Regional Project for the Development of Marine and Coastal Protected Areas in the Mediterranean Region

Second mission relating to the Development of Marine Protected Areas on Syrian coasts, 1-18 August 2003

Mission Report

Ministry of Local Administration and Environment

High Institute of Marine Research of Tishreen University
Preamble:

All the people having contributed throughout this mission are cordially thanked;

- Ministry of Local Administration and Environment, represented by Dr. Akram Issa DARWISH, Bouthaina JRAI and Nuha TAMIM

Scientific collaboration:
- The Director of the High Institute for Marine Research of Lattakia, Dr. Amir IBRAHIM
- Doctors from Tishreen University of Lattakia: Mohamed Moujahed BATAL and Izdihar AMMAR

- The National Navy Department
- Military divers: Wail BOBO, Taissir DERBAS, Yahya ZAMZAM, Rami IBRAHIM, Ali HABIB
- Ports Department: Ramiz HASSAN
- President of Arwad Port: Nabil BITAR
- President of Tartous Port: Ghassan JOUMA'A
- Kazem AHMAD, Environment Department at Tartous
- Habib ABDO, Environment Department at Lattakia
- Bassam and his two sons
- Salim, our boat pilot during 10 days
- El Bassit holiday organizers and Syrian people for their cordial welcome

Not forgetting our mission companions: Giovanni TORCHIA, Fabio BADALAMENTI and Daniel CEBRIAN-MENCHERO.

The authors specify that selected photographs illustrating this report and not mentioning neither places nor external sources, were not been taken in Syria but in other sites of the Mediterranean and that they remain the whole property of their author. The use of these photos could not be allowed without prior agreement of these same authors.
CONTENTS

1. Mission course ........................................................................................................... p.5

2. Methodologies ......................................................................................................... p.7
   2.1 Ichthyologic fauna investigations ........................................................................ p.7
       2.1.1 Station points method ................................................................................ p.7
       2.1.2 Transects method ....................................................................................... p.7
       2.1.3 Census according to photographs ................................................................. p.8

2.2 Study of the macro-flora and the macro-invertebrates .......................................... p.8

3. Mapping of the diving sites ...................................................................................... p.9

4. Reports on diving .................................................................................................... p.10

5. Analysis of collected data ....................................................................................... p.24
   5.1 Marine vegetation ............................................................................................... p.24
       5.1.1 Algae ............................................................................................................. p.24
           5.1.1.1 Stypopodium schimperi ................................................................. p.24
           5.1.1.2 Galaxaura rugosa ............................................................................... p.25
           5.1.1.3 Asparagopsis taxiformis ...................................................................... p.25
           5.1.1.4 Neomeris annulata ............................................................................. p.26
       5.1.2 Phanerogams ............................................................................................... p.27

5.2 The marine Fauna ................................................................................................. p.28
   5.2.1 Invertebrates: Molluscs and Sponges ............................................................... p.28
       5.2.2 Fish biodiversity .......................................................................................... p.29
           5.2.2.1 Species observed ............................................................................... p.29
           5.2.2.2 The dusky grouper – Epinephelus marginatus .................................... p.29
           5.2.2.3 Traditional fishing – Preliminary reports ........................................... p.30
       5.2.3 Marine reptiles and mammals ..................................................................... p.31
6. First preliminary conclusions and recommendations ........................................ p.32

6.1 First proposals for the creation of Marine Protected Areas (MPAs) ................. p.33

6.1.1 Syrian northern coast .................................................................................. p.33

6.1.2 Ras El Bassit ................................................................................................ p.33

6.1.3 Um Tiur ....................................................................................................... p.34

6.1.4 Sector of Borj Islam - From Cap du Porc to Ibn Hani ................................ p.34

6.1.5 Arwad Island: Case study ......................................................................... p.34

6.1.6 The South of the Syrian coast .................................................................. p.34

6.2 Recommendations to continue the development of the national plan ........ p.35

6.2.1 Biodiversity .............................................................................................. p.35

6.2.2 Human activities ...................................................................................... p.35

7. Bibliographical references quoted in the text ................................................. p.36

8. Complementary bibliographical references ................................................... p.37

Appendices ........................................................................................................ p.39
1. Course of the mission:

**Friday, August 1st, 2003:**
Departure from Montpellier (France) at 9.55 a.m.
Arrival in Damascus at 21.00 p.m. and transfer to the "Sahara Touristic Complex"
First contact with Daniel Cebrian-Menchero (RAC/SPA) on arrival at hotel and first briefing around the organization and schedule of the mission.

**Saturday, August 2nd, 2003:**
Distribution of per diem
Visit to Zebdani
Organization of the mission with Daniel Cebrian-Menchero and telephone contacts with Mr. Darwish.

**Sunday, August 3rd, 2003:**
7.30 a.m: First contact with Nuha and Bouthaina from the Ministry of Local Administration and Environment
Departure for Ras El Bassit
14.00 p.m.: Arrival at Hotel El Bassit, meeting with Ghazi Bitar, arrived two days earlier. Attribution of rooms and preparation of submarines cameras
End of afternoon: First dive in apnea (A1) in the extreme south of the fishing port of Ras El Bassit (Renaud Dupuy de la Grandrive + Daniel Cebrian-Menchero + Mathieu Foulquié).

**Monday, August 4th, 2003:**
Dive D1: Ras Samra
Dive D2 and D3: El Hamam Island.

**Tuesday, August 5th, 2003:**
Dive D4: Ras Samra
Dive D5 : Ras Samra (cave)
Dive D5 Alt.

**Wednesday, August 6th, 2003:**
Dive D6: Cove of the military station of Ras El Bassit
Dive D7: Northern-Est of Ras El Bassit.

**Thursday, August 7th, 2003:**
Dive D8: Offshore Ras El Bassit (rocky site)
Dive D9: Ras El Bassit
Apnea A2: Cove of the military station of El Bassit + dive D9 Alt. (Ghazi Bitar).

**Friday, August 8th, 2003:**
Apnea A3: Southern end of the fishing port of El Bassit
Apnea A4: Offshore El Bassit
Visit to valley of Samra.

**Saturday, August 9th, 2003:**
Dive D10: Offshore Ras El Bassit
Dive D11: Southern Ras El Bassit
Dive D11 Alt.: Cascade Bay
Dive D12: Cove of the military station of Ras El Bassit
Apnea A5: Cap du Porc, Southern Um Tiur.
Sunday, August 10th, 2003:
Dive D13: Ras Samra
Apnea A5 Alt.: Creek in Southern Ras El Bassit
Dive D14: Southern Ras El Bassit
Dive D15: Southern Ras El Bassit.

Monday, August 11th, 2003:
Dive D16 and D17: Offshore Ibn Hani (Lattakia)
Dive D18 and D19: Ibn Hani (meadow with Cymodocea nodosa).

Tuesday, August 12th, 2003:
Dive D20 and D21: Les Chalets (Northern Lattakia).

Wednesday, August 13th, 2003:
Dive D22: Offshore Ras El Bassit (rocky site)
Dive D23: Cascade Creek.

Thursday, August 14th, 2003:
Dive D24: Offshore Arwad Island
Dive D25: Arwad Island.

Friday, August 15th, 2003:
Apnea A6: Arwad Island (Flat and shallow bottom)
Sharp hollow rocky plateau (platform).

Saturday, August 16th, 2003:
Departure from Tartous for beaches bordering the Syrian-Lebanese coasts, on the tracks of marine turtles
Arrival to the "Sahara Touristic Complex" early afternoon
Visit to Mr. Darwish in the buildings of the Ministry for a draft mission report.

Sunday, August 17th, 2003:
Visit around Damascus
Appointment with the director of Damascus Air-France, Mr. Bassam F. Jallad, for negotiating exemption from payment of excess luggage for the return voyage to France
Meeting with Mr. Darwish, in the "Sahara Touristic Complex" to deliver photo films
20.00 p.m., departure for Damascus Airport
22.30 p.m., departure for Paris.
2. Methodologies:

2.1 Study of ichthyologic fauna:

2.1.1 Station points method:

Stationary points techniques used by Vacchi and Tunesi (1993) are compared to "circular quadrats or portions of quadrats" (figure 1); the observer does not move but make rotations on himself. There are two types of station points: either the observer considers fish in a sector of determined angle and ray while remaining immobile, or the observer even carries out assessment starting from a determined site while turning on himself and assesses fish in a known ray. It is necessary to take the shortest time for assessment 30 seconds to even 1 minute, and make two turns maximum on oneself (a fast turn for large fish and another one to complete). The ray of the station point is selected according to visibility: we assess visibility first then we consider only the fish which are in the visibility zone to obtain outdistances two thirds (2/3) of the maximum visibility.

![Figure 1. Method of the "station point" (Figure drawn from Joyeux et al., 1988.)](image)

2.1.2 Transects method:

The transects method, widely used in terrestrial ecology, consists in following a rectilinear course, located (or not) on the bottom by pentadecameters or graduated leaded ropes, according to a precise course, at a given distance and sometimes starting from a precise point of the coast. The majority of authors use transects going from 30 m to 200 m depth and this technique is by far the most used (Sale and Douglas, 1981; Thresher and Gunn, 1986; Samoilys and Carlos, 2000; Buckley and Hueckel, 1989; Cheal and Thompson, 1997).

The divers traverses the transect thus by noting the nature of bottoms and species met on a PVC slate. The transect width must be on the scale of the studied case, the species observed and visibility conditions. This method is mainly used to assess individuals belonging to not very mobile species.
2.1.3 Census according to photographs:

Rarely used, this method allows at the same time to complete assessments carried out in-situ by station points but also to better identify uncommon species.

2.2 Study of macro-flora and macro-invertebrates:

> Systematic Inventories along transects (cf. § 2.1.2)
> Samplings

> Identification of sampled species (Ghazi Bitar and scientists from the Institute of Lattakia)
> Collection of data by interpretation of underwater photographs (cf. § 2.1.3)
3. Mapping of diving sites
4. Reports on diving

Sunday, August 3rd, 2003:

Apnea A1:
Southern end of Ras El Bassit fishing port
Weak algae coverage (Anadyomene sp., Acetabularia, Corallina, Dictyota), foliages of flotsam
Cymodocea
Hydrozoa (Aglaophenia ?), Hermodice carunculata, Holothuria sp.
Thalassoma pavo, Epinephelus marginatus (juvenile), Scorpaena maderensis

Monday, August 4th, 2003:

Dive D1: Ras Samra
Diving parameters: -26.1 m / 45 minutes
Diving profile: transect
2 Echeneis naucrats, 7 Sparisoma cretense, 28 Epinephelus marginatus, 11 E. costae, 47
Sargocentron rubrum, 5 Diplodus cervinus
Boops boops, Siganus rivulatus, Thalassoma pavo, Coris julis, Chromis chromis, Murena helena,
Serranus cabrilla, Serranus scriba, Symphodus tinca, Scorpaena maderensis, Scorpaena porcus,
Fistularia commersonii, Diplodus vulgaris, Diplodus sargus, Oblada melanura

Rocky banks covered with Stypopodium schimperi alga

Caulerpa racemosa var. lamourouxi
Peyssonellia sp.
Lithophyllum lichenoides
Strombus decorus
Glycemeris sp.
Bulla striata
Crambe crambe
Phorbas sp.
Chondrilla nucula
Cliona celata (in facies)
Axinella polyoides
Petrosia ficiformis
Ircinia fasciculata
Sarcatragus spinosulus
Hermodice carunculata
Unspecified Nereidae
Spirobranchus tetraeceros
Blackcurrant saburon
Malleus regula
Cardita calyculata
Balanus perforatus
Balanus trigonus
Paracentrotus lividus
Centrostephanus longispinus
Synaptula reciprocans
Herdmania momus
Phallusia nigra

Presence of fishing pots and nets.

Ghazi Bitar, Renaud Dupuy de la Grandrive and Mathieu Foulquié – October 2003
Dive D2 and D3: El Hamam Island

Dive parameters D1: -12 m / 31 minutes
Dive parameters D2: -19.2 m / 49 minutes
Profile of the two dives: surrounding the Island South side-North side from the West
Colonization of rocky substrates by the Stypopodium schimperi alga on the enlightened sides and by the Crambe crambe sponge on the non-enlightened sides.
The island is surrounded by a sandy-muddy light bottom.

El Hamam Island

Dictyopteris polypodioides
Corallina elongata
Jania rubens
Galaxaura rugosa
Galaxaura oblongata
Peyssonellia sp.
Lithophyllum lichenoides
Caulerpa racemosa var. lamourouxii
Phorbas sp.
Chondrilla nucula
Cliona celata (in facies)
Agelas oroïdes
Axinella polypoides
Petrosia ficiformis
Ircinia fasciculata
Sarcotragus spinosulus
Erosaria spurca
Strombus decorus
Chlamys sp.
Blackcurrant saburon
Malleus regula
Cardita calyculata
Balanus perforatus
Paracentrotus lividus
Unspecified Didemnidae in facies (between 3 and 14 m depth)
Caryophylla inornata (5)
Pinna nobilis (2)
Cerianthus membranaceus
Hermodice carunculata
Axinella sp.
Hypsodoris sp.
Halocynthia papillosa
+ Unspecified Lessepsian bivalve
+ An unspecified alga

Ghazi Bitar, Renaud Dupuy de la Grandrive and Mathieu Foulquié – October 2003
**Visual census** (station points method + photographs):

*Chromis chromis*: 183  
*Coris julis* (juv.): 6  
*Diplodus vulgaris* (juv.): 3  
*Epinephelus marginatus* (juv.): 11  
*E marginatus* (juv.) in rack (pot): 2  
*Diplodus sargus*: 1 (hidden)  
*Enchelycore anatina* (Islands moray eel - Lessepsian species): 3  
*Thalassoma pavo*: 3 ad. + 4 juv.  
*Coris julis* ad. female: 3  
*Bothus sp.* in pot: 1  
*Sargocentron rubrum*: 27  

*Seriola dumerili* (juvenile)  
*Scorpaena maderensis*  
*Scorpaena porcus*  
*Murena helena*  
*Serranus cabrilla*  
*Serranus scriba*  
*Fistularia commersonii*  
*Diplodus vulgaris*  
*Oblada melanura*  
*Xyrichthys novacula*  
*Symphodus tinca*  
*Belone belone*  
*Sparus aurata* (juvenile)

**Tuesday, August 5th, 2003:**

**Ras Samra**  
Dive D4  
Parameters: -31 m / 49 minutes  
Dive profile: transect  
Depth at 31 m: rough sandy bottom covered by *Penicillus capitatus* alga

Algal coverage on bottom with *Stypopodium buildings* (100 % coverage)

*Dictypteris polypodioides*  
*Corallina elongata*  
*Jania rubens*  
*Liagora sp.*  
*Peyssonnelia sp.*  
*Lithophyllum lichenoides*  
*Crambe crambe*  
*Phorbas sp.*  
*Chondrilla nucula*  
*Chlona celata*  
*Ircinia fasciculata*  
*Sarcotragus spinosulus*  
*Hermodice carunculata*  
*Spirorbranchus tetraceros*  
*Strombus decorus*  
*Chlamys sp.*  
*Malleus regula*  
*Cardita calyculata*  
*Chama pacifica*  
*Pinctada radiata*  
*Balanus perforatus*  
*Balanus trigonus*  
*Paracentrotus lividus*  
*Synaptyyla reciprocans*  
*Ophioderma longicauda*  
*Herdmania momus*  
*Phallusia nigra*  
*Muraena helena*  
*Xyrichthys novacula*  
*Sargocentron rubrum*  
*Siganus rivulatus*  
*Epinephelus marginatus*
Ras Samra (cave)
Dive D5 (R. D. Grandrive + M. Foulquié)
Parameters: -12.3 m / 38 minutes
Dive profile: station point
Stypopodium schimperi
Crambe crambe

Epinephelus marginatus: 12
Sparisoma cretense (ad. + juv.)
Diplodus cervinus: 1
Thalassoma pavo: 7 (ad. + juv.)
Serranus cabrilla: 3
Diplodus sargus: 11
Diplodus vulgaris: 6
Apogon imberbis: 8
Oblada melanura: > 25
Muraena helena: 3
Juvenile rabbitfish shoal > 50

Dive D5 Alt. (Ghazi Bitar)
Parameters: -8 m / 52 ’
To reach the cave mouth it is necessary to cross a passage of 10 m length and 5 m width notched between two cliffs of 5 m.
Because of significant agitation and depth, which decreases as one advances, one can penetrate only ten meters inside the cave.
Towards the entry there are calcareous sponges as in Lebanon shaded sites + Crambe crambe and Chondrosia reniformis + Madracis pharensis, Sargocentron rubrum and Pempheris vanicolensis in great number.
A Scleractinia was also observed. It forms colonies in rather thin layers pointing out those of exotic species originating from South America: Oculina patagonica (species found by G. Bitar in Lebanon in July 1992). The sampling analysis apparently showed that the species is Polycyatus mullerae.

Sponges: Crambe crambe, Phorbas sp., Chondrilla nucula, Cliona celata in facies, Ircinia fasciculata, Ircinia sp., Sarcotragus spinosulus

Cnidaria: Eudendrium sp., Aglaophenia sp.

Polychaeta: Hermodice carunculata, Spirobranchus tetracerus, many unspecified Serpula

Mollusces: Strombus decorus, Chlamys sp., Malleus regula, Cardita calyculata, Chama pacifica Pinctada radiata, unspecified Muricidae

Crustaceans: Balanus perforatus

Echinodermata: Paracentrotus lividus and Synaptula reciprocans

Ghazi Bitar, Renaud Dupuy de la Grandrive and Mathieu Foulquié – October 2003
Ascidian: *Herdmania momus* and *Phallusia nigra*

Fish: *Siganus rivulatus*, Thalassoma pavo, *Coris julis*, *Chromis chromis*, *Sargocentron rubrum*, *Murena helena*, *Serranus cabrilla*, *Serranus scriba*, *Epinephelus marginatus*, *Epinephelus costae*, *Symphodus tinca*, *Scorpaena maderinsis*, *Scorpaena porcus*, *Diplodus vulgaris*, *Diplodus sargus*, *Diplodus cervinus*, *Oblada melanura*, *Mullus surmuletus*

**Wednesday, August 6th, 2003:**

**Military station Cove of Ras El Bassit**

Dive P6
Parameters: -11.8 m / 63 minutes
Dive profile: transect

Mixed meadow with *Penicillus capitatus* / *Halophila stipulacea* (see image below) / *Zostera noltii* 3 *Pinna nobilis* (+ 2 dead individuals)
*Strombus decorus* (very abundant)

Rocky site: micro-sloping / micro-hollow
1 *Stephanolepis diaspros*
3 *Epinephelus marginatus*
4 *Epinephelus costae*
*Apogon imberbis*
*Coris julis*
*Enchelycore anatine* (2)
*Serranus scriba* (3)
*Serranus cabrilla* (7)
*Serranus hepatus* (1)
*Chromis chromis* (> 25) + juv.
*Paracentrotus lividus*

**Northern-East of Ras El Bassit**

Dive D7
Parameters: 29 m / 40 minutes
Dive profile: transect

*Caulerpa racemosa* var. *lamourouxii*: 19 stalks on a slope
*Stypopodium schimperi* (75 % coverage of the substrate with sometimes a few feet of *C. racemosa*)

Meadow with *Penicillus capitatus* on ripple-marks sands with few stalks of *Caulerpa racemosa* and some foliages of *Halophila stipulacea*

Visual census (station point) on bottom with buildings colonized by *Stypopodium schimperi*

*Chromis chromis*: 122 ind.
*Epinephelus costae*: 2 ind.
*E. marginatus* (juv.): 3 ind.
*Sargocentron rubrum*: 6 ind.
*Apogon imberbis*: 1 ind.

Micro-sloping (-10 m): 51 stalks of *Axinella polypoïdes* (juvenile) on 2 sq. m

Nets on rocky sites

Ghazi Bitar, Renaud Dupuy de la Grandrive and Mathieu Foulquié – October 2003
Ghazi Bitar dived in apnea with Giovanni Torchia and Fabio Badalamenti in Um Tiur site, between 15 m depth and the coast.

On the Cape level, it is about a cliff going down until -5 m, with sandy bottoms -32 m (Dive D6 Alt.): *Caulerpa mexicana* having narrow thalli of small size on muddy fine sand + *Brissus unicolor, Penicillus capitatus, Glycymeris sp., Laevicardium oblongum* and *Hermodice carunculata*

On the Cape rock: *Dictyopteris polypodioides, Sargassum vulgare, Asparagopsis taxiformis, Jania rubens*, calcareous sponges, *Crambe crambe, Balanus perforatus, Balanus trigonus*.

5 nests of turtles were observed on the beach.

**Thursday, August 7th, 2003:**

**Offshore Ras El Bassit Cape (rocky site)**

Dive D8
Parameters: -55.5 m / 21 minutes
Dive profile: diving while going up on a rocky site
Bottom of the profile at -55 m
Top of the profile at -35 m

-55 m: *Penicillus capitatus* (lowest depth ever described in the literature to date)
*Dictyopteris volitans* (2 ind.)
+ Top of the site: *Cystoseira discoir, Sargassum acinarium, Hermodice carunculata, Ocinebrina edwardsii, Heraplex trunculus, Strombus decorus*

**Ras El Bassit Cape**

Dive D9
Parameters: -22.3 m / 63 minutes
Dive profile: transect

*Dictyopteris volitans*
*Chromis chromis* (341 ind.)
*Sparisoma cretense* (2 ind.)
*Muraena helena*
Small scorpionfish (unspecified species)
*Sargocentron rubrum* (2 ind.)
*Coris julis* (3 ind.)
*Serranus scriba* (1 juv.)
*Epinephelus costae*
*Hydrozoa*
*Hermodice carunculata*
*Octopus vulgaris*
*Pinna nobilis*

Bottom with rocks colonized by *Stypopodium + Padina pavonica + Caulerpa racemosa*
Meadow with *Halophila stipulacea + Penicillus capitatus*
*Cystoseira sp.*
+ Apnea (A2) Military station Cove and Eastern Cape:

4 turtles, one of which is a green turtle (*Chelonia mydas*)
Surface water temperature: 32°C
*Halophila* meadow and fractured rocky zones

Dive D9 Alt. (G. Bitar)
Parameters: -8.5 m / 38 minutes
*Malleus regula*
*Stypopodium schimperi*
*Liagora sp.*
Platform with vermitids
*Dendropoma petraeum*
+ apnea in the southern Cape further offshore: platform rim covered with *Laurencia papillosa* and *obtusa* + *Cystoseira compressa*

**Friday, August 8th, 2003:**

Morning: Apnea A3
**Southern most extremety of Ras El Bassit fishing port**

Fixed net > two carapaces of marine turtles taken in the meshes
Lizardfish with large scales – *Saurida undosquammis* (migrating Lessepsian)

Afternoon: Apnea A4
**Embarkation with Bassam and his two children to go and lift the fishing pots and observe the turtles**
**Offshore Ras El Bassit**

5 turtles: 3 *Caretta caretta* and 2 *Chelonia mydas*
Sandy-muddy bottom, offshore El Bassit beach; *Penicillus capitatus* (-13 m) in low density. *Chromis chromis* (> 150 ind.)

End of afternoon: visit to Samra Valley.

**Saturday, August 9th, 2003:**

**Dive offshore Ras El Bassit**
Dive D10
Parameters: -49.3 m / 22 minutes
Dive profile: transect

Rough sandy bottom + remains of calcareous algae and bryozoans (*Retepora* and *Cyprea*)

*Axinella polypoïdes*
*Axinella canabis*
*Chondrosia reniformis*
*Crambe crambe*
*Chromis chromis* (> 50 ind.)
*Epinephelus marginatus* (average size / 1 ind.)
*E. costae* (average size / 1 ind.)
*Serranus cabrilla*: 3 ind.

Nets all around the site, from top to bottom.
Southern Ras El Bassit
Dive D11
Parameters: -20 m / 39 minutes
Dive profile: transect

Caulerpa racemosa var. lamourouxii
Stypopodium schimperi
Padina pavonica
Coris julis (fem.) on a rocky bottom + Stypopodium: 9 ind.
Chromis chromis: > 300 ind. on rocky bottom without Stypopodium
172 ind. on rocky bottom with Stypopodium
Sargocentron rubrum: 11 ind.
Epinephelus marginatus (juv.): 5 ind.
E. costae: 1 ind.
Siganus rivulatus: 3 ind.
Sparisoma cretense: 3 ind. including 2 males on final coat (shade) and 1 juv.
Serranus scriba: 1 ind.
Serranus cabrilla: 1 ind.
Unspecified Labridae (orange, with black spot on caudal fin)

"Cascade" Bay
Dive D11 Alt. (G. Bitar)
Parameters: -9.2 m; 19'
Outside the cove: 9 m slope.
No platform on the surface, presence of calcareous algae + Laurencia papillosa
At the bottom: Eudendrium sp., Ltytcarpus philippinus, Crambe crambe + Phorbas sp. + Chondrosia fisciformis and calcareous sponges (Sycetusa sp., Vosmaeropsis sp.), Galaxaura rugosa, Paracentrotus lividus, Arbacia lixula, Hermodice carunculata.
Predominance of Stypopodium schimperi up to 9 m with a clear presence of Strombus decorus + Ocinebrina edwardsii and Synaptula reciprocans

Military station Bay, Ras El Bassit
Dive D12
Parameters: -12 m / 20 minutes
Dive profile: transect on mixed seagrass with Halophila stipulacea and Penicillus capitatus

Cap du Porc, Southern Um Tiur
Apnea A5
Pempheris vanicolensis
Cystoseira sp.

Sunday, August 10th, 2003:

Ras Samra
Dive D13
Parameters: -56.3 m / 36 minutes
Dive profile: transect and station points

Sandy-muddy bottom:
Thetys fimbria
Mullus surmuletus (5)
Xyrichthys novacula (12 ind.)
Lichia amia

Riffs: (station points)
Chromis chromis: 61 ind.
Sargocentron rubrum: 5 ind.

Bottom with rocks: (station points)
Stypopodium schimperi
Caulerpa racemosa var. lamourouxii
Crambe crambe
Strombus decorus
Galea thundered
Echinaster sepositus
Chromis chromis: 92 ind.
Siganus rivulatus: 19 ind.

Pots:
Epinephelus marginatus (3 juv.)
Scyllarides latus

First cove, southern Ras El Bassit
Apnea A5 Alt. (G. Bitar)
Towards the platform
8-15 m reef from surface to sub surface of which the supralittoral is 2 m height (characterized by the presence of Melaraphe neritoides and Littorina punctata which is more abundant).
Mediolittoral zone with: Chthamalus stellatus, then a small vermitids platform + Dendropoma petraeum (2-3 m broad) on which we find Laurencia papillosa and Brachidontes pharaonis in abundance + Jania rubens and Lithophyllum trochanter (species already found on 16/6/1999 in Borg Islam by G. Bitar).
Infralittoral layer: Balanus perforatus, Crambe crambe, Stramontina haemastoma, Liagora sp., Stypopodium schimperi, Hermodice carunculata.
The sandy bottom is approximately at 8-9 m depth.
Fish observed: Thalassoma pavo, Coris julis, Chromis chromis, Serranus scriba, Diplodus vulgaris, Diplodus sargus, Oblada melanura.

Southern Ras El Bassit
Dive D14
Parameters: -19.6 m / 21 minutes
Dive profile: transect on sandy bottom with ripple marks: Xyrichthys novacula (7 ind.)

Southern Ras El Bassit
Dive D15
Parameters: -14.3 m / 43 minutes
Dive profile: transect and station points

Stypopodium schimperi
Spondylus spinulosus
Ircinia sp. (?)
Hermodice carunculata
Octopus vulgaris (1)
Epinephelus costae
Oblada melanura

Visual census / station point:

Epinephelus marginatus juv.: 8
Diplodus vulgaris: 11
Diplodus sargus: 27
Siganus rivulatus: 2
Thalassoma pavo: 9
Holocentrum sargocentron: 17
Sparisoma cretense: 3
Scorpaena maderensis: 2
Unspecified Carangidae: (Seriola dumerili?): 2
1 unspecified Labridae

Monday, August 11th, 2003:

Ibn Hani (Lattakia)

Dive D16
Parameters: -40.2 m / 9 minutes
Dive profile: localized diving on muddy bottom
Strombus decorus (rare)

Dive D17
Parameters: -32.6 m / 23 minutes
Profile of the dive: localized diving on a rocky site

Visual census (station points):

Chromis chromis: 51
Sparisoma cretense: 3
Siganus rivulatus: 4
Sargocentron rubrum: 15
Epinephelus costae: 2
Stephanolepis diaspros: 1
Epinephelus marginatus (juv.): 4

Invertebrates inventory:

Caryophyllia inornata
Crambe crambe
Chondrosia reniformis
Hermodice carunculata
Unspecified Ascidian (Ciona sp.)
Unspecified Sponge
Ircinia sp.
Synaptula reciprocans

Several nets around the site
Cranium of turtles

Ibn Hani (Lattakia) – Cymodocea nodosa meadow

Dive D18
Parameters: -11.7 m / 28 minutes
Dive profile: transect: lower limit >> higher limit

Dive D19
Parameters: -12 m / 14 minutes
Dive profile: localized diving – Upper limit of the meadow
Cymodocea nodosa  
Penicillus capitatus  
Caulerpa racemosa var. lamourouxii  
Stombus decorus  
Cerithium scabridum  
Synaptula reciprocans  
Siganus rivulatus (juv.) > 150 ind.

Rocky bottoms:

Stypopodium Schimperi (rare)  
Galaxaura rugosa (covers almost entirely the rocky substrate)  
Peyssonnelia sp.  
Ircinia sp.  
Crambe crambe  
Phorbas sp.  
Niphates sp.  
Cliona celata  
Axinella polypoïdes  
Eudendrium sp.  
Hermodice carunculata  
Lytocarpus philippinus  
Spondylus  
Chama pacifica  
Balanus perforatus  
Siganus rivulatus (ad.): 3  
Coris julis: 7  
Chromis chromis > 50  
Sargocentron rubrum: 11  
Epinephelus marginatus (juv.): 2  
Serranus cabrilla: 3  
Diplodus vulgaris  
Diplodus sargus

Tuesday, August 12th, 2003:

Les Chalets (North of Lattakia)
Dive D20  
Parameters: -29.4 m / 24 minutes  
Dive profile: localized diving on mixed meadow with Penicillus capitatus, Caulerpa scapelliformis (see image below, according to a sample put in a Herbarium) and Cymodocea nodosa

Dense populations of Penicillus capitatus (up to 575 feet / sq. m)

Echinaster sepositus  
Sphaerechinus granularis  
Hermodice carunculata  
Strombus decorus persicus  
Echinocardium  
Axinella damicormis  
Venus verrucosa

3 species of Cystoseira of which C. discor  
Sargassum sp.  
Caulerpa racemosa var. lamourouxii

Les Chalets (North of Lattakia)
Dive D21  
Parameters: -19 m / 40 minutes  
Dive profile: transect

Rocky bottom, colonized by Stypopodium schimperi alga

Ghazi Bitar, Renaud Dupuy de la Grandrive and Mathieu Foulquié – October 2003
Galaxaura rugosa
Asparagopsis taxiformis
Unspecified Nudibranchia (Chromodoris ?)
Sycon raphanus
Niphates
Crambe crambe
Axinella canabis
Ircinia sp.
Sarcotragus spinosulus

Gymnothorax unicolor (2)
Scorpaena maderensis (3)
Unspecified Labridae
Siganus luridus (7)
Epinephelus marginatus (juv.): 5 ind.
Chromis chromis (> 200 ind.)
Sargocentron rubrum (11)
Apogon imberbis (3)
Serranus cabrilla (4)
Sparisoma cretense (2)

Wednesday August 13th, 2003:

Offshore Ras El Bassit – rocky site
Dive D22
Parameters: -62.3 m / 26 minutes
Dive profile: localized specific diving on a rocky site + cave
Padina pavonica (at the upper surface) + Styopodium schimperi

Strombus decorus
Sphaerechinus granularis
Simnia sp.
Axinella polypoïdes
Clathrina sp.
Centrostephanus longispinus

Epinephelus marginatus (2)
Epinephelus costae (3)
Sargocentron rubrum

Southern Ras El Bassit – the cascade cove
Dive D23
Parameters: -12 m / 53 minutes
Dive profile: transect and station points
Thursday, August 14th, 2003:

Offshore Arwad Island
Dive D24
Parameters: -34 m / 20 minutes
Localized dive on a sandy bottom with ripple marks
Strombus decorus
Caulerpa scalpelliformis
Flabellina affinis
Unspecified Ophiuroidea

Arwad Island
Dive D25
Parameters: -16 m / 40 minutes
Colonization of the hard substrate by Padina and Neomeris annulata (in facies)

Friday, August 15th, 2003:

Morning: Apnea A6
Arwad Island (platform and shallow bottoms)

Brachidontes pharaonis
Pterocladia capillacea (found only in Arwad where it seems to tolerate the presence of organic matters)
Jania rubens
Corallina elongata

Ghazi Bitar, Renaud Dupuy de la Grandrive and Mathieu Foulquié – October 2003
Caulerpa mexicana: collected in flat surface basins and placed in a Herbarium (opposite illustration)
Bryopsis sp.
Sargassum vulgarum
Cystoseira compressed
Ulva sp.
Enteromorpha intestinalis
Neomeres annulata
Dasycladus vermicularis
Stypopodium schimperi + Padina pavonica (on -5 m)

Loligo vulgaris

Pempheris vanicolensis
Oblada melanura
Siganus rivulatus
Siganus luridus (1)
Diplodus cervinus (juv.)
Sparisoma cretense
Parablennius plicicornis
Holocentrum sargocentron
Coris julis
Thalassoma pavo
5. Analysis of collected data:

5.1 Marine vegetation:

5.1.1 Algae:

38 species of macro-algae were observed during this mission, including 7 Lessepsian and 5 registered in the Red Book “Gérard Vuignier” (*) (UNEP et al., 1990).

- Dictyopteris polypodioides
- Corallina sp.
- Jania sp.
- Lithophyllum lichenoides
- Galaxaura oblongata
- Penicillus capitatus *
- Madracis pharencis
- Liagora sp.
- Sargassum vulgare
- Jania rubens
- Sargassum acinarium
- Cystoseira discors
- Laurencia obtusa
- Laurencia papillosa
- Cystoseira compressa
- Sycetusa sp.
- Vosmaeropsis sp.
- Peyssonnelia sp.
- Dasycladus vermicularis
- Padina pavonica
- Padina boergenisi *
- Amphiroa sp.
- Corallina elongata
- Pterocladiella capillacea
- Bryopsis sp.
- Ulva sp.
- Enteromorpha intestinalis
- Anadyomene sp.
- Acetabularia acetabulum
- Palmophyllum crassum
- Pseudolithophyllum expansum
- Stypopodium schimperi
- Asparagopsis taxiformis
- Neomeris annulata
- Caulerpa scalpelliformis *
- Caulerpa mexicana *
- Galaxaura rugosa
- Caulerpa racemosa var. lamourouxii *

The ecology of certain Lessepsian species is detailed in the following paragraphs.

5.1.1.1 *Stypopodium schimperi* (Buchinger ex Kuetzing):

![Stypopodium schimperi](image)

*Stypopodium schimperi* photographed in Arwad Island

The growing period of *Stypopodium schimperi* extends from end of February to September. In Lebanon, the alga fronds reach 25 cm towards the end of June, and, end of August, the community regresses to disappear completely in November (BITAR et al., 2000).

MAYHOUB and BILLIARDS (1991) already described similar variations in Syria and we also observed it, the alga not having been observed in November 2002, formed, on the other hand, very dense communities, up to 40 meters depth during August 2003 (BITAR, DUPUY de la GRANDRIVE and FOUQUIÉ, pers. comm.).

Alike in Lebanon, the alga seems to present a character of invasive species, colonizing the major part of the hard substrates of the photophilous algae biocenosis.
To explain its proliferation in Eastern Mediterranean waters (Lebanon, Syria, Libya, Egypt and Turkey), BITAR et al. (2000) remind that the alga contains a powerful ichthyotoxine causing the absence of predation by possible grazers.

5.1.1.2 *Galaxaura rugosa* (Ellis and Solander) Lamouroux:

*Galaxaura rugosa* (source: www.botany.hawaii.edu)

The first observation of this species in the Mediterranean Sea goes back to 1990 and was carried out by Mayhoub, in Syria, between Banias and Lattakia. Ghazi Bitar then observed it in Ras Ibn Hani (Northern Lattakia) in June 1999. During the second mission of August 2003, the species was noted in various places of the littoral.

5.1.1.3 *Asparagopsis taxiformis* (Delile):

*Asparagopsis taxiformis* (source: www.botany.hawaii.edu)

This red alga was described in Alexandria in 1813, shortly before the opening of Suez Canal. The origin of the presence, in the Mediterranean, of this alga with rather tropical affinity, thus remains subjected to various assumptions (relic species of Thetys, introduced before the opening of the Suez Canal...).

It was observed in Lebanon in 1993 (BITAR et al., 2000) and during the mission of August 2003 on the Syrian coast.

These two species, contrary to *Stypopodium Schimperi*, do not seem to behave as invasive species, both in Lebanon (BITAR et al., 2000) and in Syria.
5.1.4.1 *Neomeris annulata* (Dickie):

*Neomeris annulata* was found between 2 and 15 m in the biocenosis of the photophilous algae on rocky substrates of various gradients (vertical and horizontal). In the same way, it was observed on the Molluscs *Chama pacifica* (Lessepsian species) and *Hexaplex trunculus*. Species not quoted in MAYOUB’s thesis (1976), and nowhere else in the Mediterranean, as it seems. It might thus be a new species for Syria and the Mediterranean area.

Among sectors explored between Arwad Island and Ras Samra in northern Syria, the species was only found in Arwad Island.

The color is yellowish green and whitish on the basal part of the fronds. This white colouring comes from a calcification phenomenon.

Measurements were taken on samples preserved in formalin. The maximum length of the fronds is of about 2.5 cm to 3 cm; what corresponds with the dimensions given in the literature.

It seems well established around Arwad Island where it forms sometimes, real facieses. It accompanies the following colonies: *Jania rubens*, *Corallina elongata*, *Padina pavonica*, *Padina boergesenii*, *Liagora sp.*, *Amphiroa sp.*, *Sargassum vulgare* and *Stypopodium schimperi* of indopacific origin, it is present in the Red Sea, in the Sinai (NARS, 1947; LIPKIN, 1985) as well as in the Indian Ocean (FOULQUIE, pers. comm.).
5.1.2 Phanerogam:

3 species of Phanerogam among which 1 Lessespsian was observed during the mission.

*Cymodocea nodosa* 
*Zostera noltii* 
*Halophila stipulacea*

In general, we preferentially observe mixed meadows with *Penicillus capitatus* and/or *Caulerpa scalpelliformis*. Only *Cymodocea nodosa* meadow observed in Ibn Hani seems mono-specific in its major part. Its lower limit is at -12 m depth and its higher limit at -8 m where it leaves room to photophilic algae biocenosis where we observe a very clear predominance of *Galaxaura rugosa* algae and where, on the contrary, the species *Stypopodium schimperi* seems rather rare, compared to other explored sites.

The meadow of the military station cove of Ras El Bassit is a mixed meadow with *Halophila stipulacea*, *Zostera noltii* and *Penicillus capitatus* in which were found 3 juvenile *Pinna nobilis*.

It should be noted that the alga *Penicillus capitatus* can form real meadows, sometimes very dense (up to 575 feet / sq. m), and often associated with *Caulerpa racemosa var. lmourouxii* and *scalpelliformis* and reaching until forty meters depth.

It should be noted also the absence of the phanerogam *Posidonia oceanica*. Only a "pelote" (algal rolling) was found on the beaches located at the Lebanese border.

Meadow with *Halophila stipulacea* (Cove of the military station of Ras El Bassit – photo: R. D. Grandrive)
5.2 The marine fauna:

5.2.1 Invertebrates: Molluscs and Sponges:

24 mollusc species including 7 Lessepsian

Glycemeris sp.  
Bulla striata  
Cassis saburon  
Cardita calyculata  
Erosaria spurca  
Chlamys sp.  
Tonna galea  
Venus verrucosa  
Octopus vulgaris  
Octopus macropus  
Chromodoris sp.  
Pinna nobilis  
Trochus erythreus  
Arca sp.  
Charonia lampas  
Lithophaga lithophaga  
Murex trunculus

The presence of species of patrimonial interest was noted; the noble pen shell (Pinna nobilis), the date shell (Lithophaga lithophaga) and large proportion of Lessepsian species.

15 species of sponges including 1 Lessepsian

Crambe crambe  
Phorbas sp.  
Chondrilla nucula  
Cliona celata  
Axinella polypoïdes  
Petrosia ficiformis  
Ircinia fasciculata  
Sarcotragus spinulosus  
Agelas oroïdes  
Axinella cananbis  
Niphates sp.  
Chondrosia reniformis  
Sycon raphanus  
Clathrina sp.  
Lytocarpus philippina

Only rare erect organisms, of big size, as the sponge Axinella polypoïdes were observed, but within great depths (between 50 and 63 meters depth).

Total absence of gorgons on the whole explored sites, was noted. 
The too high water temperature (until 31°C on surface and 24°C at -63m / temperatures recorded during this mission) could be regarded as a limiting factor.
5.2.2 Fish biodiversity:

5.2.2.1 Species observed:

36 fish species including 8 Lessepsian

Scorpaena porcus  Echeneis naucrats  Siganus rivulatus
Diplodus vulgaris  Boops boops  Sargocentrum rubrum
Diplodus sargus  Thalassoma pavo  Fistularia commersonii
Oblada melanura  Coris julis  Pempheris vanicolensis
Xyrichthys novacula  Chromis chromis  Siganus luridus
Seriola dumerili  Murena helena  Enchelycore anatina
Diplodus cervinus  Serranus cabrilla  Stephanolepis diaspros
Sparisoma cretense  Serranus scriba  Saurida undosquamis
Gymnothorax unicolor  Epinephelus marginatus
Apogon imberbis  Epinephelus costae
Dactylopterus volitans  Symphodus tinca
Lichia amia  Scorpaena maderensis
Labrus merula  Spondylosoma canthus
Labrus bimaculatus  Mullus sp.

Diagram of the proportion of various fish species (for the most commonly observed species)

5.2.2.2 The dusky grouper – Epinephelus marginatus

The abundance of juvenile dusky groupers offers a sharp contrast with North-western Mediterranean waters and consequently a one-off study field (studies on genetic recruitment of populations...). Out of forty dives carried out from northern Ras El Bassit to Arwad Island, in the south, between 10 and 63 meters depth, only juvenile individuals were reported. Some rare questioned fishermen announced to have already captured adults, but their presence remains to be determined.

Ghazi Bitar, Renaud Dupuy de la Grandrive and Mathieu Foulquié – October 2003
5.2.2.3 Traditional fishing – Preliminary reports:

August 15th, 2003, Bassam and his two sons lift in the full summer heat, their fish pots on board their fishing vessel: just coming up from an apnea to bring back the pots from the bottom, he can only note the inevitable (results).

Khalil and Mourad, Bassam’s two sons, throw the pots with their father that will be lifted next morning

The small catch of Bassam and his two sons. Today; only some dusky groupers, white seabreams and species from Red Sea, such this squirrel-fish (red striped) and rabbitfish (in the corner, in top on the left)

Indeed, a score of small fish, which do not exceed 10 cm each! Although prohibited, fishing with dynamite seems to be still practised by some fishermen but the singularity does not stop there. Fishing is curiously quite varied. Bassam captures small quite Mediterranean rock fish such as juvenile dusky groupers, damselfish... but also the reticulated leatherjacket (Stephanolepis diaspros), rabbitfish (Siganus sp.), squirrel fish (Sargocentron rubrum) ... Lessepsian migrants.

It was obvious! What we could observe in diving, the local Syrian fisherman experiences it daily; the "tropicalization" of the Mediterranean is a reality.

Symbol of this tropicalization of the Mediterranean; this photograph where squirrel fish (Sargocentron rubrum) coming from Red Sea via Suez Canal mix with damselfish (Chromis chromis), typically Mediterranean fish, on a mixed bottom of vegetation of Padina pavonica (brown alga of the Mediterranean) and Neomeris annulata alga of indo-pacific origin located on the whole intertropical zone (photo taken on Arwad Island by – 15 m depth).
This tropicalization phenomenon is particularly remarked for fish (approximately one out of three species would be native from Red Sea). As the two following photographs show it, during the same dive, we can meet at the same time the painted comber (*Serranus scriba*), quite Mediterranean species and islands moray eel (*Enchelycore anatina*) which is a Red Sea native species.

![Serran writing – *Serranus scriba*](image1)

![Islands moray eel – *Enchelycore anatina* (El Hamam Island)](image2)

### 5.2.3 Marine reptiles and mammals:

2 species of marine reptiles

*Chelonia mydas*

*Caretta caretta*

Sites of potential egg laying were observed by Daniel Cebrian-Menchero on certain remote beaches between south Ras El Bassit and Cap du Porc, in south of Um Tiur.

The alive individuals were observed on a zone extending from North El Bassit to South Ras El Bassit, and more specifically in very early morning or at night fall in the Cove of the small fishing port of El Bassit, where the green turtles (*Chelonia mydas*) come to feed themselves from fish rejected by fishermen, who seem perfectly accustomed to the presence of this species, few meters off the shores and from their boats.

2 species of marine mammals

*Monachus monachus*

*Tursiops truncatus*

The bottlenose dolphin is regularly observed by the questioned fishermen on this subject. As for the monk seal, it seems to frequent the Syrian littoral. Indeed, there are certain sites with many caves favourable to the settlement of the species, in particular in the far North of Ras Samra. Moreover, during our stay, we were informed that fishermen unloading their catch in Lattakia, had found two dead individuals in their nets.

The search for this species in the Northern part of the Syrian littoral must thus continue.
6. First preliminary conclusions and recommendations:

The north of the Syrian coast, Ras Samra, is of strong interest if we consider the landscape and the geomorphological, ecological, floristic, faunistic and biological aspects.

Borg Islam: Wild relief bottom with potatoe-shaped and cavitary reefs and great rocky labs. The interest of the zone between Borg Islam and Um Tiur is strengthened by indications given by local fishermen who used to capture very peculiar species (Hammerhead shark, Manta ray, etc.).

On the whole, the ichthyologic richness is undeniable (testified by the great number of species observed in diving and captured by the questioned fishermen), but the poorness of fauna reported on explored sites is notable and worth being studied further.

The sector located between Cap du Porc (Southern Um Tiur) and Southern Ras El Bassit seems to be made up mainly by large sandy areas.

On the other hand, the whole part of Ras El Bassit, including offshore, seems to be more interesting from the biological and landscape points of view (many rocky sites starting from –30 m, exploration of a vast cave at the foot of one of these sites –53 m, with species of patrimonial interest; Mediterranean locust lobster, dusky groupers, crowned sea urchin, etc.).

The President of an association of fishermen of Tartous, in the south of Syrian coasts, told us about the problems that encounter hundreds of traditional fishermen regarding their bad living conditions. Among cargo liners off Tartous and hundreds of floating plastic bags, they are suffering the effects of pollution in all kinds of the large neighbouring city.
Striking contrast between the Turkish border in north, of a breathtaking beauty, quasi virgin of any anthropization, and the one, in the south, bordering Lebanon where seem to settle, as far as the eye can see, all macro-waste of the Mediterranean...

6.1 First proposals for the creation of Marine Protected Areas (MPAs)

They are primarily based on criteria related to the interest of biodiversity and underwater and coastal landscapes. They concern general geographical sectors. It will be advisable to further analyse these sites by taking into account, in particular, the presence and impact of marine and coastal human activities.

For the limit of offshore potential MPA, as a general rule, it is the isobath 50 meters, which is proposed.

From observations reported during this mission; it proves that the regulation in progress on the marine zones should be better respected (trawling and artisanal fishing "small trades" in prohibited sectors, underwater fishing, including protected areas like Ibn Hani).

The map page 39 (appendix 1) indicates the suggested sectors.

6.1.1 North of the Syrian coast:

The sector extending from Pigeons Island (El Hamam Island) in the south until the limit of Samra valley in north, while passing by Ras Samra presents, from the coastal and submarine point of view a strong interest as far as the landscape, geomorphology, ecology, flora and fauna are concerned. It is a remarkable site, the wildest of all sites explored during this mission, and the one where human activity is the weakest at the terrestrial level. Therefore, it is worth being registered in the development plan of protected marine areas in Syria.

6.1.2 Ras El Bassit:

It is one of the most interesting sectors for its biodiversity and underwater landscapes: many rocky sites starting around 30 meters depth, underwater caves around less 50 meters depth, underwater falls, rocky flagstones, sandy zones, phanerogam meadows, littoral and underwater geomorphological diversity, presence of animal and vegetal species of patrimonial importance such as dusky groupers, the large cicada, the crowned sea urchin, the green turtle...

The selected sector could go from Cap El Midan (first rocky point in the south of El Bassit beach) to the said place of the Cascade Cove. The following sites seem to be made up only of sandy surfaces (to be checked with findings of the Italian mission). However complementary observations on the laying of marine turtles on this site are essential to sharpen this proposal. A particular zoning could then be affected to this sector.
6.1.3 Um Tiur (protected sector):

Between Cap du Porc (southern Um Tiur) and the south of Ras El Bassit Cape, the underwater bottoms are primarily sandy and rather poor in marine biodiversity. Moreover, the activity of fishing is very present and there are many macro-waste covering sandy bottoms with rare rocky surroundings. The site interest lies more in the littoral landscapes (landscape complex of beaches, cliffs and sand) and may be, the rich diversity of fauna (birds, bats...) or flora (littoral flora associated to rupicolous environments). Because of already existing terrestrial protection, a particular statute to marine environment could be possibly planned in order to ensure a relation land-sea.

6.1.4 Sector of Borj Islam; from Cap du Porc to Ibn Hani:

The interest of the site lies in the presence of underwater reliefs with potato-shaped forms strongly cavitary and of large rocky flagstones. The ecological richness concerns especially fish, present in great numbers with diverse species. Information received from fishermen attests also the diversity of species of patrimonial value like the Manta ray and several shark species.

This sector could go from Cap du Porc to the protected site of Ibn Hani, close to the High Institute of Marine Research. The presence of this Institute - gathering Syrian scientists working on marine environment - within the limits of a future protected marine area- is a considerable asset.

6.1.5 Arwad Island: case study

The mission led in August enabled us to quickly appraise the isle underwater richnesses, the largest of the Syrian coasts. Underwater landscapes are monotonous and fauna not very abundant. The major interest of this site lies however in the presence of a great number of species said Lessepsian (coming from Red Sea via Suez Canal) – fauna and flora – which some have just been described there for the first time in Syria (Neomeris annulata). The "tropicalization" of the Mediterranean is a reality in this zone. Moreover this zone of Tartous is a very significant port where many ships use the roads. For this reason, Arwad Island constitutes a real "Hot Spot" for Lessepsian species and could be the topic of a scientific follow-up of international level (Globallast program...).

In addition the level of pollution appeared high (a lot of macro-waste, seaside dumping with direct discharges at sea...), which is confirmed by local fishermen associations. It thus appears difficult in this context to establish an MPA on Arwad. For all that, solutions for a durable management of Arwad are to be found especially as local fishermen are concerned with these problems of pollution and their difficulty of living from their activity. Because of the very low number of islands on the Syrian coasts, Lebhas Islands, close to some miles and which could not be visited during the missions, should receive full attention for an ecological expertise.

6.1.6 The South of the Syrian coast to the border is not of interest in the field of marine biodiversity; some spots with nesting presence of marine turtle remain to be confirmed.
6.2 Recommendations to continue the development of the national plan:

In order to work out the national plan for development of marine protected areas in Syria, complementary studies and expertises could concern:

6.2.1 Biodiversity:

Complements of underwater expertise on Borj Islam and Lebhas Islands sites
Complements of expertise on fixed fauna in selected sites
Search for information (or study campaign) on cetacean populations and marine turtles (including adjacent territorial waters, in particular the north which is a significant potential site).
Some selected sites have an undeniable ecological richness in land and coast: complementary ecological studies would permit to better articulate the ecological analysis land/sea: thus, in particular on the north and south of Um Tiur, a work (survey) should be continued on sea birds, bats (caves) and littoral flora.

6.2.2 Human activities:

Assessment of the fishing effort on the whole located sites and socio-economic study of this activity: this point is capital before working out any action plan for future MPA.
Search for studies carried out on hot spots of marine pollution, in particular emissaries at sea near the cities (Lattakia).
Land identification of all great sites of wild discharge liable to affect the quality of marine environment; qualification and classification of macro-waste sites.
Inventory of touristic projects envisaged on the coast (El Bassit in particular, northern Lattakia).
Presentation of a master plan with statistical data on the frequentation of sites (number of tourists, periods, origins...).
Synthetic test for zoning sites already urbanized and town planning schemes on each site.
7. Bibliographical references quoted in the text:


8. Complementary bibliographical references:


APPENDIX 1: Mapping of approximate limits for potential Marine Protected Areas in term of marine biodiversity (Ras Samra site - Lattakia).
APPENDIX 2: Photographic Plate

*Hermodice carunculata* (R. D. Grandrive)
*Hypselodoris tricolor*? (M. Foulquié)
*Epinephelus marginatus* (R. D. Grandrive)
*Echeneis naucrates* (M. Foulquié)
*Scorpanena maderensis* (R. D. Grandrive)
*Enchelycore anatina* (M. Foulquié)
*Sargocentron rubrum* (R. D. Grandrive)
*Cymodocea nodosa*