		10-15	2
		>15	3
	Ecosystem continuity to the nearest ICBA	Continuous	2
		Separate patches	1
	Habitat diversity (mangrove, mud flat, coral, seagrass, sand beach etc)	1 to 2	1
		3 to 4	2
		> 4	3
	Adequacy of the site to maintain ecosystem level process	Adequate	1
		Needs addition	0
	Whether a prominent wildlife corridor (connected by forest, water etc)	Yes	1
		No	0

Life Support Systems	Freshwater discharge	Significant	2
		Marginal	1
		Not al all	0
	Coastal erosion control	Significant	2
		Marginal	1
		Not al all	0
	Carbon sequestration value	Significant	2
		Marginal	1
		Not al all	0
	Natural protection against disaster	Significant	2
		Marginal	1
		Not al all	0

Unique Biodiversity (fauna and flora)	Number of Globally threatened species	<2	1
		3 to 5	2
		6 to 8	3
		>9	4
	Number of Regionally threatened Species (IWPA 1972)	<5	1
		6 to 10	2
		11 to 15	3
		>16	4
	Number of restricted range species	<2	1
		3 to 5	2
		6 to 8	3
		>9	4
	Number of flagship species	<2	1
		3 to 5	2
		6 to 8	3
		>9	4
	Number of endemic species	<2	0
		3 to 5	1
		6 to 8	2
		>9	3
	Nursery and Breeding site provisions for species of conservation significance	<2	1
		3 to 5	2
		6 to 8	3
		>9	4
	Congregation area for species of conservation significance	0	0
		<2	1
		3 to 5	2
		6 to 8	3
Congregation area for migrant species	>9	4	
	Yes	1	
	No	0	

Scoring system ...

Conservation Priority Index (CPI)

- The total score of a site was divided by total number of indicators to obtain score ratio (= CPI of site)
- A Candidate site was selected as ICMBA if its CPI is ≥ 0.5

Identified ICMBA sites in India

Coast	States	Identified ICMBA's	Total
West	Gujarat	15	62
	Maharashtra	14	
	Goa	4	
	Karnataka	12	
	Kerala	17	
East	West Bengal	2	44
	Orissa	14	
	Andhra Pradesh	15	
	Tamil Nadu & Pondicherry	13	
		Total	106 *

*** An ATLAS of 106 ICMBA site prepared**

Further prioritization among ICMBAAs for immediate attention

Prioritization based on

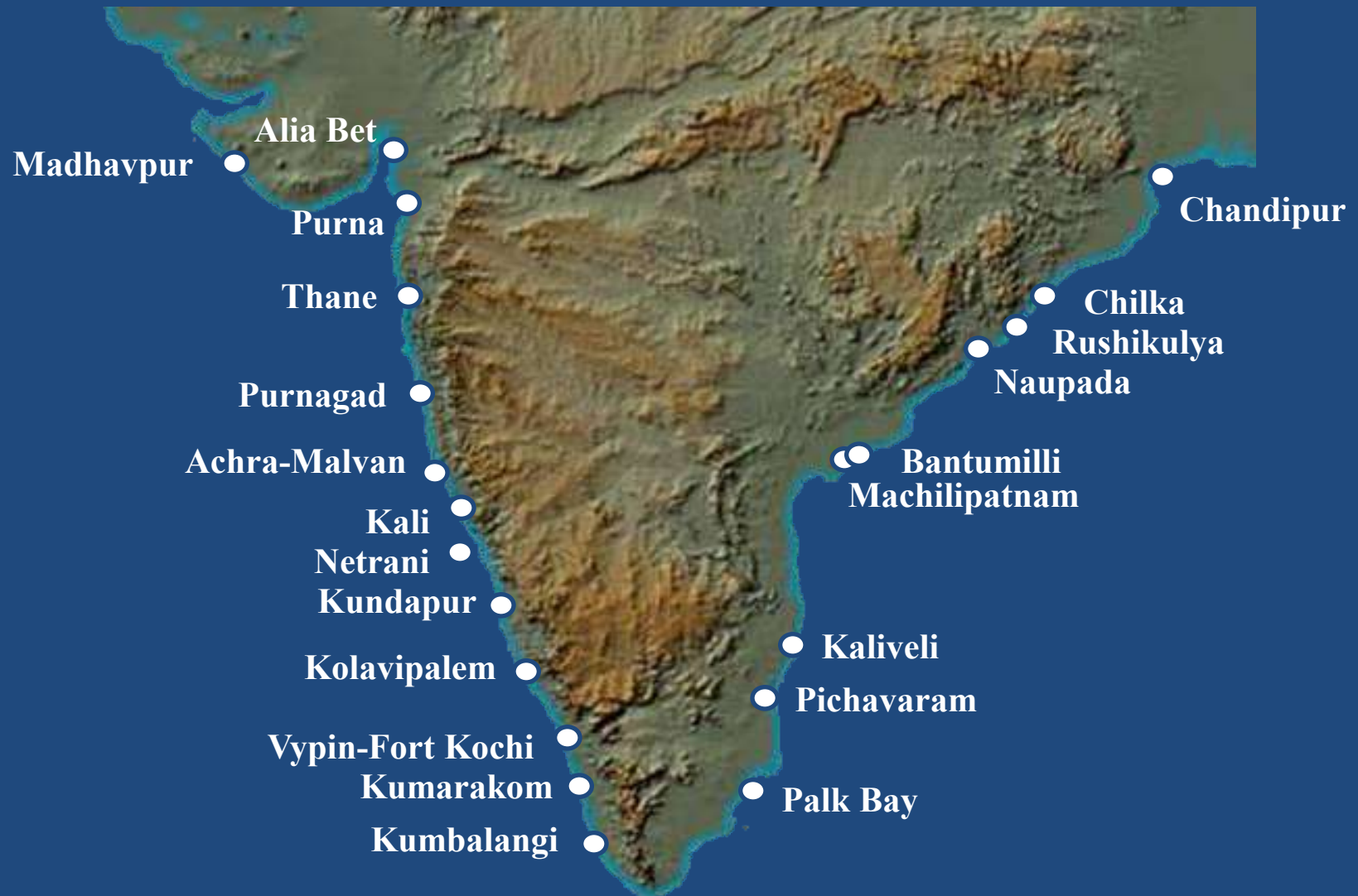
- **Additional biodiversity values of candidate site's surrounding landscape matrix**
- **Habitat vulnerability to range of threat**
- **Land tenure system**

Prioritized ICMBA sites

Coast	States	Prioritized ICMBA's	Total
West	Gujarat	3	13
	Maharashtra	3	
	Goa	1	
	Karnataka	2	
	Kerala	4	
East	West Bengal	-	9
	Orissa	3	
	Andhra Pradesh	3	
	Tamil Nadu & Pondicherry	3	
		Total	22 *

* Fact Sheets in ICMBA Atlas were coloured in Red

Prioritized ICMBA sites in India



Example

ICMBAs in one of Indian state of Gujarat & Diu - Daman

Listed ICMBAs	Prescribed conservation strategy	
	Designate as	Management agencies
Koteswar	Conservation Reserve	Local Admin. + SFD
Sangi - Jacau	Community Reserve	GUIDE + SFD
Lethadi	Community Reserve	Local Admin. + SFD
Porbandar	Community Reserve	Local Admin. + SFD
Madhavpur	Community Reserve	Local Admin. + SFD
Diu	Community Reserve	Local Admin. + SFD
Katpar - Gopnath	Community Reserve	Local Admin. + SFD
Navbandar	Community Reserve	Local Admin. + SFD
Sabarmati	Community Reserve	Local Admin. + SFD
Wadgham	Community Reserve	Local Admin. + SFD
Alia bet	Community Reserve	Local Admin. + SFD
Narmada	Community Reserve	Local Admin. + SFD
Purna	Conservation Reserve	GEER + SFD
Daman ganga	Community Reserve	Local Admin. + SFD
Umargaon	Community Reserve	Local Admin. + SFD

Prioritized ICMBAs in Gujarat & Diu - Daman

Prioritized ICMBAs	Site significance	Additional values
Madhavpur	TNS	Fisheries, sand dune
Alia bet	Mudflat	Birds, Fisheries
Purna	Estuary	Mangroves, birds, fisheries

- Candidate sites scores CPI value ≥ 0.8

Identified ICMBAs in Gujarat & Diu - Daman



Turtle hatchery in Madhavpur



Mudflat in Alia Bet

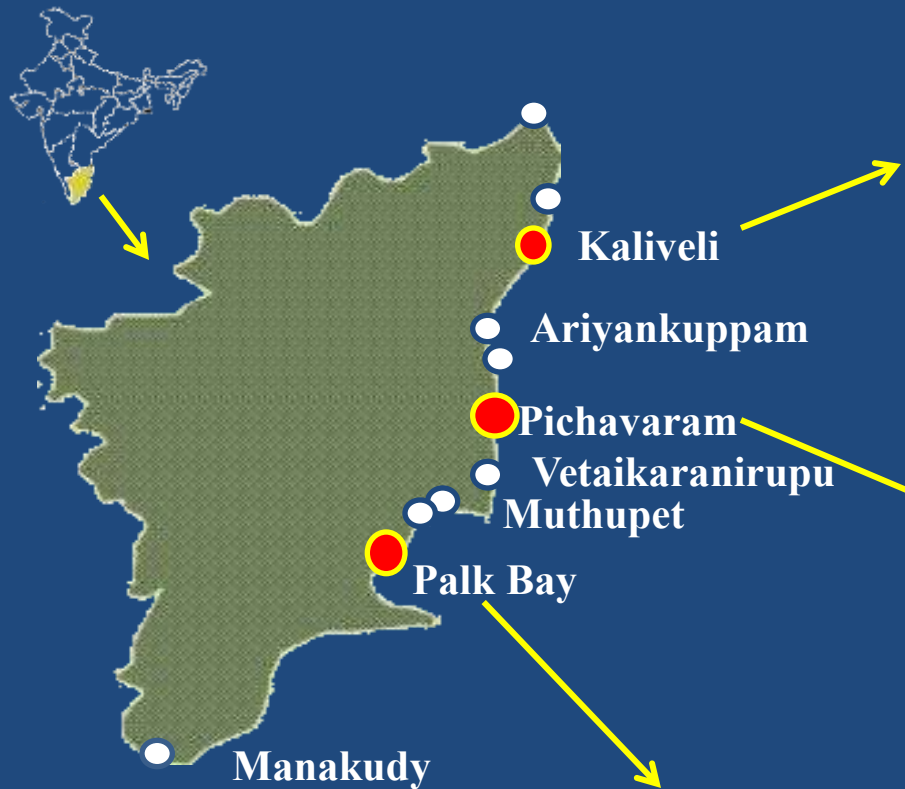


Mangroves in Purna



 Prioritized sites

Identified ICMBAs in the state of Tamil Nadu & Pondicherry



Kaliveli wetland



Mangroves in Pichavaram



Palk Bay

 Prioritized sites

Features in ICMBA Atlas of India

Fact Sheets

- Site location map with geo-coordinates
- Access route and area
- Habitat description
- Biodiversity values
- Socio-economic importance
- Conservation status
- Threat
- Site significance/justification
- Site score (criterion and indicator)



Prioritized ICMBA site



Thank You

