**Assessment of CONSERVATION AND MANAGEMENT OF THE natural resources and ecosystems in the COASTAL-MARINE AREA of tyre coast nature reserve, LEBANON**

Graphical user interface, application, Excel

Description automatically generated

**System cause-effect analysis:  *Animal and plant species, biophysical system*.**

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| **N.** | **Component** | | **Direct Interaction with other components** | | **Management options/Governance Protocols** |
| **Name** | **Quantitative analysis** | **Related Component** | **Component quantitative analysis**  **Description of the interaction between components** |
| 9 | [Marine  Reptiles (Id=1095)] | It is inside the Container called [Animal Species (Id=10)], [Reptiles (Id=5)] Component, in which there are two subcomponents: marine and terrestrial reptiles.  There are records of species of marine turtles: *Caretta caretta* and *Chelonia mydas*.  There is an ongoing project, called “Conservation of marine turtles in the Med sea”. It protects the nests on the beaches, awareness campaigns targeted on local communities, included fishermen, tourists and civil society.  A rescue centre is based inside the TCNR reserve.  Data are coming from project “MAVA Foundation SPA/RAC with the Environment”. Still pending (4 Sept ‘23).  Indicators available: species; number of nests and location; number of eggs; weather parameters. Started 2019, data available for that year, 2020, 2021 and 2022. | [Sandy Beach (Id=13)] | It is a component of the “Biophysical System”.  We must verify if we have a land cover map in the ISP, the surface of this habitat and related relevant information, such as protection regime, presence of facilities, fences, and other.  The turtles are usually nesting in the protected area of the beach, called “scientific zone” inside TCNR.  The nest is protected with clear signs. It is monitored in particular in the laying and hatching phases*.*  The other parts of the beach (“touristic zone”) are not interested of nests because the light pollution and disturbance.  There are other records outside the protected area. | Conservation of marine reptiles with surveys to evaluate the impacts (on land and in the sea) on the species: **priority**.  Synergies with all the projects and initiatives regarding this dynamic, with actions like management of lights along the beach. |
| 10 |  |  | [Fisheries (Id=1104)] | Ali can provide the impact information. Data about accidents in the last four years. Data still pending (4 September 2023). |  |
| 11 | [Marine biodiversity (Id=15)] | [Marine Ecosystem (Id=1012)] -> [Shallow water (Id=14)] | [Diving (Id=1108)] | Relation: awareness  There are two diving centres in Tyre area, called marine diving academy and Lebanon diving centre.  The cooperation between TCNR and the first diving centre is occasional, the second started a partnership.  The future targets are helping in monitoring programmes, awareness and ecotourism, it is an ongoing process. | To be discussed with TCNR team. We need their monitoring protocols, if they have them already. Understand the nature, the aims, the equipment, the data storage, if there base their surveys on Citizen Science, and so on. |
| 12 | [Marine biodiversity (Id=18)] | [Marine Ecosystem (Id=1012)] -> [Deep water (Id=17)] |  | Relation: awareness  Related to marine biodiversity conservation and litter management. |
| 13 | [Birds (Id=4)] | Data in the ISP not available yet.  Data saved from GBIF available (DB sent by Pella to the Lebanese team); please note that there are several records linked with only few way points, this means that 1) either the observer/s was/were doing a survey from a specific position or 2) the records are attributed to one single point. This kind of information could be used to calculate the indexes listed in the ISP. Nevertheless, it is strongly recommended to use a DB coming from standardized protocols applied at the national and international levels, such as those used by BirdLife Lebanon.  The checklist from Ali shows the occurrence of the survey carried out in 2018. They observed the bords from two towers (inside the scientific and agriculture areas); Hassan is going to digitalise the position, so we should have more elements to include this kind of data in the ISP as well. Mr. Fouad Itani is a birdwatcher and did already a training course for TCNR. Mr. Itani works for ABCL (Association for birds Conservation Lebanon) and another association (SPNL). New project, called STEPping up Nature, is improving the knowledge of the terrestrial flora and fauna. Ali is asking for preliminary data (now not available) as soon as they publish them (24 August 2023). Data still pending (4 September 2023) | [Local Community  in TCNR  Biosphere (Id=1121)] | Relation: Poaching  The quantification and the trend of the poaching activity is unknown. To describe better the dynamics Ali suggested to organise more meetings between experts and stakeholders.  The guards of the reserve, in cooperation with the municipality of Tyre, are responsible for patrolling and acting against the poachers: alerting twice, then confiscate guns or other actions. | Verify if the network of Lebanese and Polish NGOs to fight the poaching is still active. Explore the possibility to continue or replicate with other partners the experience (from: Kozera 2014. White Storks Killings in Lebanon and the Effort to Stop It:  The Role of Social Media in Spreading and Counteracting the  Phenomenon). DOI: 10.5604/2354029X.1111242)  Enforcement of law (explaining how and why) |
| 14 |  |  | [Wetland (Id=10)] | Relation: Providing habitat.  Touristic zone: winter, temporary  Agriculture zone: permanent (plus winter rain contribution)  Scientific zone: permanent area.  There is no GIS data about it. |  |
| 15 | [Terrestrial Mammals (Id=3)] |  |  | Bats are considered “pest insects’ control” species in the wetlands |  |
| 16 | [Terrestrial Species (Id=28)] | Container [Plant Species (Id=1029)] -> Component [Rare/Threatened species (Id=27)] | [Local Community  in TCNR  Biosphere (Id=1121)] | Relation: Illegal collection/destruction  There is some information about grazed zone in the scientific area by sheep. It is legal to go there with an authorisation, but it is illegal to send the livestock there, and TCNR is building fences around the scientific area. In the past there was a fence, but destroyed. Municipality is participating, Lebanese army will be part of the initiative. |  |
| 17 |  |  | [Terrestrial Species (Id=33)] | Container [Plant Species (Id=1029)] -> [Invasive species (Id=32)]  Relation is: competition | Control/Eradication protocol of invasive species and monitoring rare and endemic species: **priority**.  Hp: Coordination with projects, ongoing or concluded, such as the research done by the "Laboratoire Caractérisation Génomique des Plantes, Faculté des sciences, Campus Sciences et technologies, Université Saint-Joseph, Mar Roukos Mkalles, Lebanon" (Name of the research: Invasion and management of *Heterotheca subaxillaris* in Tyre Coast Nature Reserve, Lebanon) |
| 18 | [Terrestrial Species (Id=31)] | Container [Plant Species (Id=1029)] -> [Endemic species (Id=30)]  Data of presence and cover of *Astragalus beritheus* are not in the ISP yet. A review about this species status was published in 2020 (Samad et al.) | [Local Community  in TCNR  Biosphere (Id=1121)] | Relation: Illegal collection/destruction | Verify if the collaboration Tyre/UNESCO is continuing (pag 3-4 of Farah Abdel Samad et al 2020. *New insights on the conservation status of the Endangered coastal endemic plant Astragalus*  *berytheus (Fabaceae) in Lebanon*. Oryx: 4pp. |
| 19 |  |  | [Terrestrial Species (Id=33)] | Container [Plant Species (Id=1029)] -> [Invasive species (Id=32)]  Relation: competition |  |
| 20 | [Birds (Id=4)] | Invasive species: Common myna (2017-2023 in the DB) and Indian crow (no data in the DB).  Common myna observed for the first time 2010 (article of 2013). | Animal Species (Id10) | In particular, impacts in particular against reptiles and birds. | Eradication project of Common myna |
| 21 | [Marine biodiversity (Id=15)] | Inside [Shallow water (Id=14)].  Indicators: presence and cover of *Cymodocea nodosa*. As far as I know, maps of this seagrass are not available for the target area (I checked in EMODnet) | [Diving (Id=1108)] |  |  |
| 22 | [Marine biodiversity (Id=18)] | Inside [Deep water (Id=17)]  No indicators |  |  |  |
| 23 | [Marine Ecosystem (Id=1012)] |  |  | ***Explain why the relation is "Cleaning" with Diving*** |  |
| 24 | [Fish (Id=6)] | Indicator analysed:  Total abundance.  We recorded at least one discrepancy between the data (2017), that reported a VU species, and IUCN red list website, where this fish is absent from its map. *Pteragogus pelycus:* lessepsian migrant, recorded in the same survey (2017). About the alien species:  They became invasive. Fishermen try to adapt their activities.  Lion fish and *Siganus* sp. Now are caught and sold.  *Lagocephalus sceleratus* (pufferfish) is a problem because invasive and toxic. They are not eaten.  There are at least four species of pufferfish. | [Marine Ecosystem (Id=1012)] | *Cymodocea nodosa* is a key habitat for the fish community and all the other taxa.  It is a nursery for the fish.  It is illegal, but there is poaching that can impact on it, such as anchoring or dynamite.  This habitat is considered a priority to conserve the ecosystem and guarantee the sustainability of fishery activities.  Coralligenous assemblages. |  |