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## Résumé

La Réserve naturelle de la côte de Tyr (TCNR) offre une superficie terrestre de près de 4,40 km<sup>2</sup> et une superficie maritime (eaux territoriales) de près de 113 km<sup>2</sup>.

La plage et les dunes de sable de la Réserve naturelle de la côte de Tyr (TCNR) se composent d'un mélange de quartz et de sables carbonatés qui sont localement lithifiés pour donner un grès de plage. En certains endroits, on observe des graviers calcaires. La géologie sous-jacente est très significative, du fait qu'elle contrôle l'existence de sources artésiennes. Une séquence de calcaire poreux et fissuré du Crétacé inférieur et moyen constitue les principales unités rocheuses, qui sont recouvertes d'une séquence de craie marneuse de la fin du Crétacé. Celle-ci, à son tour, est recouverte d'une séquence de calcaire du Tertiaire inférieur. L'ensemble de la séquence est légèrement immergé et brisé par une faille locale dont une partie semble être d'origine relativement récente.

Le calcaire du Crétacé inférieur et moyen forme l'aquifère qui apporte la majorité de l'eau de la région, bien que des puits privés exploitent l'eau des sédiments de l'Eocène supérieur.

La moyenne de pluviométrie annuelle de la Réserve de la côte de Tyr est de 654 mm.

A Ras Al Ain, il existe trois puits artésiens dont les parois ont été construites par les Phéniciens, de même que d'autres petites sources. Les sources d'eau douce de Ras Al Ain alimentent à 1500 l/sec les trois piscines remarquables. L'écoulement crée de petites zones marécageuses qui attirent les amphibiens et les oiseaux d'eau, notamment les canards, les marouettes, les foulques, etc.

Les habitats de la TCNR sont les suivants :

- Des dunes de sable de la rive méditerranéenne
- Des terres d'eau douce du littoral
- Des terres agricoles
- Des plages de sable
- Des plages de galets et de pierres

Les utilisateurs de la TCNR sont des visiteurs des environs immédiats (communauté locale) et des visiteurs de l'ensemble du territoire libanais.

L'utilisation humaine courante et le développement sont limités à la conservation, aux loisirs, à l'agriculture, à la pêche, à l'éducation et à la recherche scientifique.

Vingt-et-un pour cent (21%) de la flore de la TCNR sont restreints à la zone orientale de la Méditerranée (Ramadan-Jaradi *et al.* 2004).

La TCNR constitue un site important de reproduction pour les tortues caouannes et les tortues vertes de Méditerranée, mondialement menacées, un site comportant une grande diversité d'écosystèmes : des écosystèmes marins, agricoles, des zones humides, qui présentent les caractéristiques méditerranéennes et un lieu de puits artésiens romains d'importance historique et archéologique dans la région de la Méditerranée orientale.

La réserve se caractérise par des plages de sable où les tortues caouannes et les tortues vertes, menacées mondialement, se reproduisent et où les échassiers migrateurs trouvent leur alimentation loin des chasseurs, une communauté unique de flore des dunes de sable et leur faune associée, les dernières dunes du littoral libanais et une zone humide avec des plantes non halophytes sur la côte et la plage dans un cadre méditerranéen.

L'intérêt pédagogique de la réserve réside dans le fait que la Réserve fait partie de la ville de Tyr, désignée en 1984 par l'UNESCO (Organisation des Nations Unies pour l'éducation, la science et la culture) comme Site du patrimoine mondial. Les activités pédagogiques des lycéens et des étudiants sont essentiellement axées sur l'observation des oiseaux et des tortues de mer. Ceci est appuyé par le fait que la TCNR est une ZICO potentielle et la plage de sable est assez vaste pour attirer les tortues vertes et les tortues caouannes.

Pour les ornithologues, de nombreux oiseaux d'eau et échassiers utilisent la réserve comme escale – une possibilité de voir des oiseaux aquatiques et semi-aquatiques dans une zone humide d'eau douce à proximité de la mer, où il est possible d'observer le passage des oiseaux de mer le long du littoral.

Pour les botanistes, la TCNR comprend une espèce endémique *Astragalus berytheus*, deux espèces rares et menacées, *Ficus sycomorus* et *Pancreatimum maritimum*, en plus d'une grande variété de plantes remarquables, notamment celles qui ont disparu de la plupart des zones côtières libanaises. Une espèce de plante introduite *Physalis peruviana* mérite d'être suivie.

Pour les herpétologues, les espèces de reptiles des dunes de sable et les amphibiens des marécages constituent une communauté protégée facile à surveiller, loin de toute perturbation humaine. La présence, également, de ponte de deux espèces de tortues marines, offre des conditions d'étude différentes de celles des îles des Palmiers (présence de prédateurs terrestres d'œufs, notamment les chiens et les renards et la présence d'une importante foule de visiteurs).

De même, les tortues marines mondialement menacées qui visitent les îles pour se reproduire ou leurs eaux pour hiverner, offrent de meilleures conditions de recherche que sur tous les autres sites des plages perturbées du continent.

Pour les océanologues, l'étude de la diversité marine, des biocénoses et des habitats est facilitée dans la réserve où il est possible de protéger et d'entretenir les plots de suivi avec le temps.

Un certain nombre d'aspects de la TCNR peuvent être considérés comme des paysages particuliers, notamment les plages de sable, auxquelles il est fait référence comme les plus belles plages de sable et les plus pittoresques du Liban, les eaux peu profondes s'étendant tout le long de la plage avec du sable doux et une eau transparente, un panorama admiré par l'ensemble des visiteurs. En outre, la région de Ras el Ain a été grandement valorisée depuis qu'elle comprend un site archéologique important, et les terres agricoles autour des puits de Ras el Ain, constituent un paysage rural rare sur le front de mer.

Il convient de noter que les menaces suivantes ont un impact léger sur la réserve :

Les détritiques, le déplacement des visiteurs, le forage et les parasols sur les plages de sable de la TCNR menacent l'habitat de reproduction des tortues vertes et des tortues caouannes et contribuent au déclin de ces espèces mondialement menacées.

Les pratiques agricoles actuelles non pérennes peuvent détruire le sol et tuer les espèces non ciblées lorsque des pesticides sont utilisés.

Les activités de pâturage étaient pratiquées dans la TCNR essentiellement avec du petit bétail, des troupeaux de chèvres ou de moutons, dans certaines zones du site mais toutes les activités de pacage ont été entièrement interrompues dans la réserve depuis trois ans.

Le nombre actuel de visiteurs pourrait avoir des répercussions négatives sur la réserve si des études sur la capacité de charge ne sont pas effectuées afin de réguler le nombre de visiteurs au sein de la TCNR.

Le port de pêche de Tyr est le deuxième plus grand port de la côte sud du Liban après le port de Sidon. A Tyr, les deux tiers de la pêche sont pratiqués au moyen d'équipements de

pêche inappropriés, essentiellement des filets maillants et des chaluts et un tiers au moyen de palangres (SOER, 2001). Ces pratiques devraient nécessairement avoir un impact sur la vie en mer à l'extérieur et à l'intérieur de la réserve.

La nécessité d'un parking pour les visiteurs de la réserve a imposé dans le passé l'aplanissement et la compression de quelques dunes de sables avec des bulldozers. Ceci a détruit non seulement une partie de l'habitat précieux des dunes de sable mais également une partie du paysage esthétique de la réserve.

Quelques 15 villages et trois camps de réfugiés palestiniens dans le Caza de Tyr évacuent leurs déchets dans une décharge à ciel ouvert proche de la rive sud de la ville de Tyr, à 200 m au sud des sources de Ras el Ain, menaçant les nappes souterraines qui alimentent les puits et, par conséquent, l'adduction en eau douce de la réserve. Le lixiviat des décharges menace également la côte de la réserve du fait que le mouvement du courant marin le long du littoral libanais est orienté du sud vers le nord (SOER, 2001).

Quant au plan de gestion, la vision de la TCNR consiste à préserver et à maintenir l'intégrité naturelle et culturelle du site par le biais d'une utilisation pérenne des ressources naturelles et la préservation du tissu social et culturel de la communauté directement concernée et de la communauté environnante.

Le milieu marin et le paysage marin ne sont pas encore étudiés dans la TCNR. Par conséquent, il sera difficile d'identifier son développement et ses tendances. Toutefois, la mise en œuvre appropriée de l'éthique du plan de gestion, élaboré en collaboration avec les communautés locales, pourrait permettre d'éviter tout développement et tendance néfastes sur le milieu marin et les paysages marins de la zone.

La déclaration légale de la TCNR énonce les principaux objectifs suivants :

- La protection de l'environnement naturel et la conservation de la faune et de la flore terrestres et marines en vue d'éviter leur extinction. La réhabilitation d'un écosystème durable et renouvelable afin d'en bénéficier pour la recherche scientifique.
- La conservation du patrimoine et des ressources naturelles, notamment les plages, le sol, l'écosystème et les bassins versants afin de les protéger de toute pollution et d'éviter leur dégradation qui pourrait être due à des phénomènes naturels et à une utilisation humaine. Leur gestion et entretien sûrs permettrait d'en bénéficier pour les loisirs et l'éco-tourisme organisé de façon non contradictoire avec leur conservation et leur durabilité.

La TCNR est une zone humide d'importance internationale, ou site Ramsar, dans le cadre de la Convention Ramsar de 1999. Elle est située sur des itinéraires migratoires majeurs, où des espèces d'oiseaux d'importance internationale ont été identifiées et elle a été désignée en 1984 par l'Organisation des Nations Unies pour l'éducation, la science et la culture (UNESCO) comme site du patrimoine mondial.

Etant une terre co-étatique, l'habilitation juridique de la Réserve naturelle de la côté de Tyr est répartie sur plusieurs institutions gouvernementales et non gouvernementales, en particulier :

- Le Ministère de l'Environnement (MoE), qui est l'autorité de tutelle de la TCNR, responsable de sa protection et de sa gestion.
- Le Ministère de l'Agriculture (MoA), responsable de la gestion des terres agricoles. Toutefois, actuellement, le MoA n'exerce pas de rôle actif dans la TCNR. Le MoA est également l'autorité nationale en charge du contrôle des activités de pêche.
- Le Ministère des Travaux publics et des transports (MoPWT), responsable de l'ensemble des plages du Liban. Il possède une juridiction parallèle à celle du Ministère de l'Environnement (MoE).

- Le Ministère de la Culture (MoC), par le biais de la Direction générale des Antiquités, est en charge de l'ensemble des sites archéologiques et historiques, notamment de celui de Ras El Ain.

La TCNR possède, conformément à la Loi 708/98, trois zones différentes avec des objectifs de gestion différents : des zones de loisirs, agricoles et de conservation. Cette loi est appuyée par d'autres lois sur l'environnement, notamment la Loi N° 444/02 (code de l'environnement), la Loi N° 508/04 sur la chasse et la Décision N° 125/1 du 23/9/1999, stipulant la protection des tortues marines, des phoques moines et des baleines.

En vertu de la Loi 708 du 5/11/1998 portant création de la Réserve naturelle de la côte de Tyr, un comité composé de cinq bénévoles établi par décision du Ministre de l'Environnement, se charge de la gestion du site ; les bénévoles représentent les institutions suivantes :

- La Municipalité de Tyr
- Le "Kaemakam" ou le Gouverneur du Caza de Tyr
- Deux ONG locales de la région de Tyr, actuellement Amwaj et Protection de l'Environnement – Tyr, qui sont les deux ONG représentées
- Le Ministère de l'Agriculture

Un plan de gestion quinquennal pour la TCNR a été préparé dans le cadre du Projet MedWetCoast, une initiative méditerranéenne dans le cadre de la Convention Ramsar et exécutée au Liban par le Ministère de l'Environnement, financée par le Fonds français pour l'environnement mondial (FFEM) et gérée par le Programme des Nations Unies pour le développement (PNUD).

La surveillance globale est sous la responsabilité du Ministère de l'Environnement. Localement, deux gardes-forestiers à plein temps et un autre à temps partiel sous la supervision du gestionnaire de la réserve, patrouillent la réserve et constituent les principaux moyens de protection afin de surveiller et de contrôler les visiteurs et d'arrêter les braconniers ou de dissuader toute infraction. Les pénalités existantes (Article 14 de la Loi 708/98) octroient le pouvoir requis afin de préserver et de protéger efficacement la TCNR et suffisent à dissuader les infractions.

La TCNR dépend grandement des bénévoles, des scouts et des ONG pour la gestion de la réserve et des visiteurs. Les universités et les institutions de recherche contribuent à l'appui des objectifs de la réserve au moyen d'un engagement dans le cadre d'un Programme de recherche. La gestion de la TCNR, est, par conséquent, une responsabilité nationale requérant une allocation annuelle du Trésor national.

Enfin, la réserve bénéficie d'activités de recherche et de surveillance réalisées par divers scientifiques.

## **Rapport de présentation soumis**

**Acronyms:**

APAC	Appointed Protected Area Committee
COM	Council of Ministers
EIA	Environmental Impact Assessment
IBA	Important Bird Area
IEE	Initial Environmental Examination
MOA	Ministry of Agriculture
MOC	Ministry of Culture
MOD	Ministry of Defense
MOE	Ministry of Environment
MOPWT	Ministry of Public Works and Transport
NCSR	National Center for Scientific Research
NGO	Non Governmental Organisation
PA	Protected Area
PINR	Palm Islands Nature Reserve
SOER	State of Environment Report
SPA	Specially Protected Area
SPAMI	Specially Protected Areas of Mediterranean Importance
TCNR	Tyre Coast Nature Reserve



## 1. AREA IDENTIFICATION

### 1.1. COUNTRY/COUNTRIES (in the case of transboundary areas)

LEBANON

### 1.2. ADMINISTRATIVE PROVINCE OR REGION

TYRE/ MOHAFAZAT (GOVERNORATE) OF SOUTH LEBANON

### 1.3. NAME OF THE AREA

TYRE COAST NATURE RESERVE (TCNR)  
TYRE

### 1.4. GEOGRAPHIC LOCATION

Describe its geographical boundaries, e.g. rivers, roads, geographical or administrative boundaries (do not describe the co-ordinates here; please make a separate annex with a map and a description of geographical co-ordinates as stated in the legal declaration of the area).

The Tyre Coast Reserve is formed of two parts, both along the beach of Tyre: the first part extends between Tyre city that is 80 km from Beirut city and Rachidieh to the south. The second part extends further to the south from Rashidyah to Ras Al Ain Pools. Rashidyah is a Palestinian refugee camp lying alongside the principal road to the beach (Figure 1).

### 1.5. SURFACE OF THE AREA (total)

According to the Law 708/98 :  
3.88 (in Km<sup>2</sup>) + 0.5 Km<sup>2</sup> of entrance sandy beach  
= 4.38 Km<sup>2</sup>

388 (in ha) + 50 ha sandy beach = 438 ha.

### 1.6. LENGTH OF THE MAIN COAST (Km)

4.10 km

But the coast in front of the Palestinian camp (1 km) needs to be added in order to be able to calculate the territorial sea area (113.22 Km<sup>2</sup>) that is making part of the reserve according to the Law 708/98.

## 2. EXECUTIVE SUMMARY (maximum 3 pages)

Tyre Coast Nature Reserve (TCNR) has a terrestrial area of about 4.40 Sq km and a marine surface area (territorial waters) of about 113 sq km.

The beach and the sand dunes of the Tyre Coast Nature Reserve (TCNR) are made up of a mixture of quartz and carbonate sands which are locally lithified to give beach rock. In places limestone gravels occur. The underlying geology is very significant as it controls the existence of the artesian springs. The main rock units are a sequence of porous and fissured Lower and Middle Cretaceous limestone which are overlain by a sequence of Late Cretaceous chalks and marls. These in turn are overlain by a sequence of Lower Tertiary limestone. The entire sequence is gently dipping and broken by local faulting some of which seems to be relatively recent.

The lower and middle Cretaceous limestone forms the aquifer that provides the majority of the region's water, although private wells tap the water of the upper Eocene sediments. The annual rainfall average on Tyre Coast Reserve is 654 mm.

At Ras Al Ain there are three artesian wells whose walls were built by the Phoenicians, as well as other small springs. The freshwater springs of Ras Al Ain feed 1500 l / sec into three striking pools. The off-flow creates small areas of marshland attractive to amphibian and water birds such as ducks, crakes, coots, etc.

The habitats of TCNR are:

Sand Dunes of Mediterranean Coast

Coastal Freshwater Land

Agriculture Land

Sandy Beaches

Pebble and stony beaches

The users of the TCNR are visitors from the immediate surroundings (local community) and others from all over Lebanon.

The current human use and development is limited to conservation, recreation, agriculture, fishing, education and scientific research.

Twenty one (21%) of the TCNR flora is restricted to eastern Mediterranean area (Ramadan-Jaradi et al. 2004).

TCNR is an important nesting site for globally endangered Mediterranean Loggerhead and Green sea turtles, a site containing a wide diversity of ecosystems; marine, agriculture, wetland that are of Mediterranean characteristics, and a place of roman artesian wells of an important historical and archeological aspect in the east Mediterranean area.

The reserve is characterized with sand beaches where the globally threatened Loggerhead and Green turtles do breed and where migratory waders find their food away from hunters, a unique community of sand dunes flora and its associated fauna, the last remaining dunes on the coast of Lebanon, and a wetland with non halophyte plants on the coast and the beach within a Mediterranean framework.

The Educational interest of the reserve derives from the fact that the Reserve is part of the city of Tyre, which was designated in 1984 by the United Nations Educational, Scientific and Cultural Organization (UNESCO) as a World Heritage Site. The educational activities of school and university students are mainly focusing on bird watching and sea turtle watching. This is supported by the fact that TCNR is a potential IBA and the sandy beach is wide enough to attract Green Turtles in addition to Loggerheads.

For ornithologists, many waterfowls and waders use the reserve as a stopover- an opportunity to see aquatic and semi-aquatic birds in a freshwater wetland near the sea, where also sea birds are seen passing along the shore.

For botanists, the TCNR encompasses one endemic species *Astragalus berytheus*, two rare and threatened species *Ficus sycomorus* and *Panocratimum maritimum*, in addition to a wide variety of noteworthy plant species, including those which disappeared from most of the Lebanese coastal areas. An introduced plant species *Physalis peruviana* merits monitoring.

For herpetologist, the sand dune reptile species and the amphibians of the marshes constitute a protected community that is easy for monitoring away from human disturbance. Also the presence of two nesting globally marine turtle species offers study conditions different from those of Palm Islands (presence of terrestrial predators of eggs like dogs and foxes and presence of crowds of people)

Also the internationally threatened marine turtles visiting the islands for breeding or its waters for wintering offer better research conditions than in any other sites of the continental disturbed beaches.

For oceanologists, the study of marine diversity, biocenoses and habitats will be made easier within the reserve where monitoring plots can be protected and maintained over the time.

A number of aspects of the TCNR can be regarded as distinctive scenic landscapes including the sandy beach, which is referred to as one of the most beautiful and scenic sandy beaches in Lebanon, the shallow waters extending throughout the length of the beach with soft sand and clear water, a sight admired by all visitors. Additionally, the Ras el Ain area has been greatly valued since it includes an important archeological site, and the agricultural lands surrounding the wells of Ras el Ain constitute a rare rural landscape on the coastal front.

The threats having pressure on the reserve are mild but worth to be noted:

Littering, stepping, digging and umbrellas fixing on the sandy beach of TCNR threaten the breeding habitat of both Green and Loggerhead turtles and contribute to the decline of these globally threatened species.

The current unsustainable agricultural practices may destroy the soil and kill non target species when pesticides are used.

The Pasture activities were practiced in TCNR mainly with small cattle, goat or sheep herds, in selected areas of the site. but all grazing activities were totally stopped in the reserve since three years.

The current visitors' number may negatively impact the reserve if studies of carrying capacity are not conducted to regulate the number visiting the TCNR.

The Tyre fishing harbor is the second largest in the southern coast of Lebanon after the harbor of Sidon. In Tyre, two-thirds of fishing is practiced using improper fishing equipments, mainly trammels and dragnets, and one-third using long lines (SOER, 2001). These practices should necessarily impact the life in the sea outside and within the reserve.

The need for a parking to the visitors of the reserve imposed flattening and compressing of some sand dunes by bulldozers in the past. This destroyed not only part of the valuable habitat of sand dunes but also a part of the easthetic landscapes of the reserve.

Some 15 villages and three Palestinian refugee camps in the caza of Tyre dispose of their garbage in an open dumpsite close to the shore south of the city of Tyre, 200 m south of Ras

el Ain springs threatening the groundwater that supplies the wells hence the freshwater supplies in the reserve. The leachate of landfills also threatens the coast of the reserve since the marine current movement along the Lebanese coastline is from south to north. (SOER, 2001).

As per the management plan, The TCNR's vision is to conserve and maintain the natural and cultural integrity of the site through the sustainable use of the natural resources and the preservation of social and cultural fabric of the community directly concerned and the surrounding community.

The marine environment and the seascapes are not studied yet in TCNR. Thus it will be difficult to identify their expected development and trends. However, the proper implementation of the ethics of the management plan that was developed in collaboration with the local communities may prevent any development and trends of the marine environment and seascapes of the area.

The following main objectives are stated in the legal declaration of the TCNR:

- Protection of the natural environment and conservation of the terrestrial and marine fauna and flora to prevent their extinction. The rehabilitation of a sustainable and renewable ecosystem in order to benefit from it for the scientific research.
- Conservation of heritage and natural resources such as beaches, soil, ecosystem and watersheds to protect them from pollution and to prevent their degradation that may be caused by natural phenomena and human use. The safe management and maintenance of the above to benefit from them in the recreation and the organized eco-tourism in a way not contradicting with their conservation and sustainability.

TCNR is a Wetland of international importance or Ramsar Site under the Ramsar Convention in 1999, it is located on major migratory routes, where internationally important bird species have been identified, and is designated in 1984 by the United Nations Educational, Scientific and Cultural Organization (UNESCO) as a World Heritage Site.

Being a co-government land, Tyre Coast Nature Reserve's legal right is distributed over different governmental and non-governmental institutions mainly:

The Ministry of Environment (MoE), is the tutelage authority over TCNR, the MoE is responsible of its protection and management.

The Ministry of Agriculture (MoA) is responsible for managing the agriculture land, however currently the MoA is not exercising an active role in TCNR. The MoA is also the national authority responsible for controlling fisheries activities.

Ministry of Transport and Public Works and Transport (MoPWT) is mandated over all beaches in Lebanon; and has parallel jurisdiction with the Ministry of Environment (MoE), Ministry of Culture (MoC), through the Directorate General of Antiquities, is mandated over all archeological and historical sites, including that of Ras el Ain,

TCNR has, in accordance with the Law 708/98, three different zones allocating different management objectives: Recreation, agriculture and conservation zones. This law is supported by other environmental laws such as the Law no. 444/02 (code of environment), Law no. 508/04 of hunting, and Decision no 125/1 dated 23/9/1999 stating the protection of marine turtles, monk seals and whales.

According to the law 708 dated 5/11/1998 establishing Tyre Coast Nature Reserve, a committee of five volunteers established through a decision from the Minister of Environment, undertakes the management of the site; the volunteers represent the following institution:

- Municipality of Tyre
- “Kaemakam” or Governor of the caza of Tyre
- Two local NGOs in the Tyre region; currently Amwaj and The Protection of Environment-Tyre are the represented NGOs
- Ministry of Agriculture
- 

A five years management Plan for TCNR was prepared under MedWetCoast Project, which is a Mediterranean initiative under the Ramsar Convention, and which was executed in Lebanon by the ministry of Environment, funded by the Fonds Francais pour l’Environnement Mondial (FFEM) and managed by the United Nations Development Program (UNDP).

The overall surveillance is the responsibility of the MoE. Locally, 2 full time rangers and one part time ranger under the supervision of the reserve manager patrol the reserve and are the essential protection means to protect and survey and control visitors and stop poachers or dissuade infractions. The existing penalties (Article 14 of the Law 708/98) provide the power needed to effectively conserve and protect the TCNR and are sufficient to dissuade infractions.

The TCNR is largely dependent on volunteers, scouts, NGOs for the management of the reserve and the visitors. Universities and research institutions contribute to the support of the reserve’s objectives through commitment to a Research Agenda. TCNR management is therefore a national responsibility requiring yearly allocation from the national treasury.

Finally, the reserve enjoys research and monitoring activities conducted by various scientists.

### 3. SITE DESCRIPTION

#### 3.1. TYPOLOGY OF THE SITE

3.1.1. Terrestrial surface, excluding wetlands (ha):		437.72 ha
3.1.2. Wetland surface (ha):		0.28 ha
3.1.3. Marine surface (Sq. Km):	Marine internal waters	0.00 ha
	Territorial sea	113.22 Sq. Km
	High sea	N/A

#### 3.2. MAIN PHYSICAL FEATURES

##### 3.2.1. Geology/Geomorphology

Give a brief description of: (i) geological aspects (lithologic and tectonics); (ii) processes of sedimentation and erosion observable in the area; (iii) coastal geomorphology and (iv) island system. Indicate bibliographical sources.

The beach and the sand dunes of the Tyre Coast Nature Reserve (TCNR) are made up of a mixture of quartz and carbonate sands which are locally lithified to give beach rock. In places limestone gravels occur. The underlying geology is very significant as it controls the existence of the artesian springs. The main rock units are a sequence of porous and fissured Lower and Middle Cretaceous limestone which are overlain by a sequence of Late Cretaceous chalks and marls. These in turn are overlain by a sequence of Lower Tertiary limestone. The entire sequence is gently dipping and broken by local faulting some of which seems to be relatively recent (C. Walley, unpubl.).

The reserve is situated on a sandy area of the Quaternary age. Some of the sand dunes became sandstone. Remarkably, most of the remaining dunes are free and mobile, as the sparse, scattered vegetation is unable to fix them (Jaz in Ramadan-Jaradi *et al.* 2004).

Sand predominates on the stretch of beach nearest to Tyre. Towards Ras Al Ain, it is interspersed with pebbly areas and rocky shelves and the gravel gets gradually closer to the beach, where the remaining sand is either represented by hummocks or used by farmers.

A point of significance is that the area is a bay in which new materials are mainly brought by waves and sea currents.

Ramadan-Jaradi *et al.* 2004: Ramadan Jaradi, G., Tohmé, G., and Hraoui, S. (2004). Biodiversity Assessment and Monitoring in the Protected Areas Lebanon LEB/95/G31 TCNR, Ministry of

Environment (MoE)/ Lebanese University, 145 p. [www.moe.gov.lb/ProtectedAreas/publications/Final-ReportTyre.pdf](http://www.moe.gov.lb/ProtectedAreas/publications/Final-ReportTyre.pdf)

Sattout E. & Talhouk S. N. (2001) *A proposed Monitoring Program for the flora of the Natural Reserves of Al-shouf, Ehden, and the Palm Islands*. The Protected Areas Project. Ministry of Environment. LEBANON.

3.2.2. Other interesting physical features: Such as hydrodynamics, volcanic formations, caves, underwater formations, etc.

The lower and middle Cretaceous limestone forms the aquifer that provides the majority of the region's water, although private wells tap the water of the upper Eocene sediments. The capping of the largely impermeable Late Cretaceous has allowed the development of artesian wells where the water rises above ground level under natural pressure. At Ras Al Ain there are three artesian wells whose walls were built by the Phoenicians, as well as other small springs. The water at the wells rises up to 5 m. above the ground level. The wells have a supply of 1500 l/sec (C. Walley, unpubl.) and serve the irrigation needs of the surrounding farmland, provide some of the drinking water needs of the region and also drain into the sea by a small channel through the beach.

What is also of interest is that the freshwater allowed the practice of agricultural activities on a humid soil near the shore.

3.2.3. Length of beaches (in Km), including islands: (excluding the coast of Rachidieh camp).

a) Length of sandy beaches:

2.13 km

b) Length of pebble or stony beaches:

1.97 km

c) Length, height and depth of active sand-dunes:

1.37 km x height  
5m

### 3.3. FRESHWATER INPUTS

3.3.1. Mean annual precipitation (in mm)

The annual rainfall average on Tyre Coast Reserve is 654 mm. Rainfall is concentrated in the winter months from October through April and nearly rainless the other months of the year (Ramadan-Jaradi *et al*, 2004)

3.3.2. Main water courses (permanent and seasonal)

At Ras Al Ain there are three artesian wells whose walls were built by the Phoenicians, (Figures 7) as well as other small springs. The water at the wells rises up to 5 m. above the ground level (Figure 8). The wells have a supply of 1500 l/sec (C. Walley, unpubl.) and serve the irrigation needs of the surrounding farmland, provide some of the drinking water needs of the region and also drain into the sea by 2 small permanent watercourses with length of 607 m and 508 m respectively, through the beach.

3.3.3. Estuarine areas: Existence and brief description

N/A

3.3.4. Freshwater springs: Existence and brief description, including marine offsprings

The freshwater springs of Ras Al Ain feed 1500 l / sec into the three striking pools mentioned above. The pools provide a freshwater habitat and the off-flow creates small areas of marshland attractive to amphibian and water birds such as ducks, crakes, coots, etc. The inflow of fresh water from the springs into the sea creates brackish water, especially productive and rich in aquatic species (Ramadan-Jaradi *et al*. 2004).

Freshwater is also represented by small temporary ponds of rain water in winter and spring seasons. The surrounding sea shows several freshwater springs

Ramadan-Jaradi *et al*. 2004: Ramadan Jaradi, G., Tohmé, G., and Hraoui, S. (2004). Biodiversity Assessment and Monitoring in the Protected Areas Lebanon LEB/95/G31 TCNR. Ministry of Environment (MoE)/ Lebanese University, 145 p. [www.moe.gov.lb/ProtectedAreas/publications/Final-ReportTyre.pdf](http://www.moe.gov.lb/ProtectedAreas/publications/Final-ReportTyre.pdf)

### 3.4. BIOLOGICAL FEATURES (B2, Annex I)

3.4.1. Habitats: A brief description of dominant marine and terrestrial habitats, on the basis of the habitat classifications adopted within the framework of MAP (and their coverage in ha)

#### **Terrestrial:**

According to Corine classification, the Tyre Coast Reserve lies under "Sand Dunes of Mediterranean Coast" type and belongs to "Dunes with *Euphorbia terracinea*" habitat (code 2220) where the grassland communities contain both *Euphorbia* and *Silene* species. But the reserve is characterized by the artesian wells or pools (semi-standing water) and the course of water towards the sea (running water) as well as the tiny marshy area with pebbles (still water) along the way of the water course. Such small wetland is difficult to match with any of Corine classification of natural habitats. For this reason it would be suitable to divide the plant formations at Tyre Coast Reserve into four formation categories:

- **Formation of beach plants:** it is subdivided into two formations:
  1. **Formation of rock plants,** with *Arthrocnemum macrostachyum*, *Crithmum maritimum*, *Limonium graecum*, *Limonium sinuatum*.
  2. **Formation of sand and pebble plants,** with *Atriplex halimus*, *Convolvulus secundus*, *Echium angustifolium*, *Euphorbia paralias*, *Euphorbia peplis*, *Glaucium flavum*, *Ipomoea stolonifera*, *Otanthus maritimus*, *Pseudorlaya pumila*.
- **Formation of sand dunes plants,** primarily with *Cakile aegyptiaca*, *Cyperus kalli*, *Matthiola tricuspidata*, *Muscari maritimum*, *Pancratium maritimum*, *Salsola kali*, *Silene colorata decumbens*; and secondarily with *Astragalus berytheus*, *Cakile aegyptiaca*, *Cyperus kalli*, *Daucus aureus*, *Daucus littoralis*, *Echium angustifolium*, *Emex spinosa*, *Eryngium maritimum*, *Hypocrepis multisiliquosa*, *Lagonychium farctum*, *Lagurus ovatus*, *Matthiola tricuspidata*, *Muscari maritimum*, *Pancratium maritimum*, *Plantago albicans*, *Plantago squarrosa*, *Polygonum maritimum*, *Salsola kali*, *Silene colorata decumbens*, *Trifolium scabrum*, *Trigonella cylindracea*, *Vulpia membranacea*.
- **Formation of cultivated land plants,** with *Adonis annua*, *Convolvulus pentapetaloides*, *Medicago scutellata*, *Nigella arvensis mutica*, *Ononis hirta*, *Physalis peruviana*, *Salvia hierosolymitana*, *Salvia verbenaca serotina*, *Trigonella spinosa*, *Vicia hybrida*.
- **Formation of Ras Al Ain wetland plants,** with *Carex divisa*, *Carex extensa*, *Cyperus alopecuroides*, *Cyperus laevigatus*, *Ipomoea palmata*, *Lemna gibba*, *Vigna luteola*.

An investigated sample area at N 33° 13' 683 E 35° 13' 062 and c.6m altitude provided a plant community composed of *Arundo donax*, *Carex divisa*, *Cyperus alopecuroides*, *Cyperus laevigatus*, *Ipomoea palmate* and *Vigna luteola*.



- **Formation of near-water plants**, with mainly *Arum hygrophilum*, *Epilobium hirsutum*, *Lycopus europaeus*, *Lythrum salicaria*, *Mentha aquatica*, *Mentha pelagium*, *Salix alba*, *Veronica anagallis-aquatica*. Other less important species may be added to this formation such as: *Alopecurus venticosus*, *Arum hygrophilum*, *Dipsacus laciniatus*, *Drabopsis verna brachycarpus*, *Epilobium hirsutum*, *Hordeum hystrix*, *Lycopus europaeus*, *Lythrum salicaria*, *Mentha aquatica*, *Mentha pelagium*, *Myosotis caespitosa*, *Polygonum lapathifolium nodosum*, *Potentilla reptens*, *Pulicaria dysenterica*, *Salix alba*, *Scirpus tuberosus*, *Veronica anagallis-aquatica*.

**Marine:**

Unfortunately, there are no available marine studies conducted within the waters of the reserve. This is probably partly due to the current political tension in the territorial waters of the TCNR. The nearby marine studies known in the vicinity are those conducted by an oceanologist in 2004, precisely at Naqoura area near the southern border of the country. The extrapolation of some data from Naqoura to TCNR could be possible if executed with maximum care under the supervision of a marine biologist.

3.4.2. List of regionally important species (flora and fauna) (B-2a, Annex I)

List here ONLY those species protected by international agreements, particularly those marine species included in Annex II of the Protocol, which are present in the area. Any other species may be listed if it is clearly considered of regional importance given its high representation in the area. Display the species list under the headings Marine Plants, Terrestrial Plants, Marine Invertebrates, Fish, Amphibians and Reptiles, Birds, and Mammals. For each species state:

- its relative abundance as Common (C), Uncommon (U) or Occasional (O),
- Its global status as rare (r), endemic (e) and/or threatened (t), and
- its status as an important resident population (R), or important for its breeding (B), feeding (F), wintering (W) or migratory passage (M)

SPECIES	Rel. Abundance (C) (U) (O)	Global STATUS (r) (e) (t)	Local STATUS (R) (B) (F) (W) (M)
Examples: BIRDS			
<i>Pelecanus onocrotalus</i>	(C)	(e) (t)	(R)
<i>Falco eleonora</i>	(U)	(e) (t)	(B)

The data concerning the marine flora and fauna given below are inspired from a study made in 2004 made by Dr. Sami Lakkis within the Camp Project, 17 kilometers to the south of Tyre. They are given here as potential species only in the waters of Tyre.

<b>Marine plants</b>			
<b>3.5. Magnoliophyta</b>			
<i>Zostera marina</i>	U		
<i>Zostera noltii</i>	U		
<b>Phaeophyta</b>			
<i>Cystoseira mediterranea</i>	C		
<b>Terrestrial plants</b>			
--			
<b>Marine invertebrates</b>			
<b>Mollusca</b>			
<i>Charonia lampas</i> (= <i>Ch. Rubicanda</i> = <i>Ch. Nodifera</i> )	O		
<i>Dendropoma petraeum</i>	C		
<i>Lithophaga lithophaga</i>	U		
<i>Luria lurida</i> (= <i>Cypraea lurida</i> )	C		
<i>Mitra zonata</i>	U		
<i>Patella nigra</i>	C		
<i>Pholas dactylus</i>	PRESENT		
<i>Pinna nobilis</i>	O		
<i>Tonna galea</i>	U		
<b>Fish</b>			
<i>Epinephelus guaza</i>	U		
<i>Epinephelus aeneus</i>	U		
<b>Amphibians and Reptiles</b>			
<i>Caretta caretta</i>	C	t	B
<i>Chelonia mydas</i>	U	t	B
<i>Dermochelys coriacea</i>	O	t	M?
<b>Birds</b>			
<i>Pandion haliaetus</i>	U	r	M
<i>Calonectris diomedea</i>	C	-	M, W
<i>Falco eleonorae</i>	U	r	M
<i>Hydrobates pelagicus</i>	O	r	M
<i>Phalacrocorax pygmeus</i>	U	r	M, W
<i>Pelecanus onocrotalus</i>	C	-	M
<i>Pelecanus crispus</i>	O	t	M
<i>Phoenicopterus ruber</i>	U	-	M
<i>Puffinus puffinus yelkouan</i> ( <i>P. yelkouan</i> )	C	-	M, W
<i>Sternula albifrons</i>	U	-	M
<i>Sterna bengalensis</i>	-	-	M
<i>Sterna sandvicensis</i>	U	-	M, W
<b>Mammals</b>			
<i>Delphinus delphis</i>	-	t	
<i>Monachus monachus</i>	-	t	
<i>Stenella coeruleoalba</i>	-	-	

3.4.3. Flora: Describe in a few sentences the main plant assemblages significant in the area.

- **Formation of beach plants:** it is subdivided into two formations:
  1. **Formation of rock plants,** with *Arthrocnemum macrostachyum*, *Crithmum maritimum*, *Limonium graecum*, *Limonium sinuatum*.
  2. **Formation of sand and pebble plants,** with *Atriplex halimus*, *Convolvulus secundus*, *Echium angustifolium*, *Euphorbia paralias*, *Euphorbia peplis*, *Glaucium flavum*, *Ipomoea stolonifera*, *Otanthus maritimus*, *Pseudorlaya pumila*.

A representative-site involving an area near the mouth of Ras el Ain stream at N 33° 13' 716" E 35° 12' 689" and about 3m altitude has a community which appeared to be chiefly characterized by *Atriplex halimus*, *Convolvulus secundus*, *Crithmum maritimum*, *Echium angustifolium*, *Euphorbia paralias*, *Euphorbia peplis*, *Glaucium flavum*, *Ipomoea stolonifera*, *Limonium graecum*, *Limonium sinuatum*, *Otanthus maritimus* and *Pseudorlaya pumila*.

- **Formation of sand dunes plants,** primarily with *Cakile aegyptiaca*, *Cyperus kalli*, *Matthiola tricuspidata*, *Muscari maritimum*, *Pancratium maritimum*, *Salsola kali*, *Silene colorata decumbens*; and secondarily with *Astragalus berytheus*, *Cakile aegyptiaca*, *Cyperus kalli*, *Daucus aureus*, *Daucus littoralis*, *Echium angustifolium*, *Emex spinosa*, *Eryngium maritimum*, *Hypocrepis multisiliquosa*, *Lagonychium farctum*, *Lagurus ovatus*, *Matthiola tricuspidata*, *Muscari maritimum*, *Pancratium maritimum*, *Plantago albicans*, *Plantago squarrosa*, *Polygonum maritimum*, *Salsola kali*, *Silene colorata decumbens*, *Trifolium scabrum*, *Trigonella cylindracea*, *Vulpia membranacea*.

In a representative but clean site at N 33° 15' 333" E 35° 12' 813" and about 2m altitude, the main species of this community are represented by *Cakile aegyptia*, *Cyperus kalli*, *Inula graveolens*, *Muscari maritimum*, *Nigella arvensis mutica*, *Pancratium maritimum*, *Salsola kali* and *Silene colorata decumbens*

- **Formation of cultivated land plants,** with *Adonis annua*, *Convolvulus pentapetaloides*, *Medicago scutellata*, *Nigella arvensis mutica*, *Ononis hirta*, *Physalis peruviana*, *Salvia hierosolymitana*, *Salvia verbenaca serotina*, *Trigonella spinosa*, *Vicia hybrida*.

In a representative sample site which was selected near Ras El Ain ponds at N 33° 13' 670 E 35° 12' 841 and c.6m altitude, the plants associated to this community are chiefly made from *Adonis annua*, *Cyperus rotundus*, *Ononis hirta*, *Physalis peruviana*, *Salvia verbenaca serotina*, *Trigonella spinosa* and *Vicia hybrida*

- **Formation of Ras Al Ain wetland plants,** with *Carex divisa*, *Carex extensa*, *Cyperus alopecuroides*, *Cyperus laevigatus*, *Ipomoea palmata*, *Lemna gibba*, *Vigna luteola*.  
An investigated sample area at N 33° 13' 683 E 35° 13' 062 and c.6m altitude provided a plant community composed of *Arundo donax*, *Carex divisa*, *Cyperus alopecuroides*, *Cyperus laevigatus*, *Ipomoea palmate* and *Vigna luteola*.

- **Formation of near-water plants**, with mainly *Arum hygrophilum*, *Epilobium hirsutum*, *Lycopus europaeus*, *Lythrum salicaria*, *Mentha aquatica*, *Mentha pelagium*, *Salix alba*, *Veronica anagallis-aquatica*. Other less important species may be added to this formation such as: *Alopecurus venticosus*, *Arum hygrophilum*, *Dipsacus laciniatus*, *Drabopsis verna brachycarpus*, *Epilobium hirsutum*, *Hordeum hystrix*, *Lycopus europaeus*, *Lythrum salicaria*, *Mentha aquatica*, *Mentha pelagium*, *Myosotis caespitosa*, *Polygonum lapathifolium nodosum*, *Potentilla reptens*, *Pulicaria dysenterica*, *Salix alba*, *Scirpus tuberosus*, *Veronica anagallis-aquatica*.

3.4.4. Fauna: Describe in a few sentences, which are the main fauna populations present in the area.

Tyre Coast is habitat for only 13 **mammal** species distributed over 8 families. Two of which are flying mammals that are generally considered threatened at both global and regional levels (*Rhinolophus euryale judaicus*, *Pipistrellus kuhli ikhawanius*). In addition, one more mammal is found to be globally threatened too, the *Meles meles canescens*. Similarly, there is one very rare species in Lebanon, the *Acomys dimidiatus* and 8 restricted species to East Mediterranean area (*Erinaceus europaeus concolor*, *Canis aureus syriacus*, *Vulpus vulpus palaestina*, *Meles meles canescens*, *Spalax leucodon ehrenbergi*, *Rhinolophus euryale judaicus*, *Pipistrellus kuhli ikhawanius*, *Vormela peregusna syriaca*, *Acomys dimidiatus*, and *Meriones tristrami tristrami*). Additional species may occur but were not encountered in the various surveys. Further surveying and inventorying is likely to increase the number of officially recorded species.

**Bird** species inventory summarises the results of the survey and inventory work conducted by Ramadan-Jaradi, G. & Ramadan-Jaradi, M. between 1996 and 2008 (Ramadan-Jaradi et al. 2008) with a focus on TCNR during the study undertaken in 2004 (Ramadan-Jaradi et al. 2004).

There is a total of 222 recorded bird species in the TCNR. Seven of them *Neophron percnopterus*, *Falco biarmicus*, *Falco cherrug*, *Phalacrocorax pygmeus*, *Pelecanus crispus*, *Falco naumanni*, and *Serinus syriacus* are classified as globally threatened species as per IUCN Red List categories for 2007. The latter is globally threatened and limited in its distribution to east Mediterranean region. Eight others are classified as regionally threatened species: *Ciconia ciconia*, *Aythya nyroca*, *Pernis apivorus*, *Elanus coeruleus*, *Gyps fulvus*, *Accipiter brevipes*, *Aquila pomarina*, and *Gallinago media*.

Eighteen herptile species re recorded on TCNR. The three marine turtles (*Chelonia mydas mydas*, *Caretta caretta caretta*, *Dermochelys coriacea coriacea*) constitute the only globally threatened species in this reserve. The *Acanthodactylus shreiberi* is endemic and all the others are regionally threatened herptile species.

### 3.5. HUMAN POPULATION AND USE OF NATURAL RESOURCES

#### 3.5.1 Human population

a) Inhabitants inside the area:

	Number	Date of data
Permanent	Null	27/3/2011
Seasonal number (additional to permanent)	Null	27/3/2011

b) Description of the population

The users of the TCNR are visitors from the immediate surroundings (local community) and others from all over Lebanon.

c) Main human settlements and their populations

N/A

#### 3.5.2 Current human use and development

a) Briefly describe the current use of the area by subsistence, artisan, commercial and recreational fishing, hunting, tourism, agriculture and other economic sectors.

##### **Conservation**

**TCNR includes a specific zone for conservation which is a high conservation zone to minimize disturbance to wildlife. This section is completely conserved in order to protect and research the fauna & the flora. Protection of this zone will allow endangered sea turtles to come back and nest on the shore.**

Moreover, conservation efforts are taking place in several locations on site in order to promote and protect important species and habitats. Conservation efforts are undertaken on site by the APAC which has completed several activities such as fencing, reduction of human negative effect, infrastructure, etc... in addition, the MoE through the MedWetCoast Project, a regional initiative aiming to conserve wetlands around the Mediterranean, has implemented many activities on site such as awareness, infrastructure, biodiversity monitoring, and the development of the management plan for the reserve etc....

##### **Agriculture**

**TCNR includes an agricultural zone.**

The practiced agricultural activities in TCNR are of different types but mainly fodder culture and vegetable or legume culture. However, some of the farmers within the agricultural zone are still using fertilizers and pesticides, which may reach the water table. The Management Team is trying to find alternative type of agriculture (like aromatic and medicinal plants etc...) in order to reduce the use of pesticides.

There is an unregulated and uncontrolled use of pesticides that might negatively affect the whole food chain within the site causing a change in the water quality and leading to biodiversity loss. However, several local and national NGOs conducted activities to promote the wise use of organic farming, through training, workshops and demonstrations activities.

The collection of medicinal and other economically wild plant species is not frequent in TCNR and therefore has a minimal impact on the site.

### **Forestry**

The ecosystem of TCNR does not contain forest habitats. Sand dune habitats, fresh water ponds and agriculture are the major ecosystems.

### **Tourism & leisure activities**

The tourism zone in section E1 (Figure 2) of the reserve is a strong tourist attraction in the summer especially for swimmers, where some 49 regulated wooden booths (kiosks) are erected to serve almost 3000 tourists on weekends; this has led to an allocation of a parking area on the reserve lots. However, this issue has been dealt with on regular basis from the MoE, the APAC and the Municipality. Several solutions are under examination. The MoE through the MedWetCoast project assessed the carrying capacity of Zone E1 of the reserve. The assessment objective was to guide the municipality of Tyre on how to manage the public beach while ensuring the protection of the endangered Mediterranean marine turtles. Based on the assessment and ensuing discussions, the municipality agreed to reduce the number of kiosks from 100 to 49 (they receive thousands of tourists and beachgoers in summer) and push these kiosks back 60m from the wave level during high tide. These measures are expected to increase the occurrence of marine turtle nesting and hatching. Moreover, the MoE is pushing currently to reduce the number of these kiosks to 40.

As for eco-tourism, it is presently limited to some bird and turtle watching activities, a few educational visits by locals, and the recreational activities that are taking place each summer.

The launching of Bed & Breakfast in the city of Tyre using the local communities accommodation, has also constituted an important part of ecotourism and has shown to be successful in terms of providing revenue to the local community as well social cultural exchange with foreign tourist. Naturalists and eco-tour operators are using this facility for their accommodation; therefore, the site is acting as a source of revenue for the local community.

### **Fishing**

Fishing activities in TCNR site has not been studied yet and therefore cannot be assessed or appraised.

### **Water use**

The three artesian wells of Ras el Ain supply the cultivated area in the reserve with freshwater through an irrigation system consisting of raised concrete channels from the wells and ditches running along the field boundaries (Figure 3 ). The surplus of water may reach the sea, otherwise it could be stored in ponds (Figure 4). The agriculture area is supplied with water from the Ras el Ain ponds (artesian wells) and does not appear to have problems with water supply or distribution.

As for the water surplus, which quickly reaches the sea, it could be managed to create a shallow marsh with an outlet to the sea. Such a marsh would undoubtedly add to the value of the reserve by attracting waterfowl.

### **Education**

General leaflets and brochures have been produced by a local NGO, portraying the reserve and its major attributes. Organized tours for the media, schools, municipalities and research institutions are conducted to raise the awareness of the local community and the stakeholders.

### Research

The Tyre Coast Nature Reserve has been an area of scientific interest and study for several years. In 1999, the Lebanese National Council for Scientific Research (NCSR) carried out a comprehensive study on the flora and fauna in and around the reserve. The study also describes relevant biological indicators and their integration in a monitoring program.

Academic institutions and NGO's have assisted the management team in solving some conservation issues concerning landscape enhancement and plant identification, this collaboration resulted in:

- A Pancratium Study Developed by students from the American University of Beirut
- A Bird Monitoring Evaluation carried out by SPNL and Birdlife International for potentially declaring Tyre Coast Nature Reserve as an IBA
- Since 2000 the MedWetCoast Project in collaboration with MEDASSET has carried out turtle monitoring in the reserve and surrounding beaches:
- Kasperek, M. (2004): The Mediterranean Coast of Lebanon: Habitat for endangered fauna and flora.
- Aureggi, M. *et al* (2004). "Survey on Sea Turtle Nesting Activity, South Lebanon 2004".
- Cross, H. *et al* (2005). "A Conservation and Action Plan for Lebanon: Mediterranean Marine Turtles".

Within the MedWetCoast Project framework the following studies were conducted:

- Site diagnosis study: Biodiversity Assessment and Monitoring in the Protected Areas/Lebanon prepared by the Lebanese University, 2004.
- Business plan: Developing a Viable Economic Framework for the Management of Aammiq Wetland viability study
- Water Quality: A study "Management of Water Quality in Lebanese Wetlands: Aammiq Wetland and Tyre Coast Nature Reserve" was conducted by the American University of Beirut, 2006 to assess the quality of water and sediment in both sites at their lowest water levels and flows.
- A five years Management Plan of Tyre Coast Nature Reserve

b) Enter how many of the users depend on these resources, seasonality, and assessment of the social and economic importance of their use and of the perceived impact on the conservation of the area, in a score of 0-1-2-3 (meaning null, low, medium, high).

ACTIVITY AND CATEGORY	ASSESS IMPORTANCE OF								Estimated No. of Users	Seasonality
	Socio-economic				Conserv. Impact					
<b>FISHING</b>										
Subsistence	0	1	2	3	0	1	2	3	Not assessed	Not studied
Commercial, local	0	1	2	3	0	1	2	3		
Commercial, non-local	0	1	2	3	0	1	2	3		
Controlled recreational	0	1	2	3	0	1	2	3		
Un-controlled recreational	0	1	2	3	0	1	2	3		
Other	0	1	2	3	0	1	2	3		
<b>TOURISM</b>										
Regulated	0	1	2	3	0	1	2	3	20.000/ year 200/ year	Mostly summer Mostly summer
Unregulated	0	1	2	3	3					
Indicate the type of tourism					0	1	2	3	12.000/year 8.000/year	Mostly summer All seasons
-Family visits	0	1	2	3	3					
-Guided tours	0	1	2	3						
.Birdwatching					0	1	2	3		
.Volunteers from NGOs					3					
Tourism facilities	0	1	2	3	0	1	2	3		
					3					
					0	1	2	3		
					3					
<b>FOREST PRODUCTS</b>										
Subsistence	0	1	2	3	0	1	2	3	NA	NA
Non-timber commercial, local	0	1	2	3	0	1	2	3		
Non-timber commercial, non-local	0	1	2	3	0	1	2	3		
Timber commercial, local	0	1	2	3	0	1	2	3		
Timber commercial, non-local	0	1	2	3	0	1	2	3		
Agriculture	0	1	2	3	0	1	2	3		
Stockbreeding	0	1	2	3	0	1	2	3		
Aquaculture	0	1	2	3	0	1	2	3		
<b>EXTENSIVE STOCK GRAZING</b>										
Subsistence	0	1	2	3	0	1	2	3		
Commercial, local	0	1	2	3	0	1	2	3		
Commercial, non-local	0	1	2	3	0	1	2	3		
<b>OTHER ACTIVITIES</b>										
- Natural Treatment	0	1	2	3	0	1	2	3	300/year	Summer
-	0	1	2	3	0	1	2	3		



### 3.5.3. Traditional economic or subsistence uses

Name any environmentally sound traditional activities integrated with nature, which support the well being of the local population. E.g. land, water use, target species, if closed seasons or closed zones are used as management techniques.

**Water:** the three artesian wells of Ras el Ain supply the cultivated area in the reserve with freshwater through an irrigation system consisting of raised concrete channels from the wells and ditches running along the field boundaries. The agriculture area is supplied with water from the Ras el Ain ponds (artesian wells) and does not appear to have problems with water supply or distribution.

- **Agriculture:** local farmers invest in the lands of the agricultural zone as their main source of living, yet the random use of fertilizers and pesticides may pose a threat to the groundwater and freshwater sources in the vicinity. In order to sustain the lands as a source of livelihood for the farmers the management team promotes the wise use of pesticides and even tries to implement organic farming.
- **Pasture:** a few herders from the neighboring villages used to herd their cattle in the reserve; but this was totally banned since three years in order to stop the threat to the ecosystem of the reserve.
- **Fishing:** traditional fishing is occurring in the reserve but it is not studied yet. Thus it cannot be assessed.
- **Eco-tourism:** The eco-tourism is presently limited to some bird watching activities and few educational visits by students, mainly from the surrounding schools.

The TCNR is zoned into three areas: conservation, tourist and agriculture zones (see figure 2).

## 4. MEDITERRANEAN IMPORTANCE OF THE SITE

This Section aims at stressing the importance of the site for conservation at the regional or global scales, as set in Art. 8 para. 2 of the Protocol and B2-a, B2-b and B2-c in Annex I.

### 4.1. PRESENCE OF ECOSYSTEMS/HABITATS SPECIFIC TO THE MEDITERRANEAN REGION

Name the type of habitats considered of Mediterranean specificity, on the basis of the habitat classifications adopted within the framework of MAP, and their estimated cover (Ha).

The pluviothermic quotient of Emberger at Tyre indicates that the site is located in the Temperate Mediterranean Bioclimatic Stage with thermic variant of cool mild winter.

According to Corinne classification, the dunThe pluviothermic quotient of Emberger at Tyre indicates that the site is located in the Temperate Mediterranean Bioclimatic Stage with thermic variant of cool mild winter.

According to Corinne classification, the dune formation of Tyre Coast Nature Reserve lies under "Sand Dunes of Mediterranean Coast" type and belongs to "White Sand Dunes of the Mediterranean dominated by *Ammophila arenaria*" habitat (code 16.2122) with *Echinophora spinosa*, *Eryngium maritimum*, *Euphorbia paralias*, *Cutandia maritime*, *Medicago marina*, and *Anthemis maritima*.

- 21% of the TCNR flora is restricted to eastern Mediterranean area (Ramadan-Jaradi *et al.* 2004).
- TCNR is one of the few remaining coastal agriculture lands located on the southern coast of Lebanon planting fodders and vegetables originated from landraces of eastern Mediterranean region. The uniqueness of the site is characterized by small family farms and considered as the main sources of livelihood
- An important nesting site for globally endangered Mediterranean Loggerhead and Green sea turtles

- A site containing a wide diversity of ecosystems; marine, agriculture, wetland that are of Mediterranean characteristics.
- The presence of roman artesian wells of an important historical and archeological aspect in the east Mediterranean area.

#### **4.2. PRESENCE OF HABITATS THAT ARE CRITICAL TO ENDANGERED, THREATENED OR ENDEMIC SPECIES**

A critical habitat is an area essential to the conservation of the species concerned. These species should be those included in Annex II of the Protocol. E.g. Islets and sea stacks, as small islands in the sea or in large bodies of water, mostly important for water-bird colonies; caves appropriate for monk seals; undisturbed sand beaches where marine turtle nesting occurs; coastal lagoons where threatened fish or bird species feed or breed; tidal flats, coastal or benthic substrates important for marine invertebrates, etc.

Name the habitat types and the species linked to it.

TCNR offers:

- Sand beaches where the globally threatened Loggerhead and Green turtles do breed and where migratory waders find their food away from hunters.
- A unique community of sand dunes flora and its associated fauna. It constitutes the last remaining dunes on the coast of Lebanon.
- A wetland with non halophyte plants on the coast and the beach within a Mediterranean framework.

#### **4.3. OTHER RELEVANT FEATURES (Art. 8 paragraph 2 in the Protocol)**

##### **4.3.1. Educational Interest (B-3 in Annex I)**

E.g. particular values for activities of environmental education or awareness

- 1) The Educational interest of the reserve derives from the fact that the Reserve is part of the city of Tyre, which was designated in 1984 by the United Nations Educational, Scientific and Cultural Organization (UNESCO) as a World Heritage Site.
- 2) The educational activities of school and university students are mainly focusing on bird watching and sea turtle watching. This is supported by the fact that TCNR is a potential IBA and the sandy beach is wide enough to attract Green Turtles in addition to Loggerheads.
- 3) The TCNR also offers:
  - Activities of education on non halophyte plants among halophytes due to presence of coastal freshwater springs.
  - Activities of awareness on disappearing Lebanese coastal plants that are currently conserved on TCNR and Palm Islands Nature Reserve.

#### 4.3.2. Scientific Interest (B-3 in Annex I)

Explain if the site represents a particular value for research in the field of natural or heritage sciences.

For ornithologists, many waterfowls and waders use the reserve as a stopover- an opportunity to see aquatic and semi-aquatic birds in a freshwater wetland near the sea, where also sea birds are seen passing along the shore.

For botanists, the TCNR encompasses one endemic species *Astragalus berytheus*, two rare and threatened species *Ficus sycomorus* and *Pancreatimum maritimum*, in addition to a wide variety of noteworthy plant species, including those which disappeared from most of the Lebanese coastal areas. An introduced plant species *Physalis peruviana* merits monitoring.

For herpetologist, the sand dune reptile species and the amphibians of the marshes constitute a protected community that is easy for monitoring away from human disturbance. Also the presence of two nesting globally marine turtle species offers study conditions different from those of Palm Islands (presence of terrestrial predators of eggs like dogs and foxes and presence of crowds of people). Also the internationally threatened marine turtles visiting the islands for breeding or its waters for wintering offer better research conditions than in any other sites of the continental disturbed beaches.

For oceanologists, the study of marine diversity, biocenoses and habitats will be made easier within the reserve where monitoring plots can be protected and maintained over the time.

#### 4.3.3. Aesthetic Interest (B-3 in Annex I)

Name and briefly describe any outstanding natural features, landscapes or seascapes.

A number of aspects of the TCNR can be regarded as distinctive scenic landscapes including:

- A major aesthetic scene in TCNR is its sandy beach, which is referred to as one of the most beautiful and scenic sandy beaches in Lebanon (Figure 5 & 6). The shallow waters extending throughout the length of the beach with soft sand and clear water is a sight admired by all visitors.

In addition, the Ras el Ain area has been greatly valued since it includes an important archeological site. The historic artesian well and their outflow (Figures 7 & 8) are also attractive scenic views.

The agricultural lands surrounding the wells of Ras el Ain constitute a rare rural landscape on the coastal front (Figure 9).

#### 4.3.4. Main cultural features

Indicate if the area has a high representative value with respect to the cultural heritage, due to the existence of environmentally sound traditional activities integrated with nature which support the well-being of local populations.

The city of Tyre was declared in 1984 a World Heritage site, which characterizes the city as one having a unique and exceptional history and archaeology (SOER, 2001). The city and its archeological sites show a unique and exceptional proof of a cultural tradition of the remaining or disappearing ancient civilizations.

Important archaeological artifacts include the walls of the artesian wells built by the Phoenicians, the aqueducts from Ras el Ain to the Hippodrome and Maritime city built by the Romans. Moreover, Ras el Ain which is a part of the reserve is designated as national heritage through a governmental decree. In addition, several Byzantine mansions are spread around the city area. The archaeological artifacts found in Tyre are a strong indication of past civilizations that have played enormous roles to build the history of the coastal city of Tyre, land of the Murex.

The invention of red dye took place in Tyre; Archaeological remains reveal the heavy presence of the Phoenicians, Greeks, Byzantines, Romans, and Crusaders in Tyre.

## 5. IMPACTS AND ACTIVITIES AFFECTING THE AREA

### 5.1. IMPACTS AND ACTIVITIES WITHIN THE SITE

#### 5.1.1. Exploitation of natural resources

Assess if the current rates of exploitation of natural resources within the area (sand, water and mineral exploitation, wood gathering, fishing, grazing...) are deemed unsustainable in quality or quantity, and try to quantify these threats, e.g. the percentage of the area under threat, or any known increase in extraction rates.

Exploitation of natural resources in TCNR is of various types:

- Water resources: the current overexploitation of water resources for agricultural purposes causes a decrease in surface and ground water supply. This is mainly due to insufficient management of water resources. The increased rate of water extraction is correlated with the increased agricultural surface area. This increase is assured by the users of the reserve but its quantity is not studied yet.

On its turn, the existing agricultural practices didn't only increase the water utilization but also augmented the use of agrochemicals and fertilizers, impacting as such the soil quality and the human health. 40% of the TCNR is under this type of exploitation. The Management Team is trying to find alternative type of agriculture (like aromatic and medicinal plants etc...) in order to reduce the use of pesticides.

- The huge number of visitors for recreational purposes (3000 per weekend) on a tiny sandy beach (0.21 Sq km) during the nesting season of marine turtles appears as a threat to the latter's breeding success. The resulting littering and the odor left by visitors on the site may constitute a repellent to the turtles which are known for their sensitivity towards the cleanness of their breeding habitat.
- Illegal hunting within the reserve used to rarely happen, but this was stopped even in the surrounding area of the reserve in order to preserve the reserve and keep its role of safety refuge to the waterfowls, namely the globally threatened ones.
- Overfishing within the boundary of the reserve is not studied yet.

### 5.1.2. Threats to habitats and species

Mention any serious threats to marine or coastal habitats (e.g. modification, desiccation, disturbance, pollution) or to species (e.g. disturbance, poaching, introduced alien species...) within the area.

- Littering, stepping, digging and umbrellas fixing on the sandy beach of TCNR threaten the breeding habitat of both Green and Loggerhead turtles and contribute to the decline of these globally threatened species. However, TCNR includes a conservation zone, where human access is strictly prohibited excepted for scientific researchers, this conservation zone is an important nesting site for marine turtles.
- The current unsustainable agricultural practices may destroy the soil and kill non target species when pesticides are used.

The Pasture activities were practiced in the reserve mainly with small cattle, goat or sheep herds, in selected areas of the site. But this was totally stopped since three years.

### 5.1.3. Demand by an increased population and infrastructures

Assess whether the current human presence or an expected increase in frequentation (tourism, passage of vehicles and boats) and any human immigration into the area, or plans to build infrastructures, are considered a threat.

The current visitors' number may negatively impact the reserve if studies of carrying capacity are not conducted to regulate the number visiting the TCNR. This number may increase to compete with turtles on the limited surface area of the sandy beach that is required by human summer visitors and nesting turtles. Unfortunately, both are in need of the sandy beach during the same period of time. However, these visitors are only allowed in the tourism section of the reserve while TCNR includes a conservation zone where human access is strictly prohibited excepted for scientific researchers, this conservation zone is an important nesting site for the marine turtles.

The tourism zone in section E1 (Figure 2) of the reserve is a strong tourist attraction in the summer especially for swimmers, where some 49 regulated wooden booths are erected to serve almost 3000 tourist on weekends; this has led to an allocation of a parking area on the reserve lots.

The garbage left by visitors and the regular flattening of the dunes and the turning of the sand by the bulldozers for kiosk installation over certain areas as an infrastructure for vision, all are considered a true threat to the reserve.

However, MoE through the MedWetCoast project assessed the carrying capacity of Zone E1 of the reserve. The assessment objective was to guide the municipality of Tyre on how to manage the public beach while ensuring the protection of the endangered Mediterranean marine turtles. Based on the assessment and ensuing discussions, the municipality agreed to reduce the number of kiosks from 100 to 49 (they receive thousands of tourists and beachgoers in summer) and push these kiosks back 60m from the wave level during high tide. These measures are expected to increase the occurrence of marine turtle nesting and hatching. Moreover, the MoE is currently pushing to reduce the number of these kiosks to 40.

#### 5.1.4. Historic and current conflicts

Make a brief statement of any historic or current conflicts between users or user groups.

There is no real or significant conflict detected between users.

## 5.2. IMPACTS AND ACTIVITIES AROUND THE SITE

In Art.7.2-e the Protocol calls for the regulation of activities compatible with the objectives for which a SPA was declared, such as those likely to harm or disturb species or ecosystems (Art.6.h), while Section B4 in Annex I asks to consider “the existence of threats likely to impair the ecological, biological, aesthetic or cultural value of the area” (B4-a in Annex I), recommending the existence, in the area and its surroundings, of opportunities for sustainable development (B4-d) and of an integrated coastal management plan (B4-e).

### 5.2.1. Pollution

Name any point and non-point sources of external pollution in nearby areas, including solid waste, and especially those affecting waters up-current.

Agricultural practices in the area surrounding Tyre is conventional, where major crops are citrus fruits and bananas, and relies heavily on the use of pesticides and fertilizers (SOER, 2001). Agricultural runoff from the fields can results in algal blooms in the sea consequently affecting the marine life.

### 5.2.2. Other external threats, natural and/or anthropogenic

Briefly describe any other external threat to the ecological, biological, aesthetic or cultural values of the area (such as unregulated exploitation of natural resources, serious threats on habitats or species, increase of human presence, significant impacts on landscapes and cultural values, pollution problems, any sectorial development plans and proposed projects, etc.), likely to influence the area in question.

The Tyre fishing harbor located in Tyre city but outside the reserve, is the second largest in the southern coast of Lebanon after the harbor of Sidon. In Tyre, two-thirds of fishing is practiced using improper fishing equipments, mainly trammels and dragnets, and one-third using long lines (SOER, 2001). These practices should necessarily impact the life in the sea outside and within the reserve.

The need for a parking to the visitors of the reserve imposed in the past flattening and compressing of some sand dunes by bulldozers. This has destroyed not only part of the valuable habitat of sand dunes but also a part of the aesthetic landscapes of the reserve.

Some 15 villages and three Palestinian refugee camps in the caza of Tyre dispose of their garbage in an open dumpsite close to the shore south of the city of Tyre, 200 m south of Ras el Ain springs threatening the groundwater that supplies the wells hence the freshwater supplies in the reserve. The leachate of landfills also threatens the coast of the reserve since the marine current movement along the Lebanese coastline is from south to north. (SOER, 2001).

### 5.2.3. Sustainable development measures

Comment whether the area is covered by an integrated coastal management plan, or bordering upon a zone under such a plan. Are there other opportunities for sustainable development provided for in the neighbouring areas?

The TCNR Management Plan's vision is to conserve and maintain the natural and cultural integrity of the site through the sustainable use of the natural resources and the preservation of social and cultural fabric of the community directly concerned and the surrounding community.

## 6. EXPECTED DEVELOPMENT AND TRENDS<sup>1</sup>

The foreseeable development and trends of the site do not appear in the list of common criteria for the choice of protected marine and coastal areas that could be included in the SPAMI list, as established in the Protocol and its Annex I. Moreover, this is not always easy to assess and it is necessary to have knowledge about the site, which is not always available to all managers of protected areas; Thus, it is not obligatory to fill in the boxes in this Section 6.

On the other hand, the assessment of this foreseeable evolution and trends constitutes a dynamic supplement to the static knowledge of the site, as it appears in Sections 3, 4 and 5 above. Moreover, it is of significant importance for the definition of the objectives and the management plan of the site.

It thus appears desirable to bringing out the main outlines at least in respect to the following points:

### 6.1. EXPECTED DEVELOPMENT AND TRENDS OF THREATS TO AND PRESSURES UPON THE AREA

Deal briefly in succession with:

- The demographic development in and around the site
- The development of economic activities (other than tourism and recreation) within the area
- The development of local demand on tourism and recreation
- The development of tourism pressure on the area

The number of visitors increases in correlation with the demographic development (Diary books of the management team). Subsequent to this, the quantity of waste left behind by the visitors, the sea bottom area that is damaged by anchors and the impact of stepping on the *Euphorbia* that plays a role in fixing the sand of the upper beach increase and threaten the ecological function of the islands ecosystems.

The tour operators started already exercising some pressure, through politicians, on the management team to obtain more permits for visits even when the reserve is busy with delicate research or with training activities. A specific visitor management plan would be ideal to remedy this situation.

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<sup>1</sup> By expected development and trends are meant the development, which is thought most likely to occur in the absence of any deliberate intervention to protect and manage the site.

## 6.2. POTENTIAL CONFLICTS IN THE AREA

Make a brief statement of potential use conflicts between the users or group of users of the site.

There is no real or significant conflict detected between users

## 6.3. EXPECTED DEVELOPMENT AND TRENDS OF THE NATURAL LAND ENVIRONMENT AND LANDSCAPES OF THE AREA: as expected arising from the evolution of the pressures

The proper implementation of the management plan that was developed in collaboration with the local communities may prevent any development and trends of the natural environment and landscapes of the area. Otherwise, the site will lose its value as an important site for globally threatened marine turtles due, to at least, repetitive construction of booths (kiosks).

The Ministry of Environment has already imposed the reduction of the number of the kiosks from 100 to 49 and pushed these kiosks back 60m from the wave level during high tide. These measures are expected to increase the occurrence of marine turtle nesting and hatching. The current trend of MoE is to reduce the number of these kiosks to 40.

## 6.4. EXPECTED DEVELOPMENT AND TRENDS OF THE MARINE ENVIRONMENT AND SEASCAPES OF THE AREA: as expected arising from the evolution of the pressures

The marine environment and the seascapes are not studied yet in TCNR. Thus it will be difficult to identify their expected development and trends. However, the proper implementation of the ethics of the management plan that was developed in collaboration with the local communities may prevent any development and trends of the marine environment and seascapes of the area.

## 7. PROTECTION REGIME

### 7.1. LEGAL STATUS (General Principles “e” and Section C-2 both in Annex I)

#### 7.1.1. Historical background of the protection of the site

At a national level, a wetland policy is lacking, however the Ministry of Environment (MoE) has worked since 1996 on the conservation of key areas and ecosystems through various laws and ministerial decrees. Among these key areas is the TCNR that was recognized as a location worthy of conservation as well as a unique site due to the following criteria:

1. It is important nesting site for two globally endangered species of sea turtles (*Caretta caretta* and *Chelonia mydas*),
2. It is the last remaining coastal agricultural land encompassing small family farms growing vegetables.
3. The Reserve is part of the city of Tyre, which was designated in 1984 by the United Nations Educational, Scientific and Cultural Organization (UNESCO) as a World Heritage Site.



### 7.1.2. Legal texts currently ruling the protection on the site

Enter the national conservation category, the dates and the present enforcement status of the legal instrument declaring the protection of the area. Consider both the land and the marine areas of the site. Include the full text(s) as an annex.

Law No. law 708 dated 5/11/1998 establishing Tyre Coast Nature Reserve is the legal instrument ruling the protection of the site. (the text of the law is represented in annex 1).

The TCNR is nationally classified under Nature Reserve national category. However, with grant funding from the EU, MOE implemented in 2004-06 the “Stable Institutional Structure for Protected Areas Management” (SISPAM) project to capitalize on the vast cumulative experience in PA management and make recommendations for enhancing the PA system in Lebanon. Under SISPAM, the Ministry, with technical assistance from ECODIT, prepared a “National Action Plan for Protected Areas” and developed a new PA category system that is inspired by the IUCN classification system for protected areas and would comprise four categories, for each category, criteria for the establishment of the PA were defined as well as its management objective:

1. National Park (IUCN Category II)
2. Natural Monument (IUCN Category III)
3. Habitat/Species Management Area (IUCN Category IV)
4. Protected Landscapes/Seascapes (IUCN Category V)

The Ministry of Environment has prepared a draft decree to endorse the proposed category system, but it still awaits formal approval by the Council of Ministers. . So currently all existing protected areas are under “Nature Reserve” category, but once the draft decree on PAs categories is endorsed, the current protected areas would need to be reclassified according to one of the four categories listed above.

### 7.1.3. Objectives (General Principles “a” and D-1 in Annex I)

Name in order of importance the objectives of the area as stated in its legal declaration.

The following main objectives are stated in the legal declaration of the TCNR:

- Protection of the natural environment and conservation of the terrestrial and marine fauna and flora to prevent their extinction. The rehabilitation of a sustainable and renewable ecosystem in order to benefit from it for the scientific research.
- Conservation of heritage and natural resources such as beaches, soil, ecosystem and watersheds to protect them from pollution and to prevent their degradation that may be caused by natural phenomena and human use. The safe management and maintenance of the above to benefit from them in the recreation and the organized eco-tourism in a way not contradicting with their conservation and sustainability

7.1.4. Indicate whether the national protection regime arises from international treaties enforced or from implementation measures of treaties (Art. 6.a in the Protocol).

The national protection regime arises from international treaties enforced. In fact, the Conservation of TCNR falls within the international approach for the conservation of wetlands as defined by the RAMSAR convention.

The national protection of TCNR is influenced by several international conventions and agreements that have either been signed or ratified by the Lebanese government. These conventions include:

- The Convention on Biological Diversity (CBD) that was signed in 1992 and ratified in 1994 (Law No. 360/94).
- The African Eurasian Water Bird Agreement (AEWA) that was ratified in June 2002 (Law No. 412).
- The Barcelona Convention that was signed in 1976 and ratified in 1977 (legislative decree No.126), and the revised Action Plan for the conservation of marine turtles (1999).
- The United Nation Convention on the Law of the Sea that was signed and ratified in 1995.
- The Reserve is part of the city of Tyre, which was designated in 1984 by the United Nations Educational, Scientific and Cultural Organization (UNESCO) as a World Heritage Site.
- The Ramsar Convention on Wetlands that was ratified in 1/3/1999 (Law No. 23)

## 7.2. INTERNATIONAL STATUS

### 7.2.1. Transboundary or high seas areas

Complete this section only if the area is transboundary, totally or partially in the high sea, or within areas where the limits of national sovereignty or jurisdiction have not yet been defined. In this case, mention the modalities of the consultation (Art. 9 para. 3A in the Protocol and General Principles "d" in Annex I).

N/A

### 7.2.2. International category

Mention if the area, or part of it, has been designated and on what date, with an international conservation category (e.g. Specially Protected Area, Biosphere Reserve, Ramsar Site, World Heritage Site, European Diploma, Natura 2000, Emerald network, etc.).

Wetland of international importance or Ramsar Site under the Ramsar Convention in 1999

TCNR is within the city of Tyre, which was designated in 1984 by the United Nations Educational, Scientific and Cultural Organization (UNESCO) as a World Heritage Site

### 7.3. PREVIOUS LEGAL BACKGROUND AND LAND TENURE ISSUES

Briefly mention if the area or part of it is subject to any legal claim, or to any file open in that connection within the framework of an international body. Describe the land tenure regimes within the area, and append a map if existing.

The area of TCNR or part of it is not subject to any legal claim, or to any file open in that connection within the framework of an international body.

Tyre Coast Nature Reserve is co-government land, however due to the diverse uses of the sites; the legal rights of the site are distributed over different governmental and non-governmental institutions mainly:

- The MoE is the tutelage authority over TCNR and is mandated to supervise, conserve and manage TCNR's as per law 708 dated 5/11/1998 establishing Tyre Coast Nature Reserve.
- The Ministry of Agriculture (MoA) is responsible for managing the agriculture land, however currently the MoA is not exercising an active role in TCNR. MoA is also the national authority responsible for controlling the fishery sector.
- Ministry of Public Works and Transport (MoPWT) is mandated over all beaches in Lebanon; and has parallel jurisdiction with the Ministry of Environment (MoE),
- Ministry of Culture (MoC), through the Directorate General of Antiquities, is mandated over all archeological and historical sites, including that of Ras el Ain, which is designated as national heritage through a governmental decree.
- The Municipality of Tyre has the right to utilize the tourism zone in Section E1 throughout the summer season (as per the Law 708), for this reason a MoU is signed between the APAC and the municipality each year after approval of MoE.
- Ministry of Power and Water (MoPW) is mandated to supervise and manage the use of the groundwater sources in TCNR, TCNR is as state property owned by the Ministry of Finance -The Litani Water Authority is mandated to manage the water in Ras el Ain for irrigation.

### 7.4. LEGAL PROVISIONS FOR MANAGEMENT (Section D-1 in Annex I)

#### 7.4.1. Zoning

Briefly state if the legal text protecting the area provides for different zones to allocate different management objectives of the area (e.g. core and scientific zones in both land and sea, fishing zones, visitation, gathering, restoration zones etc) and in this case the surface area in ha of these zones. Include a map as an annex

The Law 708 dated 5/11/1998 establishing Tyre Coast Nature Reserve and the Management Plan of the reserve identified both three main zones in TCNR. They are:

- **The tourism zone:** Encompasses a sandy beach that opens to the public for swimming and sunbathing during the summer season that stretches from May to October. Approximately 0.29 Sq km.
- **Conservation zone:** A high conservation zone to minimize the disturbance to wildlife. This section encompasses fresh water ponds in close proximity to the seashore. The ponds hold fresh water invertebrates, reed beds, fresh water turtles and a diverse bird population. This section is completely conserved in order to protect and research the fauna and the flora. Protection of this zone will allow endangered sea turtles to come back and nest on the shore. However, this zone is also used as an awareness opportunity through allowing tourists to visit the site following delimited trails and constructing environmental friendly structures such as bird hides and wooden bridges. Approximately 0.31 Sq km.
- **Agricultural and Archeological zone:** This section includes the Phoenician springs of Ras el-Ain and a large area where agriculture remains an economic livelihood from many small family farms. Ras El-Ain (6 Kilometers south of Tyre) has been Tyre's main source of water since Phoenician days. Its artesian wells gush up into stone reservoirs that have been maintained through the ages. Natural discharge flows through a network of aqueducts, which partly divert the water through furrows for irrigation. Freshwater is also partially diverted to the city of Tyre for potable usage. The remaining water fraction, (still the largest portion of total flow rates, flows out to sea, creating a unique freshwater-marine ecosystem. Approximately 1.44 Sq Km

#### 7.4.2. Basic regulations

Mention the provisions, which apply to the area concerning the implementation of Article 6 of the Protocol (paragraphs a to i), Section D5 (a to d) in the Annex I and Article 17 of the Protocol.

There are a number of relevant laws and initiatives that apply to the area concerning the implementation of Article 6 of the Protocol (paragraphs a to i) and the section D5 (a-d) in the Annex1. Law no. 444/02 (Code of Environment) specifies, under Chapter VIII, the protection, conservation and management of nature and biodiversity.

- Law no. 708/98 declares the site as a nature reserve on November 5, 1998 (find attached in Annex 1)
- Law no. 508/04 (hunting law) is the latest attempt for controlling hunting in terms of season, amount and type of game birds along with a permit system based on hunting testing,
- Decision of the Minister of Agriculture no 125/1 dated 23/9/1999 states the protection of marine turtles, monk seals and whales.
- For the area concerning the implementation of Article 17, an Initial Environmental Examination (IEE) or EIA (according to the size of the project) is a pre-requisite to any potential project in the reserve.
- Different legislations (laws and Ministerial Decisions from the Minister of Agriculture) regulating fishing

#### 7.4.3. Legal competencies

Section D4 in Annex I states that the competence and responsibility with regard to administration and implementation of conservation measures for areas proposed for inclusion in the SPAMI List must be clearly defined in the texts governing each area. Additionally Art.7.4. of the Protocol calls for the provision of clear competencies and co-ordination between national land and sea authorities, with a view to ensuring the appropriate administration and management of the protected area as a whole. Mention in which way do the legal provisions clearly establish the institutional competencies and responsibilities for the administration and conservation of the area, and if being the case, their co-ordination means, including those between land and sea authorities.

The Law No.690 dated 26/8/2005 organising the Ministry of Environment and defining its mandate, states that MOE is responsible of the establishment, protection and management of protected areas.

The Law No. 708 dated November 5, 1998 establishing Tyre Coast nature reserve, states that a committee established through a decision from the Minister of Environment and including five volunteers undertakes the management of the site; the volunteers represent the following institution:

- Municipality of Tyre
- “Kaemakam” or Governor of the caza of Tyre
- Two local NGOs in the Tyre region; currently Amwaj and The Protection of Environment-Tyre are the represented NGOs
- Ministry of Agriculture

This committee (APAC) works under the overall supervision and support from the Ministry of Environment (MoE).

The law No.214 dated 2/4/1993 and its amendments (lawNo.247 dated 7/8/2000) states that the Ministry of of Public Works and Transport (MoPWT) is mandated to control the implementation of the legislation and rules related to transport and to the marine public properties.

The decree No. 22 dated 22/1/1981 (Organization of the Army) states that the Marine Forces in the Army are responsible of the coast defense. Therefore the Ministry of Defense / Lebanese Army is in charge of patrolling the sea and keeping its activities in order. The APAC requests the army to assist them against poachers on the reserve in order to control the violations on site.

The legislative decree No.31 dated 18/1/1955, defining the mandate of the Ministry of Agriculture (MOA), states that the Ministry of Agriculture is responsible for implementing the legislation related to fisheries and fishing activities.

The examples above show that the competencies and responsibilities of the various actors are concerted to serve the Law.

#### 7.4.4. Other legal provisions

Describe any other relevant legal provisions, such as those requiring a management plan, the establishment of a local participation body, binding measures for other institutions or economic sectors present in the area, allocation of financial resources and tools, or any other significant measures concerning the protection and management of the area or its surrounding zones.

Conservation of TCNR falls within the international approach for the conservation of wetlands as defined by the RAMSAR convention.

At a national level, a wetland policy is lacking, however the Ministry of Environment (MoE) has worked since 1996 on the conservation of key areas and ecosystems through various laws and ministerial decrees.

As for conservation laws it is a relatively new matter in Lebanon; however there are a number of relevant laws and initiatives that affect TCNR:

- Law no 444/02 (Code of Environment) specifies, under Chapter VIII, the protection, conservation and management of nature and biodiversity. Law no 708/98 declares the site as a nature reserve on November 5, 1998,
- Law no 508/04 (hunting law) is the latest attempt for controlling hunting in terms of season, amount and type along with a permit system based on hunting testing,
- Decision no 125/1 dated 23/9/1999 states the protection of marine turtles, monk seals and whales.

The APAC appointed through a Decision of the Minister of Environment is the local body responsible for management and protection of the reserve under the overall supervision of the Ministry of Environment. The APAC hires a management team (in coordination with the Ministry of Environment and upon its approval) who is responsible of implementation of daily management activities in the site. In case of TCNR, the management team includes a reserve's manager, 2 full time rangers, 1 part time ranger and an administrative assistant.

MoE allocates regular financial contribution to the APAC to support the management of the reserve.

A five years Management Plan was developed for TCNR and endorsed by MoE., MoE is planning also to endorse this management plan through a decree from the Council of Ministers.

The Ministry of Environment prepared a draft Law on nature reserve in Lebanon, which is pending endorsement. Once issued, this law will resolve any management, administrative and financial obstacles facing nature reserves since this law (1) defines the management objectives for nature reserves, (2) regulates the establishment of nature reserves on private lots, (3) details the management structure of the nature reserves (APACs and management team) and formally recognizes the legal identity of APAC, (4) addresses the financing mechanisms of the nature reserves, (5) grants APAC the right to collect entrance fees and to impose fines upon violations, (6) uses zoning to encourage sustainable use inside the nature

Within the framework of the Stable Institutional Structure for Protected Areas Management (SISPAM) Project, MOE prepared a National Action Plan for Protected Areas (NAPPA) which outlines purposes, objectives, and tasks that need to be fulfilled in order to successfully manage protected areas in Lebanon.

The National Action Plan for Protected Areas (NAPPA), a visionary document that has determined the priority activities and actions for effective management of Protected Areas in Lebanon. It allocates roles and responsibilities and budget estimates for the implementation of the priority activities and actions. Based on the NAPPA, the MoE developed a draft law program to secure the necessary budget from the public treasury for the implementation of the activities foreseen in the NAPPA. Once the law program will be endorsed, necessary funds will be allocated to finance the activities and actions outlined in the NAPPA.

Moreover, within the SISPAM project, the following tools addressing the management of nature reserves and their financing were produced:

- A national financial sustainable strategy for PAs that suggests alternative mechanisms for financing PA management
- A database for available sources of funding for PAs among international sources which includes a list of potential donors, conditions and procedures for applications
- A National Capacity Building Strategy for key players in PA management structure (MoE, APACs and management teams)
- A Management tool kit for Protected Areas including: (1) Monitoring and evaluation indicators for PA management, (2) Job description for PAs management team, (3) Policies and procedures for improved management

Based on the job description, the MoE has prepared a draft decree (which is still pending endorsement) that states the TORs & job description for PAs staff, defining their roles, prerogatives and their capacity building needs.

## 8. MANAGEMENT

Through the General Principles, para. (e) in the Annex I, the Parties agree that the sites included in the SPAMI List are intended to have a value as examples and models for the protection of the natural heritage of the region. To this end, the Parties ensure that sites included in the List are provided with adequate legal status, protection measures and management methods and means.

### 8.1. INSTITUTIONAL LEVEL

#### 8.1.1. Authority/Authorities responsible for the area

Tyre Coast Nature Reserve is co-government land, however due to the diverse uses of the sites; the legal rights of the site are distributed over different governmental and non-governmental institutions mainly:

- The Ministry of Environment is the tutelage authority over the nature reserve and is responsible for its supervision, protection and management. The MoE appoints a local committee (APAC) which includes volunteers representing the municipality of Tyre, “Kaemakam” or Governor of the caza of Tyre, two local NGOs in the Tyre region and the Ministry of Agriculture for the local management of the reserve.
- The Ministry of Agriculture (MoA) is responsible for managing the agriculture land, however currently the MoA is not exercising an active role in TCNR, MoA is also responsible at national level of controlling the fishery sector.
- Ministry of Public Works and Transport (MoTPW) is mandated over all beaches in Lebanon; and has parallel jurisdiction with the Ministry of Environment (MoE),
- Ministry of Culture (MoC), through the Directorate General of Antiquities, is mandated over all archeological and historical sites, including that of Ras el Ain which is designated as national heritage through a governmental decree.
- Municipality of Tyre has the right to utilize the tourism zone in Section E1 throughout the summer season upon approval of the APAC and the Ministry of Environment (as per article 1 of Law 708),
- Ministry of Power and Water (MoPW) is mandated to supervise and manage the use of the groundwater sources in TCNR,
- The Litani Water Authority is mandated to manage the water in Ras el Ain for irrigation.



### 8.1.2. Other participants in the management body

Such as other national or local institutions, as stated in Section D6 in Annex I.

Law 708/98 (law declaring the site as a nature reserve) sets in Articles 4 and 5 the entities responsible for the supervision and management of site related activities as well as community involvement.

The reserve is under the jurisdiction of the MoE which is the tutelage authority over TCNR, however based on the principles of “community participation” and “stakeholder involvement” the management of the site takes place in collaboration with an Appointed Protected Area Committee (APAC) which is composed of representatives from local stakeholders and community as stated by the law 708/98.

The responsibilities and obligations of the APAC have been determined by a letter of the Minister of Environment under the registry number 250/B/2003 dated January 29, 2003. This decision contains the legal mandates that give the APAC administrative, supervisory & planning and financial responsibilities. Within these responsibilities, the APAC has the authority to investigate any damage that befalls on the reserve and legally pursue the responsible party, it can also appoint guards trained to maintain and protect the area. Other responsibilities include but are not limited to raising public awareness, managing the needs of the reserve and all financial matters (Find attached the legal mandate of the APAC in Annex 3).

In addition, the APAC, the management team(hired by APAC in consultation and approval of MoE) and the MoE are responsible for developing and implementing an officially approved management plan.

A five years Management Plan was developed for TCNR and endorsed by MoE, MoE has also initiated necessary administrative process to endorse this management plan through a decree from the Council of Ministers.

### 8.1.3. Participants in other committees or bodies

Such as a scientific committee, or a body of representatives from the local stakeholders, the public, the professional and non-governmental sectors, as in Sections B4-b and B4-c in Annex I.

The managing committee implement the activities of the management plan in coordination and partnership with stakeholders from the public and private sectors: civil bodies, trade unions, educational, academic, media, and international organizations.

#### 8.1.4. Effectiveness

As stated in Section B4 of Annex I, assess as very low, low, moderate, satisfactory, very satisfactory, and comment as needed on the following aspects:

a) Effectiveness of the co-ordination, where existing: Satisfactory. Coordination is a preventive remedy to arising conflicts if characterized by transparency.

b) Quality of involvement by the public, local communities, economic sectors, scientific community: Satisfactory.

The involvement of the public is essential to solve many problems in the reserve. The public, particularly the local community, has a tendency to protect the area and is part of its planning and management.

Despite the fact that tour operators offer the needed information to develop eco-tourism strategies, the economic sector, in general, is not satisfactorily involved in the management of the reserve. Care should be taken to keep conservation and ecotourism well balanced.

The scientific community is best satisfied in reserves where the ranger constitutes a good source of information for them, a good guard for their monitoring plots, and a perfect correspondent providing data for remote studies. Example: the rangers inform the scientists through phone calls or emails the scientist about the frequency of appearance of marked lizards, the first date of blooming of a plant species, the first date and number for the nests made by a marine turtle, etc...

## 8.2. MANAGEMENT PLAN (as set out in D7 of Annex I)

### 8.2.1. Management Plan

State if there is a management plan (MP) and in this case include the document as an annex. In the absence of a MP, mention if the main provisions governing the area and the main regulations for its protection are already in place and how (D7 in Annex I) and if the area will have a detailed management plan within three years (D7 in Annex I).

TCNR has a five years Management Plan (see Annex2).

### 8.2.2. Formulation and approval of the Management Plan

Mention how the MP was formulated, e.g. by an expert team and/or under consultation and/or participation with other institutions or stakeholders. State the legal status of the MP, whether it is officialized, and how, and if it is binding for other institutions and sectors involved in the area.

This management Plan was prepared under MedWetCoast Project, which is an initiative under the Ramsar Convention. The regional project was executed in six countries in a period of 7 years from 1999 till 2006 and funded by FFEM and national contributions from these countries. The national project was executed in Lebanon by the Ministry of Environment and managed by UNDP. The Management Plan was prepared as a part of different components that aim at conserving the biodiversity of global and regional importance in the Mediterranean basin. The Management Plan was developed in consultation with the local stakeholders, and was endorsed by the Ministry of Environment (MoE). At present, MoE has initiated the administrative process to endorse it through COM decree.

### 8.2.3. Contents and application of the Management Plan

State the degree of detail in the MP by entering YES or NO in the following list of potential contents, and assess the degree of implementation of the MP by using the 0-1-2-3 score on the right hand side:

	Existing in MP		Degree of application			
	YES	NO	0	1	2	3
Detailed management objectives	<u>YES</u>	NO	0	1	<u>2</u>	3
Zoning	<u>YES</u>	NO	0	1	2	<u>3</u>
Regulations for each zone	<u>YES</u>	NO	0	1	<u>2</u>	3
Governing body(ies)	<u>YES</u>	NO	0	1	<u>2</u>	3
Management programmes as:						
Administration	<u>YES</u>	NO	0	1	<u>2</u>	3
Protection	<u>YES</u>	NO	0	1	<u>2</u>	3
Natural resource management	<u>YES</u>	NO	0	1	<u>2</u>	3
Tourism and Visitation	<u>YES</u>	NO	0	1	<u>2</u>	3
Education and Training	<u>YES</u>	NO	0	1	<u>2</u>	3
Research and Monitoring	<u>YES</u>	NO	0	1	<u>2</u>	3
Services and Concessions	<u>YES</u>	NO	0	<u>1</u>	2	3
Fund raising activities	<u>YES</u>	NO	0	1	<u>2</u>	3
Periodic revisions of the MP	<u>YES</u>	NO	0	<u>1</u>	2	3

### 8.3. PROTECTION MEASURES

By Article 6 of the Protocol the Parties agree to take all the necessary protection measures required for the conservation of the area, particularly the strengthening the application of the other Protocols to the Convention, and through the regulation of any other activity likely to harm the natural or cultural value of the area, such as economic, recreation or research activities. As per Section D2 in Annex I, the protection measures must be adequate to the site objectives in the short and long term, and take in particular into account the threats upon it.

#### 8.3.1. Boundaries and signing

Briefly, state if the boundaries of the area and its zones are adequately marked in the field, both on land, in the sea, and at the principal points of access.

The terrestrial boundary of the reserve is well marked, whereas the marine boundary is not.

The three zones (recreation, agriculture, conservation) and the main access are marked by panels.

#### 8.3.2. Institutional Collaboration

Name the different national and local institutions or organisations with legal responsibilities or involved in the protection and surveillance of land and sea zones, and any measures or mechanisms through which their co-ordination is pursued.

The Ministry of Environment is the tutelage authority of the nature reserve and is responsible for funding, and beside APAC for its protection, management, surveillance, employees recruitment, monitoring, maintenance & fundraising.

Ministry of Defense-Army: responsible for surveillance and arrest of poachers upon calls from Management Team.

NGOs Amwaj and the Protection of Environment-Tyre are represented in the managing committee (APAC).

Municipality of Tyre is represented in the managing committee, as well as the "Kaemakam" or Governor of the caza of Tyre.

The Ministry of Agriculture (MoA) is also represented in the managing committee. (apart its role in the APAC, the MoA is responsible at national level for organizing and controlling the fishery sector)

Local coordination is pursued by the APAC, whereas the national and international coordination is pursued by the MoE, namely through its Ecosystems Department.

#### 8.3.3. Surveillance

Consider the adequacy of the existing protection means (human and material), and your present ability to survey land and sea uses and accesses

Overall surveillance is the responsibility of the MoE. Locally, the management team and specifically the rangers and patrols are the essential protection means to protect and survey and control visitors and stop poachers or dissuade infractions.

### 8.3.4. Enforcement

Briefly, consider the adequacy of existing penalties and powers for effective enforcement of regulations, whether the existing sanctions can be considered sufficient to dissuade infractions, and if the field staff is empowered to impose sanctions.

The existing penalties (Article 14 of the Law 708/98) provide the power needed to effectively conserve and protect the TCNR and are sufficient to dissuade infractions.

The rangers are empowered to issue fine's ticket to a poacher or any one breaching the Law provided they (rangers) sworn first in front of the governor.

## 9. AVAILABLE RESOURCES

### 9.1. HUMAN RESOURCES (Art. 7.2.f in the Protocol)

#### 9.1.1. Available staff

Assess the adequacy of the human resources available to the management body, in number of employees and training level, both in central headquarters and in the field. Indicate if there are staff training programmes.

The staff available is composed of one manager, 2 full time rangers/ guides and one part time ranger and one secretary. During visitation season (July-October) more rangers/ workers may join the original staff on daily basis salary. It is believed that the staff size is not sufficient to manage the reserve and visitors at day time and to monitor poachers and turtles at night time.

The rangers of the permanent staff frequently attend training workshops within and outside the country on various management and monitoring aspects. Within Lebanon, the Ministry of Environment involves the staffs of all protected areas to its training program.

#### 9.1.2. Permanent field staff

Answer YES or NO on the current existence of the following FIELD staff categories. If YES, enter the number of staff either permanent or part-time in that category, and evaluate on a 0-1-2-3 score (0 is low, 3 is high) the adequacy of their training level.

	YES/NO		NUMBER Permanent/Part-time	ADEQUACY OF TRAINING LEVEL			
	YES	NO		0	1	2	3
Field Administrator (manager)	<u>YES</u>	NO	1	0	1	<u>2</u>	3
Field Experts (scientific monitoring)	<u>YES</u>	NO	-/2	0	<u>1</u>	2	3
Field Technicians (maintenance, etc)	YES	<u>NO</u>		0	1	2	3
Wardens	<u>YES</u>	NO	-/1	0	1	<u>2</u>	3
Of which marine wardens	YES	<u>NO</u>		0	1	2	3
Guides/ <u>rangers</u>	<u>YES</u>	NO	2/1	0	1	<u>2</u>	3
Other	YES	NO		0	1	2	3

### 9.1.3. Additional Support

Briefly, describe if the area currently has the advantage of other external human resources in support of its objectives, either from other national or local institutions, volunteer programmes, non-governmental organisations, academic or international organisations. Mention if there are any significant changes in prospect for the near future.

The TCNR is largely dependent on volunteers, scouts, NGOs for the management of the reserve and the visitors. Universities and research institutions contribute to the support of the reserve's objectives through commitment to a Research Agenda.

Frequent and regular cleaning campaigns of the reserve are undertaken by volunteers environmental scouts. The NGOs and municipalities participate in providing human resources for cleaning operations but NGOs implement also training, management, assessment and monitoring projects for the benefit of the reserve. Tour operators and the hikers also participate in the cleaning operations and lobby for the TCNR conservation.

## 9.2. FINANCIAL RESOURCES AND EQUIPMENT

By Art. 7 in the Protocol, the Parties agree to adopt measures or mechanisms to ensure the financing of the specially protected areas (Art.7.2.d), and the development of an appropriate infrastructure (Art.7.2.f). The General Principles para. "e" in the Annex I call upon the Parties to provide the areas with adequate management means.

### 9.2.1. Present financial means

Note if the basic financing is ensured: a core funding for basic staff, protection and information measures. Who provides this core funding? Briefly assess the degree of adequacy of the present financial means for the area, either low, moderate, satisfactory; e.g. the implementation of the management plan, including protection, information, education, training and research.

TCNR management is expensive and studies from around the world show those revenues from visitors and other forms of ecotourism alone cannot sustain management costs of PAs. TCNR management is therefore a national responsibility requiring yearly allocation from the national treasury. MoE has been disbursing funds to support the management of the TCNR through Appointed Protected Area Committees (APAC) but a review of total disbursements from 2001 through 2008 shows that the allocations are a core funding for basic staff and infrastructure maintenance. As for the implementation of the management plan, the allocation is moderate.

### 9.2.2. Expected or additional financial sources

Briefly describe any alternative sources of funding in use or planned, and the perspectives for long-term funding from national or other sources.

The committee of TCNR is actively writing project proposals that are submitted to local and foreign donors. In the near past, the TCNR benefited from projects that were funded by Embassies and development Agencies to strengthen the management of the reserve. TCNR also benefitted in the past from international funded projects mobilized and executed by MoE for protected areas, mainly the MedWetCoast project which is a Mediterranean initiative under the Ramsar Convention, and which was executed in Lebanon from 2002 till 2006 by the ministry of Environment, funded by the Fonds Francais pour l'Environnement Mondial (FFEM) and managed by the United Nations Development Program (UNDP). The MedWetCoast project supported TCNR in developing the management plan, assessment and monitoring of biodiversity, development of awareness and education materials, training and capacity building programs, infrastructure, rehabilitation of bed & breakfast accommodations etc...

### 9.2.3. Basic infrastructure and equipment

Answer YES or NO to the following questions, and if YES, assess with a score of 1-2-3 (1 is low, 3 is high) the adequacy of the basic infrastructure and equipment.

	YES/NO		ADEQUACY			
Office and/or laboratory in the field	YES	<u>NO</u>	0	1	2	3
Signs on the main accesses	<u>YES</u>	NO	0	1	<u>2</u>	3
Guard posts on the main accesses	<u>YES</u>	NO	0	1	2	<u>3</u>
Visitors information centre (under construction)	<u>YES</u>	<u>NO</u>	0	1	2	3
Self guided trails with signs	<u>YES</u>	NO	0	1	<u>2</u>	3
Terrestrial vehicles	YES	<u>NO</u>	0	1	2	3
Marine vehicles	YES	<u>NO</u>	0	1	2	3
Radio and communications	<u>YES</u>	NO	0	1	<u>2</u>	3
Environmental awareness materials	<u>YES</u>	NO	0	1	<u>2</u>	3
Capacity to respond to emergencies	<u>YES</u>	NO	0	1	2	<u>3</u>
<p>Comment on basic infrastructure and equipment</p> <p>Due to the harsh sea weather, there is a need to regularly maintain and improve the basic infrastructure on the TCNR such as interpretation panels, trails, bird watching hide (Figure 10), irrigation system of organic farms of the reserve, etc.</p>						

### 9.3. INFORMATION AND KNOWLEDGE

By Section D3 of Annex I, the Parties agree that the planning, protection and management of a SPAMI must be based on an adequate knowledge of the elements of the natural environment and of socio-economic and cultural factors that characterize each area. In case of shortcomings in basic knowledge, an area proposed for inclusion in the SPAMI List must have a programme for the collection on the unavailable data and information.

#### 9.3.1. State of knowledge (Terrestrial area)

a) Assess the general state of knowledge of the area.

0	1	2	<u>3</u>
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b) Briefly describe the extent of knowledge of the area, considering at least specific maps, main ecological processes, habitat distribution, inventories of species and socio-economic factors, such as artisan fishing.

The CNRS, Lebanese University, Balamand University, Individual researchers, graduate and post-graduate students, NGOs, and foreign scientists regularly visit the TCNR since 1996 and conduct studies on botany, ornithology, pedology, climatology, geology, geomorphology, mammalogy, herpetology, geography, ichthyology, oceanography, hydrology, hydrobiology, entomology, ecology, etc. These studies constitute the benchmark for monitoring and evaluating the biodiversity of the TCNR and for adapting the management of the reserve. However, the most important studies that were conducted on the reserve are those conducted through MoE within the MedWetCoast project, by Ramadan-Jaradi *et al.* 2004 (Lebanese University) which resulted in biodiversity database with annotated checklists of mammals, birds, reptiles, and insects and by Elsa Sattout 2004 for the flora. The main socio-economic factors are those related to ecotourism and local visitors.

#### 9.3.2. Data collection

Describe and assess the adequacy of any programme and activities to collect data in the area.

Data collection was done with professionalism due to the help of experts or the presence of well trained assistants.



### 9.3.3. Monitoring programme

Section D8 in Annex I states that to be included in the SPAMI List, an area will have to be endowed with a monitoring programme having a certain number of significant parameters, in order to allow the assessment of the state and trends of the area, as well as the effectiveness and protection and management measures, so that they may be adapted if need be (indicators may, for instance, supply information about species status, condition of the ecosystem, land-use changes, extraction of natural resources -sand, water, game, fish-, visiting, adherence to the provisions of the management plan, etc.).

a) Is there a monitoring programme?

<u>YES</u>	NO
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b) If NO, are there plans to start one, and when?

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c) If YES, assess as low, medium, satisfactory, its adequacy and present level of development.

Medium level of adequacy probably due to being at early stages of implementation.
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d) If YES, who is/are carrying out the monitoring programme?

Professional ornithologist and herpetologist for bird and reptile monitoring; the American University of Beirut assisted by expertise from IUCN for the marine studies; and individual researchers (Oceanologist among others) from Lebanese University also conduct monitoring activities.
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e) If YES, briefly describe how the monitoring programme will be used in reviewing the management plan.

The APAC will be responsible, on behalf of the Ministry of Environment, for regular review of the implementation of the management plan.
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The APAC will be required to report to the Ministry of Environment, advising the results of their assessment of progress and making any recommendations that it sees as necessary to improve the progress in implementation.
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The APAC, in collaboration with the Ministry of Environment will be expected to:
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- |  |
|--|
| <ul style="list-style-type: none"><li>▪ Periodically meet with the local Management Team (or other committee or agency lawfully responsible for the area) to establish progress and problems being encountered in implementation of the plan.</li><li>▪ Periodically, in the company of the Management Team (or other committee or agency lawfully responsible for the area), inspect the reserve to observe the condition of the reserve and compliance with the management plan.</li><li>▪ Prepare annual reports to the Ministry of Environment, incorporating the report presented during the relevant year from the local Management Team and any other information relevant to the implementation of the plan.</li><li>▪ Make recommendations to the Ministry of Environment on any changes necessary to improve the compliance with and implementation of the plan.</li></ul> |
|--|

**10. Other information, if any**

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**11. CONTACT ADDRESSES** (name(s), position(s) and contact address(es) of the person(s) in charge with the proposal and that compiled the report)

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**12. SIGNATURE(S) ON BEHALF OF THE STATE(S) PARTY/PARTIES MAKING THE PROPOSAL**

Mohammad Rahal  
Minister of Environment

**13. DATE**

11/5/2011