

National Monitoring Programme for Biodiversity in Lebanon “EO1- Marine Mammals”

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Acronyms

ACCOBAMS : Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic Area

CNRS: Conseil national de la recherche scientifique

CI: Common Indicator

EO: Ecological Objective

NCMS : National Centre for Marine Science

NGOs: Non-Governmental Organisation

1. General context

1.1. Cetaceans

Marine mammals and cetaceans in particular, in their quality of apex/alpha predators, represent an important element of marine biodiversity, which is, however, seriously threatened in most of the world's marine ecosystems. In particular, cetaceans living in the Mediterranean and Black Seas must face the manifold pressures which are exerted on the marine environment by a variety of human activities in these semi-enclosed seas (Notarbartollo di Sciara and Birkin, 2010). Most of these threats result from interactions with human activities and practices. Thus, cetaceans are subject to the impacts of pollution, navigation, fishing activities and tourism. While climate change represents an additional threat to their environmental balance.

Cetaceans are very mobile species, and many are highly migratory. With few exceptions, these mammals are not confined to waters within the jurisdiction of any single nation. In parallel, critical habitats of most cetacean populations living in this area also extend beyond national waters, as well as in areas beyond national jurisdictions.

It is now well-known that the threats, which weigh on the cetacean populations on a world level, and in particular in the Mediterranean Sea, are obvious and present an emergency character. The cetacean populations are thus under high-risk of endangerment due to alarmingly declining numbers.

According to occasional observations during scientific missions at sea, the Lebanese territorial waters are conclusive as for the presence of the dolphins and their potentially critical habitats. However, cetacean stranding - even sporadic - on the Lebanese coast, as well as the occasional catches of the dolphins by fishermen nets (sometimes intentional) constitute imminent threats for these animals. The insufficient knowledge of the cetacean ecology associated with a lack of capacity to ensure protection for these species populations constitutes yet another obstacle against the efforts of conservation.

1.1.1. Legislation context

Lebanon is a contracting partner to the Barcelona Convention (since 1994), which gives priority to the conservation of the marine environment, to the constituent elements of its biological diversity, in particular the cetacean, and to the permanent monitoring of this biodiversity. As such, Lebanon is held, by international legislation, to preserve and protect the marine mammals and to maintain them in a favourable state of conservation.

Prior to 2004, the only national legislation related to the conservation of cetacean was a Ministerial decision (N° 1/125 of September 23rd 1999): "Prohibition of fishing and marketing of by-products related to cetaceans and turtles."

In 2004, the Lebanese parliament ratified The Agreement of ACCOBAMS on February 11th 2004 by Law 571, which was subsequently followed by three important decisions:

- Ministerial decision N° 69/2004 of July 2nd 2004: "Establishment of a permanent inter-ministerial committee to implement the ACCOBAMS agreement."

- Decision N° 524 of the General Secretary of Ministers Council of May 10th 2005: "Designation of the National Centre for Marine Sciences - CNRS as the focal point of the ACCOBAMS agreement"
- Ministerial decision N° 1154, 2013, "General conditions to protect marine mammals (whales, dolphins and monk seal)".

ACCOBAMS agreement

Stimulated by concern for the conservation status of cetaceans in their region, the nation's bordering the Mediterranean and Black Sea resolved to implement an agreement to ensure the survival of cetaceans in the area, called "Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area" (ACCOBAMS).

ACCOBAMS, an agreement between 23 parties, was signed in 1996 and entered into force in 2001. Parties to ACCOBAMS agree to implement a detailed "Conservation Plan" to achieve and maintain favourable conservation status for cetaceans.

The ACCOBAMS Conservation Plan specifies the actions that parties shall take in the areas of: adoption and enforcement of national legislation; assessment and management of human cetacean interactions; habitat protection; research and monitoring; capacity building; collection and dissemination of information; training and education; and responses to emergency situations.

During the 6th meeting of parties in 2016 a resolution (6.13) was adopted related to the Comprehensive Cetacean population estimates and distribution in the ACCOBAMS area (monitoring of Cetacean distribution, abundance and ACCOBAMS Survey Initiative). The implementation of the survey is programmed for the summer of 2018.

1.1.2. Scientific implementation context

In February 2000, the National Centre for Marine Sciences (NCMS) participated in the first ACCOBAMS workshop entitled "Recognition and conservation of cetaceans in the Mediterranean" in France. Following this meeting, the NCMS took charge of: (1) cetacean monitoring in Lebanon, (2) collection of available data on the stranding of these marine mammals through the creation of contact points on main Lebanese fishing ports.

Because of the sad events that Lebanon went through between 2004, when the agreement was signed, and 2007, and despite some activities undertaken by NCMS for the conservation of cetaceans; the launch of real activities commenced in late 2008. A national Action Plan was elaborated (Gonzalvo, 2009) in which four activities were considered: education and awareness, human resources, research and sustainable management.

1.1.3. Research activities and results

Many missions at sea, onboard the CANA-CNRS vessel, were executed between 2009 and 2013. The prospected zone covers the waters of the Lebanese coast from the Lebanese-Syrian border in the North to the southern borders of Lebanon, with a length of 220 km.

The results highlight the regular presence of bottlenose dolphins in a central area of the Lebanese coast, adding a piece to the puzzle of the Mediterranean knowledge of this species' distribution. 91 individuals were detected in 32 sightings. The size of the groups ranged between a minimum of one individual and a maximum of 7 young and adult individuals.

The individual's relative abundance and sighting rate are higher in Beirut area ($0.11 \text{ ind}\cdot\text{km}^{-1}$) compared to values obtained for the entire Lebanese coast ($0.032 \text{ sighting}\cdot\text{km}^{-1}$) (khalaf, *et al.*, 2013).

1.1.4. Cetaceans sightings

Data collected on cetaceans observed, either at sea or stranded on the beaches, allow us to recognize six species of dolphins, observed at least once, in the Lebanese marine environment (Gonzalvo, 2009; khalaf, 2016):

| Scientific Name | English Name | French Name |
|------------------------------|-----------------------|-------------------------|
| <i>Grampus griseus</i> | Risso's dolphin | Dauphin de Risso |
| <i>Steno bredanensis</i> | Rough-toothed dolphin | Dauphin sténo |
| <i>Stenella coeruleoalba</i> | Striped dolphin | Dauphin bleu et blanc |
| <i>Physeter catodon</i> | Sperm whale | Cachalot |
| <i>Ziphius cavirostris</i> | Cuvier's beaked whale | Baleine à bec de Cuvier |
| <i>Tursiops truncatus</i> | Bottlenose dolphin | Grand dauphin |

T. truncatus remains by far the most abundant species in Lebanese Marine Waters and has been the subject of a detailed study concerning its range and abundance.

On the other hand, *T. truncatus* occurs in higher numbers beyond the continental shelf, a fact which indicates that the bottlenose dolphins observed in the Lebanese waters belong to the offshore ecotype (Khalaf *et al.*, 2013).

1.2. Mediterranean Monk -Seal

There is one species of seal in Lebanon: *Monachus monachus* or the Mediterranean monk seal. It is a sedentary species that lives in caves along the quiet coasts. It was considered missing in the western Mediterranean and in Greece in the 1980s (Tohmé et Tohmé, 1985). In Lebanon, it was reported by Gruvel in 1931 as existing in the pigeon cave at Raoucheh; in addition, fishermen had also reported it in Amchit. Because of its predatory behavior against fish, it is easily caught in the nets of fishermen who harass and kill it. Urbanization and socio-economic development of the Lebanese coast had a detrimental effect on the presence of this species. The last couple was observed at Raoucheh in 1970 (Tohmé et Tohmé, 1985). However, since 2003, the monk seal has reappeared along the Lebanese coast. The NGO "Big Blue" reported that it is often observed in Raoucheh either individually or in groups of three, one of which is a juvenile. One individual

was also observed in Batroun in 2015. A Sea Lion appeared along the Lebanese coast between Tyre and Naqoura for a period of about 20 days in 2014, then it disappeared completely. Ramadan Jaradi observed and photographed a seal in the area of Palm Islands Reserve in February 2016 recognized by the Seal Conservation Society as being a hooded seal.

2. Objectives and sub-programmes for monitoring

Cetaceans and Monk-Seal are subject to a variety of threats, which adversely affect their presence in Lebanese marine waters, especially as the exploitation of petroleum will start in the very near future which would aggravate the situation of these animals (Borrell *et al.*, 2000; Bearzi *et al.*, 2004; Bearzi and Fortuna, 2006; Bearzi *et al.*, 2008; Reeves and Notarbartolo di Sciara, 2006). The most important of these threats are: bycatch, decreased food supplies, pollution from wastewater and solid wastes, ship collisions and acoustic disturbances.

The protection and conservation of these animals are a necessity and must be subjected to a permanent monitoring programme in order to sustain their good ecological status.

In order to maintain the ecological status of these animals and to protect and preserve them, a permanent monitoring divided in sub-programmes must be established.

2.1. Cetaceans sighting campaigns from ships

2.1.1. Logistic conditions

Campaigns carried out by the CNRS-L National Centre for Marine Sciences team on board the scientific vessel CANA-CNRS revealed that the common bottlenose dolphin *Tursiops truncatus* is the species most present in Lebanese marine waters. It is distributed along the coasts with the highest abundance facing Beirut (Khalaf *et al.*, 2010, 2013).

Continuous monitoring should be developed to (i) protect this species; (ii) record other species that may be frequent in Lebanese marine waters. This activity also concerns the individuals of other species of Cetacean reported or observed occasionally in the marine waters.

- Observation should begin in summer 2018 in accordance with "ACCOBAMS Survey Initiative"
- Ten consecutive days aboard the CANA-CNRS vessel to cover the 220 km of coastline for a width of 12 nautical miles (possibility of aerial surveillance by the support of the "ACCOBAMS Survey Initiative")
- Line transect sampling is typically used to estimate abundance and assess density (Gannier, 2005)
- Ship speed: 8 knots
- Less than 3 Beaufort Sea scale
- Position of the vessel is regularly and automatically recorded through a computer connected to a GPS

- At each sighting, data concerning time, number of individuals and behaviour of the species must be recorded with other complementary environmental information.

2.1.2. Biodiversity (EO1): Common indicators (CIs) related to cetaceans

The description, mapping of the distributional range (CI3), recognition of cetacean species and their population abundance (CI4) and demographic characteristics (CI5), more particularly the dolphins in Lebanese territorial waters should constitute the first elements of the ACCOBAMS Survey Initiative. This would require:

- Monitoring of the distribution of these species in Lebanese marine waters
- Recording and identification of species encountered
- Population size assessment: density, abundance, number of individuals per group
- Population description: demographic characteristics, structure of size or age class, sex ratio, fertility rate, survival / mortality rate
- Photo identification (made possible thanks to the CNRS acquisition of a 7m long CADMOS-CNRS catamaran)
- Visual surveys from aircraft or land observation platforms and Passive acoustic monitoring carried out during ship surveys with towed hydrophones can be supported by ACCOBAMS Survey Initiative

2.2. Monitoring of cetaceans stranding

Shore stranding is one of the main source of access to tissue and organ sampling to assess the ecological status of top predators and the functioning of the food web. From 2002 to 2016, twenty-two individuals of stranded cetaceans were recorded by the CNSM-CNRS along the Lebanese coast. They include: one individual of *Grampus griseus* (risso's dolphin), two individuals of *Steno bredanensis* (rough-toothed dolphin) and 19 individuals of *Tursiops truncatus* (bottlenose dolphin) (Khalaf, 2002; 2016).

The analysis of stranded individuals also allows us to study the effects of anthropogenic pressures on them such as bycatch, waste ingestion, collisions, and contamination by toxic compounds. Hence, there is a need to create a network of stranding:

- Accredited contact points at major ports
- Contacts with the navy, merchants and fisheries for the transmission of data on stranding
- Intervention of municipalities, public defence and NGOs
- Allometric measurements
- Autopsy, if possible, with notifications of anatomical and physical remarks
- Taking tissue samples (local analysis or dispatch to specialized centres)
- Creation of a tissue bank
- Installing a database

2.3. Monitoring of common indicators (CI 3, CI4, CI5) related to Monk-Seal

Despite its low numbers and rare observations, the monk- seal makes regular appearances (Raoucheh) or sudden appearances (Batroun, Amchit) and is a target for depredations. A dead pregnant female was drafted at sea next to Raoucheh in April 2015. This female was carrying an almost mature baby pup. Coastal urban development, the detriment of natural habitats, as well as, the intervention of fishermen, remain the main factors of depredation of this species. Its protection depends on several measures that fall to all the actors of the marine environment. Its continuous monitoring implies:

- Regular observations at the sites of its presence on board of the CANA-CNRS vessel or the catamaran CADMOS-CNRS or with fishermen vessels
- Group size
- Status of individuals
- Definition of the area of its presence
- Notifications of anatomical and physical remarks
- Photos identification
- Placement of instantaneous trigger cameras in the caves where they are found
- Have contact points in main regions of its appearance for transmission of data

3. Recommendations

In order to develop the marine mammals monitoring programme and to establish a sustainable strategy for their conservation, important measures should be considered by involving all stakeholders and especially those concerned in the marine environment:

3.1. Education and awareness

- Production of materials for public awareness and education purposes. Make available a variety of materials to be used during seminars, training courses and awareness-raising events
- Dissemination of the documentary series “Cetaceans of the Mediterranean Sea” on DVD (as well as online)
- Facilitate the reporting of cetacean stranding. Develop an information network and make available a phone number (24 h/day) to report stranding events. Design and distribute flyers and stickers to let people know what to do in case they find a stranded cetacean
- Design and conduct awareness actions targeting the fisheries sector. Oral presentations and informal talks targeting fishermen cooperatives. Round tables to promote exchange of information between fishermen representatives and marine conservation biologists.

3.2. Capacity building

- Create capacity for the implementation of an effective cetacean stranding network
Provide training and materials to create expertise on the management of cetacean stranding

- Create capacity in laboratory techniques. Organization of training courses on laboratory techniques for cetacean studies
- Create capacity in cetacean field research methods. Organization of training courses on field research techniques for cetacean studies for committed Lebanese researchers
- Opportunities for long-term training for Lebanese researchers and students.
- Create opportunities for the long-term professional training in Universities and laboratories possessing relevant expertise in cetacean research
- Create a Cetacean Library on cetacean biology and conservation.

3.3. Management

- Grant protection to cetaceans in Lebanese waters. Promote marine mammal protection in the Lebanese legislation and ensure that new regulations contemplate the different issues related
- Make fisheries sustainable. Manage the fishing effort based on evidence provided by scientific studies. Implement GFCM Recommendations. Elaborate a review on fishing technics
- Ensure that environmental impact assessments give special consideration to cetaceans and their habitat. Require investigation of potential damage to cetaceans in environmental assessment studies
- Support the creation, development and growth of marine conservation-oriented NGOs.

4. Estimated Budget

| Activities | Budget in \$ |
|-----------------------------------------|---------------------|
| Cetaceans sighting campaigns from ships | 60000 |
| Monitoring of cetaceans stranding | 35000 |
| Monitoring of Monk- Seal | 20000 |
| Total | 115000 |

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