Impact of Fishing on the Ichthyofauna in the North Lebanese Coast

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The thesis objectives:

1- Study fishing techniques, target species, and distribution of fisheries in Lebanon;

2- Study fishing techniques with regards to bycatch and to the IUCN Red List;

3- Evaluate the impact of each fishing technique on fish fauna in north Lebanon.
The fishes of the Mediterranean were the fishes of the Atlantic ... Until:

1869: Opening of the Suez Canal

Lessepsian migration
referring to Ferdinand de Lesseps,
Initiator of Suez Canal
Located in the Eastern Mediterranean Sea, its surface is 10,452 Km², its coastline is 220 km long
The major risks on the Ichthyofauna on Lebanese coast:

**Port and maritime navigation**

- Tributyltin (TBT) (Antifouling biocidal agent used on boats)
- Oil leak
- Waste discharges
- Loading and unloading goods

**Sterility and deformation in some species**

**Oil Pollution**

- It takes six to seven years to remove the visible traces of an oil spill

*Lebanon 2006*  
40,000 m³ fuel oil
Agricultural activities

Eutrophication: excessive fertilization of water (Nitrogen and Phosphorus) from agricultural activities in coastal plains.

Undesirable disturbances to the marine ecosystem

Variation in the composition of flora and fauna that affects habitats and biodiversity

Exhaustion of Oxygen
Degradation of marine habitats

Habitat loss or degradation appears to be the main cause of extinctions of marine species (37%),

(Dulvy et al. 2003)

Industrial and power Plants

- Heavy and Toxic Metals
- Oil leak
- Change in water temperature
- pH variation

Species displacement
90% of waste water are discharged directly to the sea along the Lebanese coast without treatment.
Waste dumping site on coastal area

- Plastic debris (Macro and Micro)
- Heavy and Toxic Metals
- Leachate
Rivers

Accumulation of waste
Degradation of habitats
Sewers
Agriculture
Industry
Sediments

Change of ecosystem
Movement of species
Climate change

- Surface water temperature has increased by about 1.5 °C since 1960.
  - Sea level rises
  - Marine currents change
  - Sea becomes more acidic

Species move

Marine seabed are particularly affected

Marine organisms with a calcareous skeleton will suffer

Biological Pollution: Bio-invasion

- Ballast water
- Fouling
- Accidental immersion

Suez Canal (Lessepsian migration)
**Fishing**

- Fishing is the capture of aquatic organisms in marine, coastal and inland areas. (FAO)
- In 2014, FAO estimated that 29% of the world's fish stocks are overexploited.

Exploitation (fishing) caused most marine losses at various scales (55%). (Dulvy et al., 2003)

The main factor that threatens marine fish biodiversity globally is fishing
(Dulvy et al., 2003; Garcia et al., 2006)

Fishing in Lebanon is not subject to laws or regulations, that are applied at minimum levels.
1. Direct observation: Fishermen numbers, boat specification and distribution of fisheries
2. Direct observation: Fishing technique
3. Sampling: 10% of fishermen, respecting the fishing techniques quota:
   - 117 fishermen: Traditional
   - 140 fishermen: Recreational
   - 18 Fishermen: Illegal
   Date collected: twice a week for 68 weeks
   \[ 117 \times 68 \times 2 = 15912 \text{ (Trad)} - 19040 \text{ (Rec)} / 2448 \text{ (Illegal)} \]
   37400 registrations
4. Analyzing data
Traditional fishing boats / port

- 28 Main fishing port
- 83% constructed of wood
- 95% are motorized
- 35% have fish finders
- 60% have GPS
- Typical artisanal Mediterranean
- 89% between 6 & 12 m
- 9% less than 6 m
- 2% more than 12 m
- 3174
  2,662 (Majdalani, 2004)
Distribution of vessels per fishing area (traditional fishing)
Recreational fishing boats (North Lebanon)

110 Recreational fishing boats

Including: 54 sport fishing boats
Fishing techniques

- Recreational fishing
- Commercial fishing
- Illegal fishing
  - Industrial fishing
  - Traditional fishing
Recreational fishing

19 techniques
1. **hand line Fishing:**
   1.1 Handline shallow trolling with lures (feather, soft, hard)
   1.2 Handline deep trolling with lures (feathers, soft, hard)
   1.3 Handline shallow trolling with dead natural baits
   1.4 Handline deep trolling with dead natural baits
   1.5 Dead baits bottom fishing
   1.6 Handline casting night with lures
   1.7 Hand line casting night with dead natural bait
   1.8 Night bottom fishing with bait (dead, alive)

2. **Longline fishing:**
   2.1 Drifting loglines
   2.2 Demersal loglines

3. **Fishing with net**
   3.1 Drifting gill net
   3.2 Fixed net - bottom set gill net
   3.3 Purse seine
   3.4 Night purse net
   3.5 Beach seines - drag net
   3.6 Net with dead Bait
   3.7 Fishing with cast net

4. **Nasse - trap**

5. **Spearfishing (day, night)**

19 techniques
Illegal fishing

6 techniques

1. Fishing with explosives
2. Poison fishing
3. Fishing with very small mesh nets
4. Underwater hunting with air tank or air compressor
5. Trap net - Messlayeh
6. Night Spearfishing with light
- Fishing usually occurs up to a maximum depth of 200 m;
- Most activities take place at an average depth of 50 m;
- 80% of the fishermen fishing within 3 nautical miles.
183 illegal fishermen

- Fishing with explosives: 18
- Fishing with poison: 35
- Spearfishing
  - Night Spearfishing with Light: 33
  - Spearfishing with Air Tank: 60
- Trap Net / Messlayeh: 37
Targeted species

Traditional fishing

- SV: Survived
- NEW: New Target
- BT: Bait Target
- Byc: Bycatch
- ST: Secondary Target
- PT: Primary Target
Recreational fishing

Illegal fishing
56 species (List IUCN-2017-3)

<table>
<thead>
<tr>
<th>Species Name</th>
<th>IUCN Status</th>
<th>Fishing with explosives</th>
<th>Poison fishing</th>
<th>Handline shallow trolling with lures (feather, soft, hard)</th>
<th>Demersal Longline</th>
<th>Spearfishing</th>
<th>shore casting</th>
<th>Spearfish</th>
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<tbody>
<tr>
<td>Carcharhinus brevipinna</td>
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<td>Anguilla anguilla</td>
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<td>Centroscymnus coelolepis.</td>
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<td>Cetorhinus maximus</td>
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<table>
<thead>
<tr>
<th>Illegal</th>
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<tbody>
<tr>
<td>IUCN</td>
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<table>
<thead>
<tr>
<th>Extinction Risk</th>
<th>CR (Critically Endangered)</th>
<th>EN (Endangered)</th>
<th>VU (Vulnerable)</th>
<th>NT (Near Threatened)</th>
<th>LC (Least Concern)</th>
<th>DD (Data Deficient)</th>
<th>NE (Not Evaluated)</th>
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<tbody>
<tr>
<td>All species</td>
<td>Adequate data</td>
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</table>
Now:
Analyzing catches for each method
Fishing in Lebanon
THANK YOU

(ECOMERS), Nice Sophia Antipolis University, Nice, France

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