



Estuaries as Marine Protected Areas: Importance of managing river basins from source to sea in Lebanon



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Lebanon's Rivers

- Total of 40 rivers, 16 of which are perennial.
- Total length: 730 km.
- Total annual discharge: ~ 52 Million Cubic Meters (MCM), with about 20% flowing into Transboundary Rivers.
- Characterized by small catchments and short lengths.
- Provide water resources for drinking, irrigation, hydropower generation, and industrial use.
- Support freshwater and coastal aquatic ecosystems, and recharge aquifers.
- Essential in nutrient upload into coastal waters driving coastal food webs.
- Essential in sediment transport into coastal environments replenishing beaches that eroded during the winter season.
- Essential in reducing salinity and temperature in shallow coastal waters where such habitats represent spawning and nursery grounds.
- Support the livelihoods of many communities in all sectors and sustain the country's natural resources and ecosystem services.
- Over 50% of water resources are believed to be contaminated all types of pollutants.



Perennial Rivers in Lebanon

Name	Length (km)	Average Annual Volume (1990 – 2013) (Mm ³)	Mohafaza	Kaza	Transboundary	Perennial/Seasonal
El Kabir	77.8	432	Akkar	Akkar	Yes	Perennial
Ostuene	44	71	Akkar	Akkar	No	Perennial
El Bared	24	127	Akkar	Akkar	No	Perennial
Abou Ali	45	218	North	Bcharre	No	Perennial
El Jaouz	38	57	North	Batroun	No	Perennial
Ibrahim	30	335	Kesrouan	Jbeil	No	Perennial
El Kalb	31	190	Kesrouan	Kesrouan	No	Perennial
Beirut	42	78	Beirut	Beirut	No	Perennial
Damour	38	183	Mount-Lebanon	Chouf	No	Perennial
El Awaly	48	433	South	Saida	No	Perennial
El Zahrani	25	18	South	Sidon	No	Perennial
Litani (upper)	140	223	Beqaa	Baalbek	No	Perennial
Litani (lower)	170	215	Beqaa	Baalbek	No	Perennial
Hasbani	25	151	Beqaa	Hasbaya	Yes	Perennial
El Assi	46	390	Baalbek-Hermel	Baalbek-Hermel	Yes	Perennial

Hydroelectric Plants and Dams

Major Hydroelectric Plants

- 3 on the Litani River generating about 190 megawatts (MW) of electricity.
- 3 on the Awali River.
- 3 on the Ibrahim River (Chouane, Yahchouch, and Fitri) with an installed capacity of 32 MW and an effective capacity of 17 MW.

- **NLWE:** North Lebanon Water Establishment
 - **BWE:** Beirut Water Establishment
 - **SLWE:** South Lebanon Water Establishment
 - **BMLWE:** Beirut and Mount Lebanon Water Establishment
- Source: Updated National Water Sector Strategy 2020-2035

Dams

Dam	Static Storage (M m ³)	Dynamic Storage (M m ³ /year)	Dam Height (m)	Status	Usage
<u>BMLWE</u>					
Chabrouh Dam	9	11	65	Operational	Potable / Irrigation
Ballout Lake	0.5	0.5	15	Operational	Potable / Irrigation
Qaysamani Lake	1	1	15	Operational	Potable
Janneh Dam	38	95	-60+100	Under Construction	Potable / irrigation / Hydropower
Bisri Dam	125	125	74	Under Construction	Potable / irrigation / Hydropower
Boqaata Dam	6	12	71.5	Under Construction	Potable
	179.5	244.5			
<u>NLWE</u>					
Kouachra Lake Rehab.	0.4	0.4	11	Operational	Irrigation
Brissa Dam	0.8	0.8	35	Needs repair	Irrigation
Mseilha Dam	6	12	35	Under Construction	Potable / Irrigation
Balaa Dam	1.2	2.2	35	Under Construction	Potable
	8.4	15.4			
<u>BWE</u>					
Yammouneh Lake	1.45	1.45	7	Operational	Irrigation
Assi Dam - Phase I		63	10	Under Construction	Irrigation
	1.45	64.45			
<u>SLWE</u>					
Qaraaoun Dam	220	300	62	Operational	Potable / irrigation / Hydropower
Total storage capacity at country scale	409	624			

Threats, Gaps and Challenges

Threats

- **Pollution:** Due to untreated or poorly treated domestic sewage, industrial discharges, agricultural activities, solid waste, increased runoff.
- **Water scarcity:** Over-extraction of water by all sectors due to bad management and governance.
- **Climate change:** Changing precipitation regimes and flow patterns, deforestation, and unsustainable water drafting methods.
- **Governance:** Lack of effective environmental governance and enforcement of laws and regulations.
- **Illegal activities:** Quarries, illegal extraction of sand and gravel, illegal construction on the riverine public domain.
- **Urbanization:** Urban sprawl, construction of dams, artificial channels and other infrastructure.
- **Biodiversity Loss:** Due to the above, these ecosystems are destroyed and/or altered negatively impacting species.

Gaps

- Inadequate enforcement of existing environmental and other related laws and regulations.
- Absence of WW and SW treatment and management.
- Lack of Integrated Water Resources Management in a sustainable approach.
- Absence of application of the Ecosystem Approach and the importance of linkages to coastal and marine environments.
- Limited research and monitoring activities.
- Low public awareness on the importance of rivers.

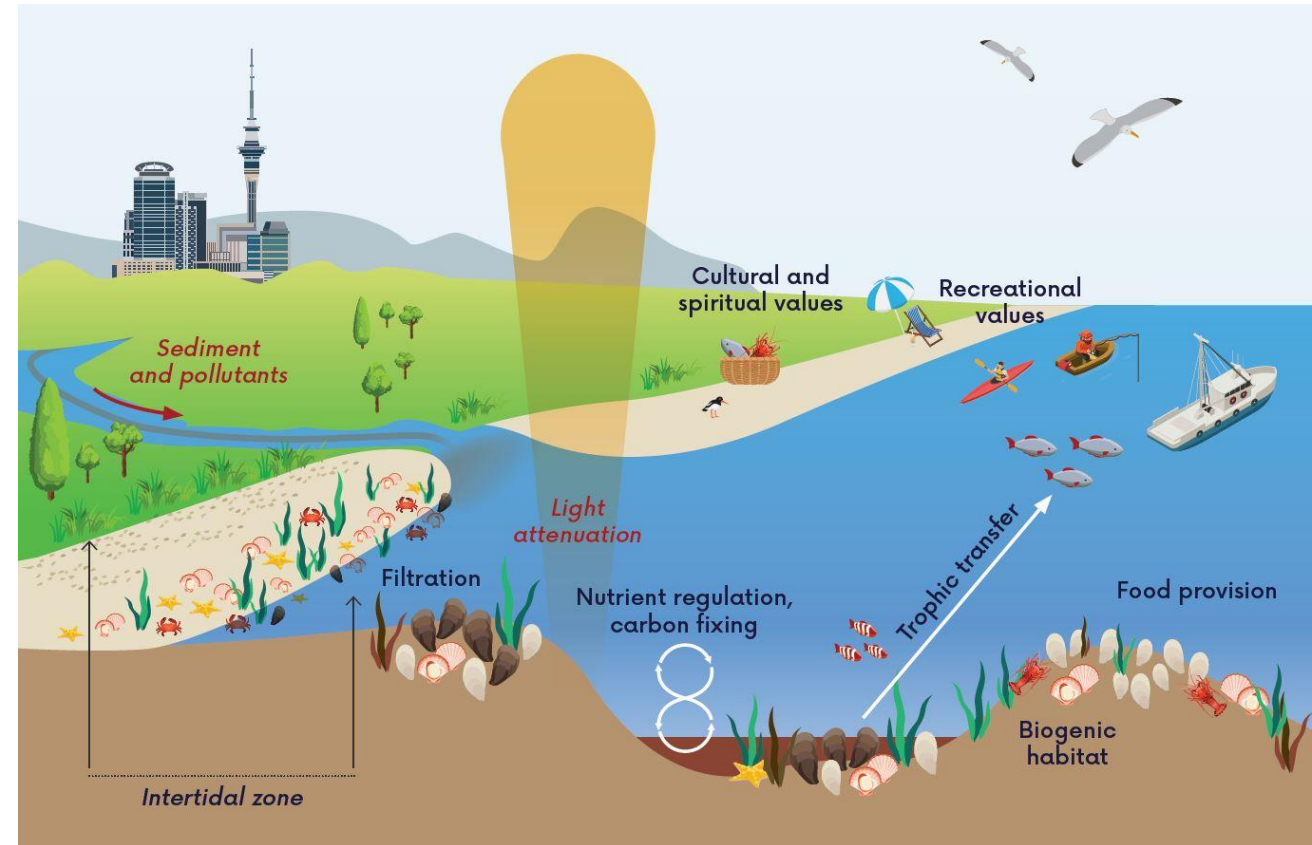
Challenges

- Convincing public authorities of the importance of the Ecosystem Approach in RBM.
- Convincing state and non-state actors about the importance of allowing river flow to reach coastal waters.
- Implementation of applicable laws.
- Introducing and cementing a culture of RBM and conservation.
- Funding Limitations.
- Remove dependency on external funding.
- Comprehensive and participatory management.
- Reduction of urban sprawl.

Estuaries as Marine Protected Areas in Lebanon

Importance of managing river basins from S2S

- Biodiversity hotspot supported by the delicate salinity balance.
- Vital breeding, nursery and feeding grounds.
- Natural filters of contaminants and sediments from rivers before they enter coastal waters.
- Help reduce erosion through sediment replenishment and serve as buffer against storm surges.
- Important areas of nutrient input and cycling.
- Essential for coastal productivity which is important for food webs, fisheries sector and food security.
- Support tourism, ecotourism and blue economy activities like boating, fishing, and bird watching.
- Mitigate Climate Change by sequestering carbon, improving water quality, and enhancing coastal resilience.



Estuaries as Marine Protected Areas in Lebanon

Importance of managing river basins from S2S

To strengthen the capacities of Lebanese Non-State Actors to enhance the use of evidence and science in environmental policy-making and regulation (National)

Funding agency

European Commission

Implemented by

Lebanese Environmental Forum (LEF)

Partners

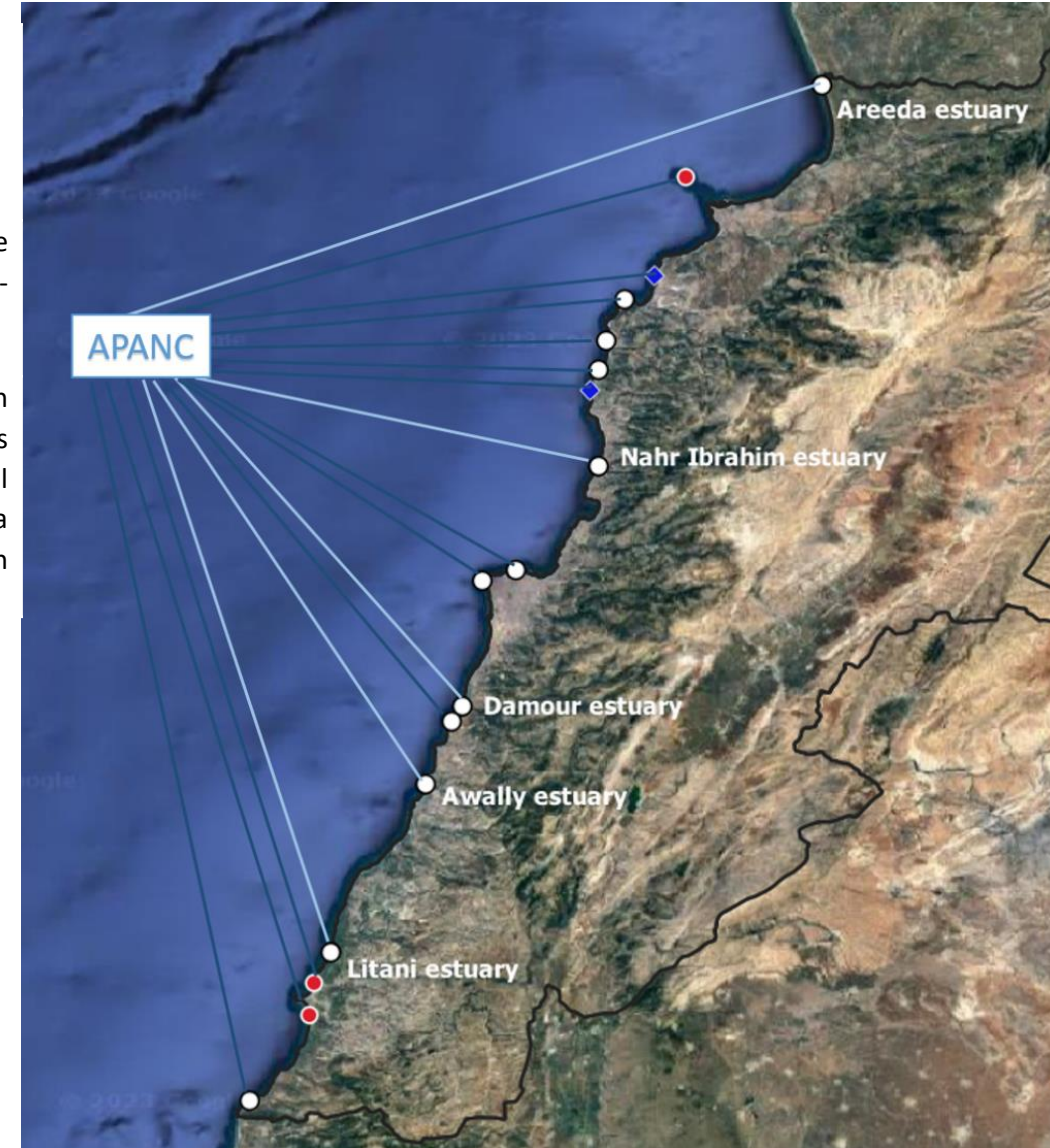
Marine and Coastal Resources Program – Institute of the Environment – University of Balamand (MCR-IOE-UOB)

Objective

The establishment of an effective MPAs network in Lebanon based on the MOE MPA strategy is enhanced for the protection of Lebanon's coastal and marine biodiversity and ecosystems through a national non-state actors' advocacy campaign supported by science-based evidence.

Lebanon's MPA Strategy of 2012 includes five estuary sites for declaration:

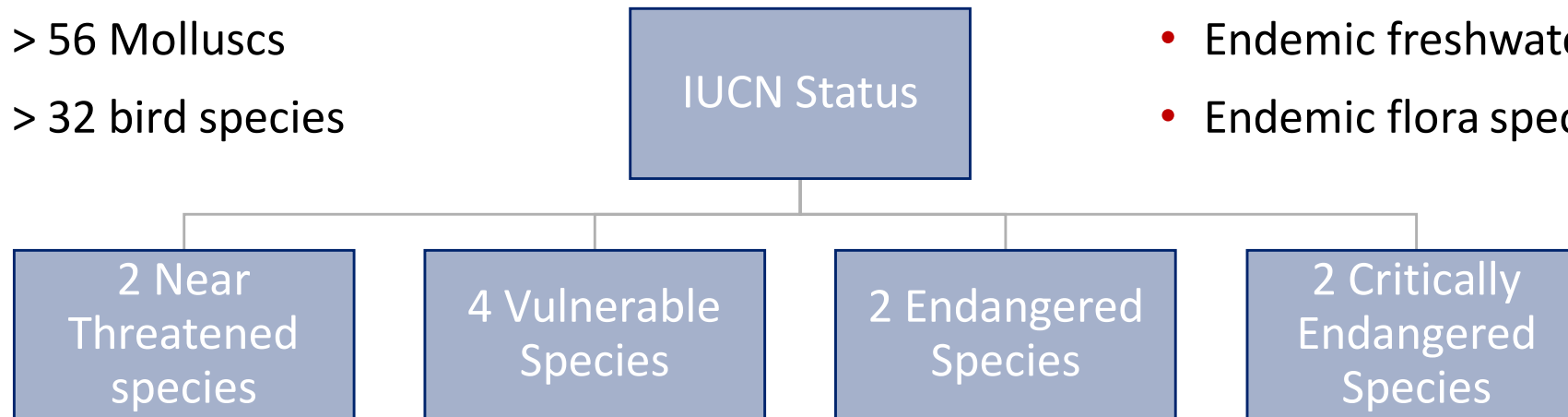
- Litani
- Awally
- Damour
- Nahr Ibrahim
- Areeda



Biodiversity of the five Estuaries

- > 16 Macrophytes
- > 56 Molluscs
- > 32 bird species

- > 100 Diatoms
- Endemic freshwater species
- Endemic flora species



Conclusion and Recommendations

- Declaring the five estuarine sites as MPAs will force the introduction of RBM for the whole watershed.
- It will also require the launching of monitoring and research programs and activities that will lead to protecting whole basins.
- All Threats, Gaps and Challenges should be seriously addressed to protect and sustainably manage rivers in Lebanon.
- State and non-state actors should launch the implementation of the S2S Approach.
- Strategies and management plans should ensure the environmental flow into coastal waters.
- Public institutions should adopt “Science as the Basis for Decision-Making” with the Ecosystem Approach as the driving force.
- Strategies, management plans and associated indicators should all respond to international targets such as the Sustainable Development Goals (SDGs) and the Global Biodiversity Framework (GBF).



Thank you

