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# CONCERTED ACTION FOR THE IRRAWADDY DOLPHIN (*Orcaella brevirostris*) [1]

Adopted by the Conference of the Parties at its 13th Meeting (Gandhinagar, February 2020)

## (i). Proponent:

The Government of India.

## (ii). Target species/population(s) and their status in CMS Appendices:

Target Species/Population:

Irrawaddy Dolphin, *Orcaella brevirostris,* CMS Appendix I and II.

Sub-populations across National Boundaries for Concerted Action:

1. Sundarbans of India and Bangladesh
2. Mekong River: Laos, Cambodia and Vietnam
3. Pacific islands
4. All other isolated and small populations need to be given conservation management priority

CMS Appendix: Appendix I and II

## (iii). Geographical range:

Irrawaddy dolphins, *Orcaella brevirostris* occur in the tropical and subtropical waters of the Indo-West Pacific region. The global population appears to be fewer than 7,000. It is a facultative, euryhaline species of dolphin as a result of its ability to adapt to both fresh water and saline water environments. Coastal and estuarine populations occur close to river mouths and in brackish water lagoons and established freshwater sub-populations stay within river systems and do not move into coastal areas (Stacey & Arnold 1999).

The range of *Orcaella brevirostris* extends from the western Bay of Bengal, along the coasts of India, Bangladesh, and southwards to Myanmar, Thailand, Cambodia, Vietnam, Philippines (Palawan), Malaysia, Brunei Darussalam, Singapore and Indonesia (Figure 1) (Stacey & Arnold 1999). Important Marine Mammal Area's in South and South East Asia have been identified owing to the presence of Irrawaddy dolphins (MMPATF 2019).

Coastal populations of *O. brevirostris* are being studied along the coasts of India (Sutaria 2009, D'Lima 2014, Chilika Development Authority and Orissa State Forest Department), Bangladesh and Myanmar (Smith et al. 2006, 2009), Gulf of Thailand (Hines et al. 2015), Malaysia (Ponnampalam et al. 2013) and Malampaya Sound in the Philippines (Dolar 2002, Smith et al. 2004).

[1] The geographical designations employed in this document do not imply the expression of any opinion whatsoever on the part of the CMS Secretariat (or the United Nations Environment Programme) concerning the legal status of any country, territory, or area, or concerning the delimitation of its frontiers or boundaries. The responsibility for the contents of the document rests exclusively with its author.

Freshwater populations occur in three major river systems: the Mahakam (Kalimantan, Indonesia); Mekong (Laos, Cambodia, Vietnam); and Ayeyarwady (Myanmar) Rivers (Figure1). These populations have attracted most of the research effort (Kreb 2007; Beasleyet al. 2007). Brackish water populations are found in Songkhla Lagoon (Thailand) and Chilika Lagoon (India)and both populations are currently being studied and monitored (Kittiwattanawong et al. 2007; Pattnaik et al. 2007).

The possibility of movement across political boundaries in south east Asia, is high just as the movement across Indian and Bangladesh or the riverine populations in the Mekong. But dorsal fin matches have not yet been found across these different populations (riverine versus coastal in Indonesia or across Malaysia and Indonesia; or Malaysia and Thailand). Further research needs to look into the possibility of movements across large distances.

Confirmed Presence in:

1. India
2. Bangladesh
3. Laos
4. Vietnam
5. Cambodia
6. Myanmar
7. Thailand
8. Malaysia
9. Indonesia
10. Philippines

**Figure 1:** The range of *Orcaella brevirostris* (yellow) from India to Indonesia and the Philippines, and the range of *Orcaella heinsohni* (blue) in Northern Australia (Sutaria 2009)

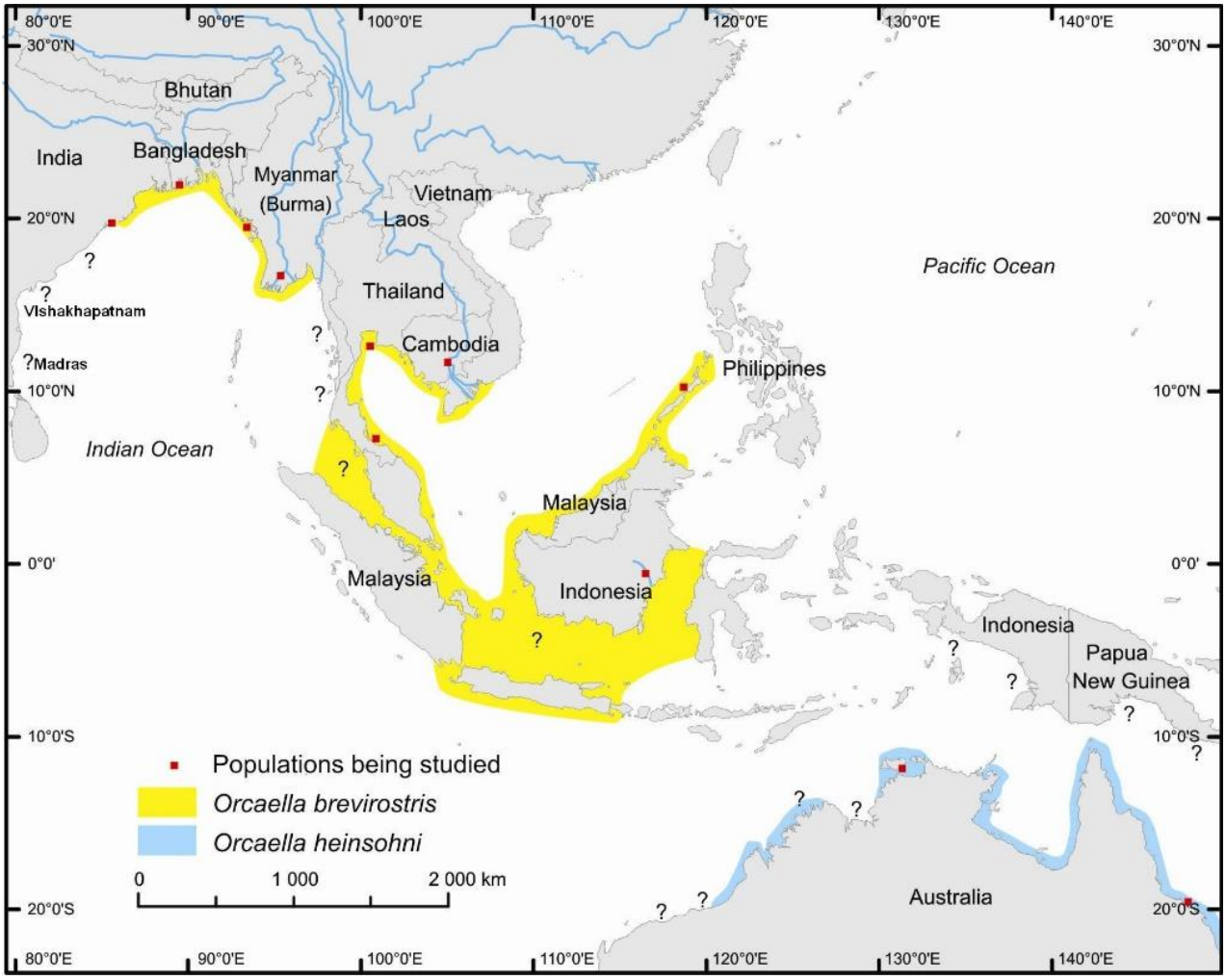

**Table 1:** A comparison of population estimates of *Orcaella brevirostris* in the species range

| | Country | Location | Population estimates | Reference |
|---|---|---|---|---|
| 1 | Bangladesh | Coastal waters | 5383 | Smith et al 2005, 2008 |
| 2 | Bangladesh | Sundarbans | 397-451 | Smith et al 2006, 2008, 2009 |
| 3 | Cambodia | Mekong River | 161 -127 | Beasley 2007 |
| 4 | Cambodia, Lao PDR, Vietnam | Mekong River | 125 | Beasley et al 2007 |
| 5 | India | Chilika Lagoon<br><br><br><br><br><br><br>Sundarbans | 85<br>131<br>135<br>138<br>145<br>104-112<br>109<br>Presence confirmed | Pattnaik et al 2007<br>CDA<br>CDA<br>CDA<br>IANS<br>Sutaria 2009<br>Sutaria and Marsh 2011<br>WII 2018 |
| 6 | Indonesia | Mahakam River | 83 | Kreb and Boudino 2018 |
| 7 | Indonesia | Banten Bay | 10-15 | Khalifa et al 2015 |
| 8 | Indonesia | Balikpapan Bay | 56 | Kreb et al 2019 pers comm |
| 9 | Malaysia | Kuching Bay, Sarawak | 149 | Minton et al 2013 |
| 10 | Malaysia | Cowie Bay, Sabah | 31 | Woan et al 2013 |
| 11 | Malaysia | Brunei Bay, Malaysia | 41 | Mahmud et al 2015 |
| 12 | Malaysia | Similajau-Kuala Nyalau, Sarawak | 189 | Tuen et al 2017 |
| 13 | Malaysia | Beluran and Sandakan Bay | | Porter at al 2019 pers comm |
| 14 | Myanmar | Ayeyarwady River | 58-72 | Smith et al 2007 |
| 15 | Philippines | Malampaya Sound<br>Negros<br>Quezon<br>Visayan Sea | Reduced from 77 to 42<br>20<br>18-23<br>25-30 | Smith et al 2004a and<br>WWF Philippines 2010 report<br><br>WWF Philippines<br>Dolar 2014 report |
| 16 | Thailand | Songkhla Lake | 1-15 | Kittiwattanawong et al 2007, Smith et al 2004b |
| 17 | Thailand | Eastern Gulf of Thailand | 423 | Hines et al 2015 |
| 18 | Thailand | Trait Bay | 171 | Junchompoo et al 2015 |
| 19 | Thailand | Bangpakong Estuary | 5-20 | Tongnunui et al 2011 |

## (iv). Activities and Expected Outcomes:

| Activity | Expected Outcome | Indicators |
|---|---|---|
| ***Addressing knowledge gaps*** | | |
| Assess ecological water flow to identify flows that can maintain longitudinal connectivity in rivers flowing into Chilika and the Sundarbans for movement, dispersal, and optimal space use by dolphins and their prey. Maintaining sea water input into Chilika. | Guidelines for barrage and dam reservoir operations, towards ecologically tuned management of water releases to maintain downstream as well as upstream habitat connectivity and depth for Irrawaddy dolphins to persist and carry out vital functions. | Intensively regulated rivers, often become limited to deep pools which get cut off from each other in the dry season (e.g. Ganga River downstream of Farakka barrage) |
| Boat-based research to continue photo- identification studies and identify critical habitat. | Improved data on population estimate, distribution, habitat use population health, trends in population, and threats. | Updated report on the status of Irrawaddy Dolphins in their range<br>Updated information on life history characteristics, |
| Use of passive acoustic recorders to detect the presence and effect of underwater noise | Improved understanding of distribution | Recordings that indicate year-round presence/absence of Irrawaddy dolphins<br>Management of Boat traffic |
| Genetic analysis of samples collected from strandings and to determine population structure, connectivity and viability | Rate of gene flow across sub populations; learn about movement and population health | Publications in peer-reviewed journals |
| Working with fishermen and fisheries department officials to mitigate fishing gear entanglement | Marine mammal observer programs on fishing vessels to collect data on interactions and to understand how to avoid entanglement | Reduction in mortality from entanglement |
| ***Information sharing*** | | |
| Citizen science tools, to allow the crews of fishing, coast guard and dolphin-watch vessels and ferries to record and report Irrawaddy dolphin observations. | Improved data and models of current Irrawaddy dolphin distribution | Increased number and geographical range in the database |
| ***Capacity-building*** | | |
| Training in dolphin disentanglement protocol | Workshops and trained fishermen and researchers; reduction in stranding events | More effective stranding/entanglement response, improved data on bycatch/entanglement rates; decrease in fisheries related mortalities; increase in population size |
| Sustainable Dolphin watching program and training | A management plan created by all concerned Administrative departments – State Forest Department, Chilika Development Authority, Collector's office, Tourism Ministry and Fisheries Department | Reduction in dolphin chasing incidents and dolphin mortalities. |
| Stranding response protocol and data collection | Increase data available on life history characteristics, cause of mortality, reproductive health and longevity | Data build up in the database and peer-reviewed papers. |

Anticipated Outputs

1. Multi-stakeholder networks that are ready to exchange information and collaborate on measures to improve the conservation status and mitigate threats faced by Irrawaddy dolphins across their range.
2. New insight into trends in the abundance, health and movement of Irrawaddy Dolphins in the region in relation to environmental parameters.
3. Improved research capacity in Range States through training workshops and cross-country collaboration
4. Scientific publications as well popular articles.
5. Increased awareness in coastal fishing communities and fishing captains who know how to report and mitigate accidental entanglement of Irrawaddy Dolphins or Irrawaddy Dolphins in fishing gear.

**(v). Associated Benefits:**

Conserving and studying Irrawaddy Dolphins via disentanglement training, will help in protecting other species of small and large cetaceans in their geographical range. These areas are also important for a range of other marine fauna like turtles, crocodiles and South Asian river dolphins.

**(vi). Timeframe:**

The Timelines for the development of an Irrawaddy Dolphin Concerted Action Plan are tabled below. Reporting points have been built into the timelines, to ensure that the CMS Scientific Council remains apprised of the Irrawaddy Dolphin Initiative's progress.

| Activity | Year 1 (2020) | 2021 | 2022/23 | Milestone achieved by | CMS |
|---|---|---|---|---|---|
| Assess Ecological water flow to identify flows that can maintain longitudinal connectivity in rivers flowing into Chilika and the Sundarbans for movement, dispersal, and optimal space use by dolphins and their prey. | Development | | Analyse | December 2024 | Progress reported to CMS Scientific Council 2025 |
| Boat-based research to continue photo- identification studies and identify critical habitat. | Research in CA countries | Research in CA countries | Meeting and Action Plan | December 2024 | |
| Use of passive acoustic recorders to detect the presence and effect of underwater noise | Units to be placed in places where movement might happen | Units placed in places where they move | Acoustic data used to identify areas of focus for mitigation measures in Action plan | December 2024 | |
| Genetic analysis of samples collected from stranding and to determine population structure, connectivity and viability | | | | | |
| Citizen science tools, to allow the crews of fishing, coast guard and dolphin-watch vessels and ferries to record and report Irrawaddy Dolphin observations. | workshops | Data collection | Data collection | December 2024 | |
| Working with fishermen and fisheries department officials to mitigate fishing gear entanglement<br><br>Training in dolphin disentanglement protocol | Research and workshops | Data collection | Data collection | December 2024 | |
| Stranding response protocol and data collection | workshops | Data collection | Data collection | December 2024 | |
| Sustainable dolphin watching management plan and training | Consultative meetings and training programmes | Consultative meetings and training programs | Monitoring of dolphin watching | December 2024 | |

### (vii). Relationship to Other CMS Actions:

The Concerted Action will support implementation of a number of recent CMS initiatives including:

- Resolution 8.22 (Adverse human induced impacts on cetaceans)
- Strategic Plan for Migratory Species 2015-2023 (e.g. Targets 5-10, 12 and15)
- Resolution 10.03 (The Role of Ecological Networks in the Conservation of Migratory Species) and Resolution11.25(Advancing Ecological Networks to Address the Needs of Migratory Species)
- Resolution 10.14 (Bycatch of CMS-listed Species in Gillnet Fisheries)
- Resolution 10.15 (Global Programme of Work for Cetaceans)
- Resolution 10.23 (Species marked for Concerted Actions 2012-14)
- Resolution10.19(MigratorySpeciesConservationinthelightofClimateChange)and Resolution 11.26 (Programme of Work on Climate Change and Migratory Species)
- Resolution10.24 (Further Steps to Abate Underwater Noise Pollution for the Protection of Cetaceans and Other Migratory Species)
- Resolution 11.10 (Synergies and Partnerships).

### (viii). Conservation Priority:

Irrawaddy Dolphins are listed as globally Endangered by the IUCN Red List Authority (Minton et al 2018). As shown in Table 1, abundance estimates for different Irrawaddy dolphin subpopulations are small, other than the population of coastal Bangladesh.

Sub-populations in Laos, Cambodia, Vietnam (Mekong River sub-population), Indonesia (Mahakam River sub-population, Borneo), Myanmar (Ayeyarwady/Irrawaddy River sub-population), the Philippines (Malampaya Sound sub-population), and Thailand (Songkhla Lake sub-population) are listed as Critically Endangered by the IUCN Red List Authority. The sub-population in Chilika lagoon, India is also small but has not yet been assessed separately. Available information from all sub-populations show that the populations have high site fidelity and are isolated from coastal populations, making these isolated populations vulnerable to extirpation if threats are not managed. Areas that are inhabited by Irrawaddy dolphins, specially the isolated populations and lagoon populations, have also been recognized as Important Marine Mammal Areas (IMMAs, IUCN-MMPATF 2019) by the IUCN Marine Mammal Protected Area Taskforce. IMMAs are also a CMS-supported initiative (see Res 12.13).

The primary threat to all Irrawaddy Dolphin populations listed here is fishing gear entanglement – mainly multifilament gill nets, shore seine and purse seine nets and hook & line fisheries. Dynamite fishing is a major cause of concern in some rivers. In Chilika unsustainable dolphin watching is also a cause of concern (D'Lima 2014).

In the riverine populations, maintaining flow and water level plays a very important role in seasonal movement and prey availability. Just like the Concerted Action required to sustain South Asian River dolphin populations, riverine Irrawaddy Dolphin populations also require international agreements on maintaining 'ecologically relevant water flow' in rivers across political boundaries, dams and barrages.

Water pollution is another very serious issue as Irrawaddy dolphins live in close proximity to human habitation – rivers, lagoons and coastal waters. In Chilika, persistent organic pollutants from agricultural run-off were detected in Irrawaddy dolphins (Kannan et al. 2005) that could compromise the dolphins' immune-system. In fact, cutaneous nodules, probably fibropapilloma's either viral or bacterial in source, have been reported in Irrawaddy dolphins from Malaysia (Kuching, Bintulu-Similajau, Kinabatangan-Segama and Penang Island), India (Chilika Lagoon) and Bangladesh (Sundarbans) with the highest percentage of individuals affected in Chilika (Van Bressen et al 2014).

Threats cause unsustainable mortality and could result in an estimated 30 per cent reduction in population size over the next three generations. Given the threats and decreasing trends in distribution and abundance in so many populations of the species, gives it high conservation priority. The species is at risk of local extirpation, requiring International cooperation and concerted action to conserve populations that move across national boundaries.

**(ix). Relevance:**

The species is relevant to CMS Concerted Action as some of the populations probably move across National Political boundaries as shown in Figure 1 and Table 1. Only India and Bangladesh are Member Parties, while the rest of the countries where Irrawaddy dolphins are found are not Member Parties.

The species is listed in Appendix I of CMS and categorized as being in danger of extinction throughout all or a significant proportion of their range, as well on Appendix II as it would benefit significantly from international co-operation, the Concerted Action is of great relevance to this species.

The listing of Irrawaddy dolphins on Appendix I and II of CMS requires CMS Parties that are also Range States:

a) *To conserve and, where feasible and appropriate, restore those habitats of the species which are of importance*
b) *To prevent, remove, compensate for or minimize, as appropriate, the adverse effects of activities or obstacles that seriously impede or prevent the migration of the species; and*
c) *To the extent feasible and appropriate, to prevent, reduce or control factors that are endangering or are likely to further endanger the species.*

The Irrawaddy Dolphin is also in Appendix I of CITES which disallows all commercial trade in species that are threatened with extinction.

The UNEP-CMS Action Plan for the Conservation of Freshwater Populations of Irrawaddy dolphins notes that spatial, place-based protection will be pertinent to protecting these isolated populations. The populations shared across countries are in the Sunder bans and in the Mekong River.

A Memorandum of Understanding for the Conservation of Cetaceans and Their Habitats in the Pacific Islands Region (MOU) also includes Irrawaddy dolphins.

Areas that are inhabited by Irrawaddy Dolphins, specially the isolated populations and lagoonal populations, have also been recognized as Important Marine Mammal Areas (IMMAs) by the IUCN Marine Mammal Protected Area Taskforce. IMMAs are also a CMS-supported initiative (see Res 12.13) and Chilika lagoon and the Sunder bans of West Bengal and Bangladesh are both IMMAs (IUCN-MMPATF 2019).

**(x). Absence of Better Remedies:**

Most of the range countries have strict Protection offered to the species by various administrative departments such as Fisheries Regulations, Wild Species Protection, and Protected Areas. Yet the populations are all showing decreasing trends. The threats to have been identified and threat mitigation solutions from a total shut down of fisheries to providing fishermen an alternate livelihood have been proposed. Yet matters concerning water flow, controlling pollution released into rivers and coastal areas, managing vessel traffic in rivers and coastal areas and habitat management needs cross-country collaboration.

In all range countries, regional, national, and international meetings and discussions have taken place over the last three decades. However, the translation of recommendations to conservation action and success are lacking, despite efforts at multiple scales. One outcome of conservation

interventions (especially education and outreach programs) has been the possible reduction in targeted capture for captive display. However, bycatch mortality in fishing gears remains a significant threat. Standard Bycatch mortality monitoring across the range is important. In the specific case of the Irrawaddy dolphins sharing habitat across coastal waters and the Sundarbans of India and Bangladesh, this Concerted Action would work hand-hand with the Concerted Action for Ganges River Dolphin. Firstly, while Bangladesh has a monitoring program for cetaceans in eastern Sundarbans, India has not carried out robust research in the Sundarbans. The total population size in this region is not yet certain because not all river stretches in which it occurs have been surveyed (especially in the Indian Sundarbans) and the region is and will face in the future the common problems arising from climate change, rising sea levels, change in water salinity and the expanse of water in the mangrove systems. Any dams or barrages upstream or in the mountain regions will affect these distribution factors. And so, a Concerted Action between India and Bangladesh is of great importance today.

**(xi). Readiness and Feasibility:**

At present, there seem to be multiple calls for concerted action and coordination of research and conservation across the range countries. The two main recent efforts toward this aim have been the formation of the Global River Dolphin Initiative by the World Wildlife Fund (WWF), and the concerted action efforts under the Convention on Migratory Species. Assessing the status and conservation of Irrawaddy dolphins in the Sundarbans was one of 57 priority projects described in the IUCN 2002–2010 Conservation Action Plan for the World's Cetaceans (Reeves et al. 2003). Thus, there are clear indications of the need and intent for collaboration, and the feasibility of joint projects or actions in the near future is expected to be high. Further, the Bangladesh and Indian governments have in place high-priority recovery plans/management plans/conservation action plans whose objectives are generally aligned with the foci of these global initiatives. The main challenge, of course, is to identify how to align the objectives of these parallel processes towards on-ground implementation of conservation recommendations.

Areas that are inhabited by Irrawaddy Dolphins, specially the isolated populations and lagoonal populations, have also been recognized as Important Marine Mammal Area IMMAs) by the IUCN Marine Mammal Protected Area Taskforce. IMMAs are also a CMS-supported initiative (see Res 12.13) and Chilika Lagoon and the Sundarbans of West Bengal and Bangladesh are both IMMAs (IUCN-MMPATF 2019).

## (xii). Likelihood of Success:

**Table 1:** Current status of Irrawaddy Dolphins Key Ecological Attributes/Indicators

| KEA | Indicator | Current status | Rationale/Justification |
|---|---|---|---|
| Population size | Number of Irrawaddy Dolphins in the geographical range | Fair | Species is Endangered (currently listed by IUCN as Endangered) with fewer than 100 individuals in almost all their subpopulations, other than one large population off the coast of Bangladesh. |
| | # of Irrawaddy Dolphin encounters per day during dedicated surveys | Poor | Dedicated surveys are limited to where Irrawaddy dolphin hotspots are known, boosting encounter rates. |
| | # of dead Irrawaddy dolphins per year | Poor | Stranding data from across the range indicates an unsustainable mortality rate. |
| Population stability | Population trend | Poor | Decreasing trend has been assessed in most small populations. |
| Population structure | Age class and sex ratios | Fair | Calves have been observed in most years in most of the studied populations. Longevity of individuals is considered fair based on identified individual survival |
| Reproductive success | # of calves observed | Fair | 1-2 calves sighted every year in populations that are monitored long-term |
| Health | 'Skinniness' (blubber thickness) | Good | Skinny Irrawaddy Dolphins have not been reported. |
| | # of new scars from fisheries/vessel interaction | Fair | Baseline not yet established, but propeller cuts have been observed in Chilika. |
| | Signs of disease | Poor | Skin disease has been observed in a high % of dolphins in India, Malaysia and Bangladesh. Probably fibropapilloma's either viral or bacterial in source. |
| | Presence/absence of lesions (TSD) | Fair | Baseline established by Bressem *et al*. (2014) and suggests 16% of adults are affected. Is assumed to be 'Fair' at best given an apparent increase in prevalence of Irrawaddy Dolphins with lesions. |
| | Hormonal levels | Unknown | No data currently available. |
| Extent of critical habitat | % of effectively protected critical habitat | Poor | Critical habitat areas are protected in the Sundarbans Biosphere Reserve in India and Bangladesh but the implementation and monitoring of threat mitigation is poor. In Chilika, the dolphins are found outside the Protected Area. |
| Habitat condition | Abundance, quality and trend of food sources | Fair | With a fall is fish catch through most of the species range we would keep this as Fair and not Good. |
| | Vessel docking sites, fishing jetties, with vessel speed controls | Poor | Vessel traffic is very high in all their habitats given their coastal habitat. Local transport ferries, fishing traffic from gill nets to trawlers and purse seiners operate in Irrawaddy Dolphin habitats, ships, barges. |
| | # of propeller strikes | Fair | Reported from Chilika. |
| | # of bycaught Irrawaddy dolphins | Poor | Direct observations of entanglement, strandings and scarring indicate unsustainable bycatch all through the range. |

| KEA | Indicator | Current status | Rationale/Justification |
|---|---|---|---|
| | Pollution with heavy metals and organochlorine pesticides | Poor | Banerjee et al 2015 and Kannan et al 2005. |
| Habitat connectivity | Ability to access critical habitats | Fair | Current movement of Irrawaddy Dolphins appears largely unhindered though fishing nets places in areas of connectivity are a major issue in most parts of its range. |

**(xiii). Magnitude of Likely Impact:**

Impact is anticipated from trans-boundary agreements within and between Range States on the priority issues of population monitoring, bycatch mitigation, water sharing and providing ecological flow regimes. Recently, India, Nepal, and Bangladesh have been working on bilateral MOUs and agreements on water sharing and development projects, such as national and international inland waterways (The Hindu 2018). Conservation efforts will have to ensure that their recommendations are integrated with implementation of these projects. Moreover, collaborative research and monitoring using standard protocols is very important to sustain the population between India and Bangladesh.

**(xiv). Cost Effectiveness:**

India has had a Conservation Action Plan (2010-2020) for river dolphins which has not yet been operationalized fully. India's National Water Policy (2012) included the management of ecological flows in all regulated rivers as an important priority. However, the provision of ecological flows, or the presence of guidelines to facilitate e-flows, has been very limited, if any.

At present Irrawaddy Dolphin has been given a priority recovery and research status by the MoEF-India. This is an encouraging development. The outputs of the project need to carry strong recommendations for conversation with other governmental agencies mandated with "river development". This is crucial in order to identify mitigation and avoidance strategies to halt the social and ecological impacts of large-scale water development projects, which have been long-term preoccupations of the Indian Government.

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