

RAMLA BAY, GOZO

*A short survey to overview current status and requirements for conservation
(Autumn 2002)*

BICREF, The Biological Conservation Research Foundation

Report drawn up by Dr. Adriana Vella, Ph.D. (Conservation Biologist)



In collaboration with the **Gaia** Foundation



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Introduction

The Gaia foundation has been entrusted with the integrated coastal zone management of Ramla Bay in Gozo in 2000 following a successful bid for EU Life Programme funding submitted in collaboration with the Institute for Insular Coastal Dynamics (ICoD). The main aim of this project is to ensure sustainability of all activities taking place in Ramla Bay. To achieve this GAIA has planned different activities, including education of the general public on site. As part of the EU Life Programme, the project also required an ecological survey of the Ramla Bay, which was requested by Gaia from BICREF (non-profit voluntary conservation research group under my supervision) for the period September and December 2002.

This survey report considers both BICREF observations recorded during the autumn period 2002 and the previous studies by other entities. This brief report and survey is part of a more extended BICREF-Gaia collaboration planned for biological conservation monitoring in the coming seasons/years.

Any conservation management demands an interdisciplinary approach that incorporates the consideration of the different entities and factors present in the area being managed. The natural setting and its dynamics needs to be understood, side by side to the changes these settings and dynamics may undergo with time, due to anthropogenic and natural causes. These causes need to be considered in detail if a vulnerable/valuable ecosystem is to be protected in the long-term. Scientific conservation assessments involve primarily the study of the biological units or biodiversity sustaining the habitat or species of conservation interest. Secondly, it involves studying the key-species and key-resources on site for detailed investigations of the status of these important elements in the conservation area. Thirdly, it involves an assessment of the impacts of human activities directly or indirectly on the site, especially on the keystone species and keystone resources so as to plan corrective action if still in time to do so. This first BICREF survey of Ramla considers the first stage so as to pave the way to the subsequent required investigations in order to assist GAIA in its management plans of Ramla in the future.

Within this perspective, it is useful to start with a brief literature survey of the observations or studies undertaken at Ramla in the past and then compare these observations with those undertaken by BICREF members during the period September to December 2002 so as to furnish a undated basis, on which to recommend further studies, monitoring, and management requirements.

Ramla Bay ecological literature back ground

In 1987, the consideration of Ramla Bay as a site (together with many other sites in the Maltese Islands) of conservation value was mentioned in Schembri *et al.*, (1987) for the following reasons: 1. to protect species with declining populations, such as the marram-grass - *Ammophila arenaria* (now considered extinct) and the sand rest harrow - *Ononis variegata*; 2. to protect the best populations of Sea Spurges on the Islands; 3. to protect an unrecorded two-leaved allseed - *Polycarpon diphylum*; 4. to protect the largest specimens of Pygmy Ragwort - *Senecio pygmaeus*; 5. to protect rare or endemic animal species such as the earwig - *Labidura riparia*, histerid beetle - *Baechmauniolus dimidiatus*, carabid beetles, five species of sphecid wasps and unrecorded ant - *Trachymesopus darwini*.

Subsequently, one of the first ecological surveys of Ramla Bay was commissioned by the Environment Management Unit of the Planning Authority, following the issue of an Emergency Conservation Order for the site in 1994, extending 100 metres offshore. This survey undertaken in October 1994 was a brief overview of five biotic communities recorded at the site above the water line (sea level) including: 1. *The Sand dune system*; 2. *Crithmo-Limonietun association*; 3. *Freshwater wetland community*; 4. *Ononis natrix garigue*; 5. *Disturbed ground*. No underwater survey or overview was included in this report. While the Red Data Book categorized species list supplied with the Micallef *et al.* 1994 survey report may be considered a baseline reference, IUCN's improved criteria for establishing conservation and viability status of species would require more detailed data than that utilized/available in 1994 for Ramla. This points towards the need for more data, which may take much more time and funds to obtain, and thus directing first research and monitoring efforts towards keystone species and resources increases efficiency and cost effectiveness.

The main reasons for protecting Ramla Bay issued by Schembri *et al.* in 1987 were by 1994, valid only in part, since the marram grass, unrecorded two-leaved allseed - *Polycarpon diphylum*, pygmy ragwort, earwig - *Labidura riparia*, and histerid beetle - *Baechmauniolus dimidiatus* were not reported or listed in the 1994 survey report. The possible change in biodiversity composition and richness with time is an important consideration that needs to be taken into account especially for conservation planning and management. Thus all other studies undertaken before and after the 1994 survey assist in adding information being gathered on this conservation site prior to undertaking plans for extended monitoring and research to fill the gaps in knowledge necessary for proper up-to-date and sustained conservation management. Such other terrestrial surveys that have been undertaken and from which data have been gathered include: Sammut 1995, Cassar 1996 and Stevens 2001. These more recent

works do not encompass in detail considerations of either seasonal or annual fluctuations of the Ramla site therefore while these studies are very useful scientific works they may be limited in their relevance to effective long-term conservation.

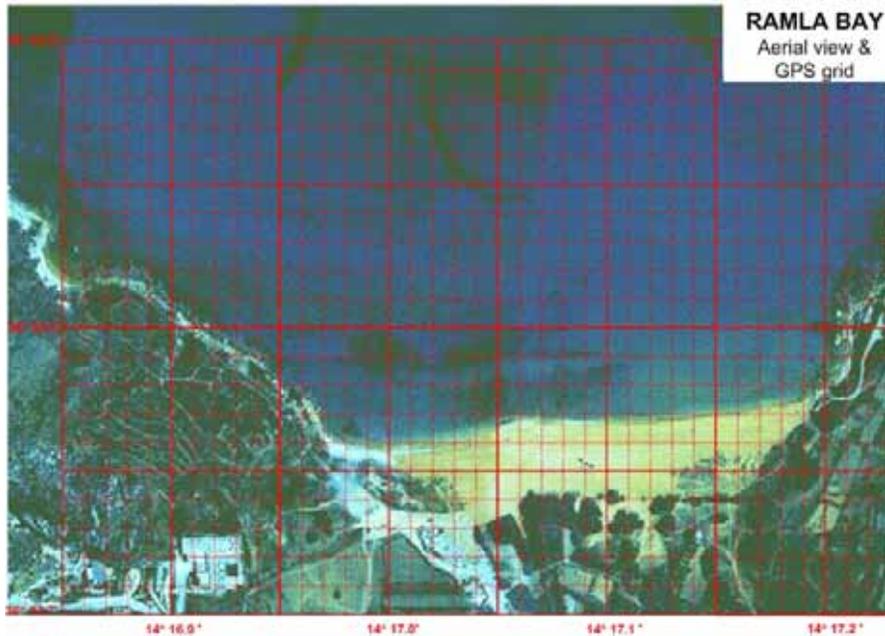
Conservation research requirements

The need for further research and long-term monitoring surveys remain the main requirement for vulnerable conservation sites, such as the Ramla Bay area. For conservation management and sustainable use of Ramla as a tourist and recreational resort, the role of biological and environmental monitoring is very important due to the increasing pressures present at this site. Indeed only after years of monitoring would the better options, for environmental restoration and habitat conservation management, be achieved. Trends and changes in the ***physical, biological, anthropogenic*** and ***climatic features*** present at Ramla need consideration for the dynamics of its dune habitat to be understood and protected.

This report is focusing on some of the biological aspects important to conservation that could be assessed during one season of the year. However it also compares some results obtained at other times of the year in previous years by other researchers.

Ramla Site

Ramla's Sandy Bay forms the end of a large valley thus receiving runoffs from the fields and agricultural land that compose most of the valley system. The valley sides slope gently into clay faluses overlying Globigerina limestone. At the top of these slopes one finds upper coralline limestone and thick green sand layer. (Mepa aerial photo with superimposed GPS grid).



1. Ramla l-Hamra Bay is at the mouth of a fluviially-eroded valley constituting Wied ir-Ramla system enclosed between two headlands of Xaghra to the east and Nadur to the west. (*Photo below of Ramla Valley taken by BICREF*).



2. From the Geological map of Wied ir-Ramla area, it may be noted that the central valley area is dominated by the Globigerina limestone formation followed by the blue clay formations on either side going up hill to the upper coralline limestone at the top of the headlands on either side of the valley. However, rock fragments and boulders of upper coralline limestone and greensand may be found on either side of the sandy shore and further offshore. The sand of this bay are thought to originate from the geomorphological interactions of these rock types, and the physical and temporal elements in the area. LARGE CATCHMENT AREA OF **5.8km²** at Wied ir- Ramla - *Terrigenous sediment source*. However the Ramla bay area covers an area of approximately **0.03km²**. (Cassar 1996)

3. After the rains, terrigenous sediment is carried to the beach via a watercourse, which forms a **semi-permanent large freshwater pond** sustaining a **Phragmites (*P. australis* - common reed)** and **Bolboschoenus (*B. maritimus*)** wetland. Other species that may be found here include: *Arundo donax* (great reed) and *Typha domingensis* (Southern reed mace).

4. The sand dunes of the Ramla area are mainly characterised by: *Elytrigia juncea* (or *Elymus farctus*) and *Sporobolus pungens* (or *S. arenarius*) as the dune builders. These are also two dominant species at Ramla together with *Tamarix africana*.
 Other species include:
Echinophora spinosa
Pancratum maritimum
Euphorbia peplis
Euphorbia terracina
Cakile maritima
Cutandia maritima
 The following are considered to be confined to Ramla only (Cassar 1996):
Euphorbia paralias
Medicago marina
Pseudorhiza pumila
Ononis variegata
Montagnites arenaria (rare sand dwelling mushroom)

5. **Crithmo-Limonietum** association dominated by:
 Halophytes - *Inula crithmoides* and *Limonium melitensis* (Cassar 1996)

6. **Ononis natrix** garigue dominated by:

Ononis natrix (subsp. *ramosissima*), *Asparagus aphyllus*, *Cyperus capitatus*,
Dittrichia viscosa, and *Pancratium maritimum* (Cassar 1996)

7. **Ramla I-Hamra Zones:**

Adapting the **zones' plant species richness and overall plant species coverage** (species list in descending order of coverage), by Stevens 2001 (through quadrat study - March to July 2000), the following Zone and plant species lists will also highlight the species observed during the recent surveys by BICREF (between September 2002 and January 2003). **** indicates species observed in these BICREF surveys.**

Zone 1 - Western aspect of the bay consists of clay slopes, rocky outcrops and typical sand dune habitat. This western side of Ramla has a well-developed clay slope system with various representatives of the Siculo-Maltese *Crucianellion rupestris* alliance (Stevens 2001).

Zone 1 - upto **24** species identified with quadrat study (Stevens 2001) including: (Dropwort grass) *Sporobolus pungens***, *Medicago littoralis*, (Sand couch) *Elymus farctus* or *Elytrigia juncea***, *Scolymus hispanicus*, (Hare's foot plantain) *Plantago lagopus*, *Reichardus picroides*, (Sea holly) *Eryngium maritimum***, *Bela maritima*, *Cynara cardunculus*, *Hordeum marinum***, (Sea daffodil) *Pancratium maritimum***, (Buck's Horn plantain) *Plantago coronopus s.l.***, *Sonchus tenerrimus*, *Lotus cylisoides*, (Bearded wild oat) *Avena barbata s.l.*, (Ripgut brome) *Bromus diandrus*, (Sea spurge) *Euphorbia paralias***, (Golden samphire) *Inula crithmoides***, (Hare's tail) *Lagurus ovatus***, (Prickly salt wort) *Salsola kali***, *Hainardia incurva*, *Silene colorata*, *Sonchus oleraceus*.

Other species spotted in this area during BICREF surveys include: *Atriplex portulacoides***, (African Tamarisk) *Tamarix africana***, (Squirting cucumber) *Ecballium elaterium***.

Behind this zone one finds rubble-walls and fields with (Prickly pear) *Opuntia ficus-indica***, (Caper) *Capparis spinosa***.



In September, *Inula crithmoides* is in flower and seems to be the main attraction to insects and arachnids in this area, as was noted by the number of butterflies, moths, bees, wasps, ants and spiders in proximity to this plant.

Water-piping systems to reintroduce small tree/plants such as Tamarisk was noted on the upper side of the walk path along the coast toward the clay side extending from zone 1 to the further west.



This area also demonstrated degradation, which was noted close to the walking path along the coast up hill to the small sandy bay west of Ramla bay. In particular, BBQ sites with stones and rubbish left over was noted at least at three sites in this area (*photos shown in degradation section below*).

Zone 2 - Eastern part of the bay with a raised dune outcrop lined with **Nerio-Tamaricetea** community dominating in (African tamarisk) *Tamarix africana* (associated with (Chaste tree) *Vitex agnus-castus* and introduced (Tamarisk) *T. gallica*).

Zone 2 - upto **28** species identified through quadrat study (Stevens 2001) including:
(Sand couch) *Elymus farctus* (*Elytrigia juncea*)**, (Dropwort grass) *Sporobolus pungens***, (Sea medick) *Medicago marina***, (*Sea daffodil*) *Pancratum maritimum***, (Large yellow rest-harrow) *Ononis natrix***, (Spiny echinophora) *Echinophora spinosa***, (thistle) *Sonchus tenerrimus***, (Milk-vetch) *Astragalus boeticus*, (Sea kale) *Cakile maritima s. l.***, (Sand fern grass) *Cutandia maritima*, (Spanish oyster plant) *Scolymus hispanicus*, *Medicago littoralis*, (Spurge) *Euphorbia terracina***, (Prickly saltwort) *Salsola kali*, *Bromus rigidus*, (Sea holly) *Eryngium maritimum***, (Stork's bills) *Erodium laciniatum*, (Bearded wild oat) *Avena barbara s.l.*, (Sweet alison) *Lobularia maritima***, (catchfly) *Silene colorata*, (Hare's tail) *Lagurus ovatus*, (Ripgut brome) *Bromus diandrus*, (Crown daisy) *Chrysanthemum coronarium*, (Bugloss) *Echium arenarium*, (Prickly sow-thistle) *Sonchus asper*, (Smooth sow-thistle) *Sonchus oleraceus*, (Maltese garlic) *Allium melitense*, *Cyperus capitatus*.



Photo of Zone 2 as seen from shore line.

Zone 3 - Behind Zone 2 (more sheltered and extends further in land).

Zone 3 - upto **36** species identified (by quadrat study (Stevens 2001), ** indicate sighting record in latest BICREF survey) including: (Ripgut brome) *Bromus diandrus*, (Large yellow rest-harrow) *Ononis natrix***, *Bromus rigidus*, (Dropwort grass) *Sporobolus pungens***, *Medicago littoralis*, (Sand couch) *Elymus farctus* (*Elytrigia juncea*)**, (Sea daffodil) *Pancratium maritimum***
(photo-below)





(Sea medick) *Medicago marina*** , (Spanish oyster plant) *Scolymus hispanicus*, (Spiny echinophora) *Echinophora spinosa*** (Photo above), (Spurge) *Euphorbia terracina*, (Milk-vetch) *Astragalus boeticus*, (catchfly) *Silene colorata*** , *Cyperus capitalus*, (Sea holly) *Eryngium maritimum*** , *Asparagus aphyllus*, (Emex) *Emex spinosa*, (Sweet alison) *Lobularia maritima*** , (Hare's tail) *Lagurus ovatus*, (Winter wild oat) *Avena sterilis*, (Bugloss) *Echium arenarium*, (Smooth sow-thistle) *Sonchus oleraceus*, (Crown daisy) *Chrysanthemum coronarium*** , (Sand fern grass) *Cutandia maritima*, (Bermuda grass) *Cynodon dactylon*, (Rough dog's tail) *Cynosurus echinatus*, (Fennel) *Foeniculum vulgare*, *Reichardia picroides*, (Prickly saltwort) *Salsola kali*** , (pea) *Lathyrus clymenum*, (Sow-thistle) *Sonchus tenerrimus*, (Maltese garlic) *Allium melitense*, (Bearded wild oat) *Avena barbata* s.l., (poppy) *Papaver strigosum*, *Urospermum picroides*** .



Photo of Zone 3 as seen looking outwards toward the sea.

Zone 4 - Central dune area close to Phragmites (*Phragmites australis* - Common reed) wetland after rainy season.

Zone 4 - upto 13 species identified including: (Sand couch) *Elymus farctus* (*Elytrigia juncea*)**, (Sea holly) *Eryngium maritimum***, (Spiny echinophora) *Echinophora spinosa***, *Medicago littoralis*, (Sea daffodil) *Pancreaticum maritimum***, (Spurge) *Euphorbia terracina*, (Sand fern grass) *Cutandia maritima*, *Bromus rigidus*, (Hare's tail) *Lagurus ovatus*, *Medicago manna*, (Sow-thistle) *Sonchus tenerrimus*, (Spanish oyster plant) *Scolymus hispanicus*, (Sea kale or Sea rocket) *Cakile maritima* s.l.**

Other species seen during the latest survey in this area between Sept. '02 and

Jan. '03 include: (Sand dwelling mushroom) *Montagnites arenaria* (photo below),



(Common sea lavender) *Limonium vulgare***, (catchfly) *Silene colorata*, and (Dropwort grass) *Sporobolus pungens***, (African tamarisk trees) *Tamarix africana***, and under tamarisk trees - (sorrel) *Oxalis pres-caprae***, (Common sea lavender) *Limonium vulgare***, (Sea daffodil) *Pancreatium maritimum*** and *Urtica sp.***

Zone 5 - Behind zones 2 to 4 there are agricultural fields and great reed beds dominated by *Arundo donax* (introduced) (photos of Zone 5 and agricultural fields behind below).

Zone 5 - upto 33 species identified using quadrat study (Stevens 2001)- including: (Great/giant reed) *Arundo donax***, *Asparagus aphyllus*, (Prasium) *Prasium majus*, (Sea daffodil) *Pancreatium maritimum***, (Sea holly) *Eryngium maritimum***, (Spiny echinophora) *Echinophora spinosa***, *Medicago littoralis*, (Ripgut brome) *Bromus diandrus*, (Pea) *Lathyrus clymenum*, (Spanish oyster plant) *Scolymus hispanicus*, (Common vine) *Vitis vinifera***, (Wild madder) *Rubia peregrina***, (Sand couch) *Elymus farctus* (*Elytrigia juncea*)**, (Spurge) *Euphorbia pinea*, (Spurge) *Euphorbia terracina*, *Bromus rigidus*, (Sweet alison) *Lobularia maritima*, (Large yellow rest-harrow) *Ononis natrix***, *Reichardia picroides*, (Fennel) *Foeniculum vulgare*, *Astragalus boeticus*, (Wild carrot) *Daucus carota s.l.***, (Peakly pear) *Opuntia ficus-indica***, (Sow-thistle) *Sonchus tenerrimus*, (Dropwort grass) *Sporobolus pungens***, (Sea kale or Sea rocket) *Cakile maritima s.l.***, *Dittrichia viscosa*, (Stork's bill) *Erodium laciniatum*, (Ragwort - Cineraria)

*Senecio bicolor*** (Bearded wild oat) *Avena barbata* s.l., *Galactites tomentosa*** (Hare's tail) *Lagurus ovatus*** *Sonchus oleraceus*.



Thus an overall of **58** plant species were identified at Ramla using the quadrat method during the March to July period in 2000. The most abundant species were the (Sand couch) *Elymus farctus* and (Dropwort grass) *Sporobolus pungens*. These quadrats did not capture all plant species as is illustrated by the **62** plant species identified using 3 transect lines (126m to 177m in length from shoreline) and scatter plots (Stevens 2001).

However when considering the BICREF autumn 2002 observations, certain differences in species richness and dominance of species may indicate that seasonal differences exist, apart from the fact that identification of certain species when not in flower in autumn proves to be more difficult. Also important is the presence of the freshwater pool in autumn/winter and thus the accentuation of freshwater community species during this period.

Zone 6 - Fresh water wetland community (shown in photo below)

Great reed - *Arundo donax*

Common reed - *Phragmites australis*

Rush - *Bolboschoenus maritimus*

Southern reed mace - *Typha domingensis*

On the sides:

African Tamarisk - *Tamarix africana*

Spiny/prickly Saltwort - *Salsola kali*



RAMLA BAY FAUNA

Introduction

Some previous works* at Ramla have allowed for listings of some of the animals recorded at this site. However the lack of repeated or detailed year round scientific work in this location may be limiting the completeness of these lists and the information on the permanence of the organisms observed in this location. The changes and degradation due to anthropogenic activities and invasive species at Ramla demand conservation management based on continuous and accurate monitoring.

The following list thus includes the fauna recorded to date at Ramla. The organisms with ** are those recorded in the recent survey undertaken by BICREF members between September 2002 and January 2003. Seasonal changes in both the ecological, environmental and anthropogenic factors need to be addressed for a more comprehensive management plan.

Though most of the scientific work at Ramla has focused on either the plants or some small invertebrates species, less work has focused on the animal biodiversity found, including the vertebrates that inhabit the area seasonally or through out the year.

Insects (adapted from Micallef, S.A, *et al.* (1994) with additions from the BICREF surveys):

Collembola or springtails - *Odontellina sexoculata*, *Mesophorus schembrii*, (found only at Ramla) small insects with an abdominal jumping organ, well-developed legs and antennae.

Subterranean cricket - *Brachytrupes megacephalus* (known only at Ramla)

Beetles - Histerid beetles - *Hypocaccus dimidatus*, *Xenonychus* species.

Anthicid beetles - *Anthicus fenestratus*

Carabid beetles - *Harpalus sp.*, *Eurynebria sp.*, *Ophonus sp.* and *Masoreus sp.*

*Stenosis schembri***.

Curulionid beetle - *Othiorynchus ovatulus*

Tenebrionid beetles - *Xanthomus pallidus*, *Nalassus oemulus*, *Pseudoseriscus cameroni* (endemic) (Mifsud 1999).

Striped Shield Bug - *Graphosoma lineatum ssp italicum***.

Dragonflies - *Sympetrum fonscolombii***, *Anax imperator***.

Ants - *Trchaymesopus darwini* (known only from this area), *Camponotus barbaricus*, (Cocktail ant) *Cremostogaster scutellaris***, (Harvest ant) *Messor capitatus***.

Bees - Halictid bee - *Psuedoapis unidentata*, *Halictus fulvipes***

Bembix oculata, *Bembecinus tridens*.

*Apis mellifera ***

Wasps - *Polistes omissus*, *Prionyx lividocinctus*, *Sphex pruinosus*, *Philanthus raptor siculus*,

*Ammophila heydeni***, *Cerceris quadricinta***

Butterflies - (Painted lady) *Cynthia cardui*** (shown below),



(White cabbage butterfly) *Pieris brassicae*** , (Yellow butterfly) *Colias croceus*** ,
Moths - (Brown moth)**.unknown species.
Grasshopper - *Anacridium aegyptium***
Ant lion - *Macronemurus appendiculatus***.
Aphids - *Aphis* sp.**.

Molluscs:

Different types of snail species including:

Rare dune shell - *Cochlicella conodeia*. (Micallef, S.A, *et al.* (1994))

Arachnids:

Different types of arachnid species including:

Large spider - *Argiope lobata*** (female shown in photo below)

Smaller spiders - *Synaema globosum*** , *Nemesia macrocephala***.



Crustaceans (Micallef, S.A, *et al.* (1994)):

Burrowing Isopod - *Tylos europaeus*, *Tylos latreilli* - lives beneath beach drift and sand emerging to feed on algae and other debris.

Amphipod or beach flea - *Taliatrus saltator* also lives beneath the drift, sand or stones.

Reptiles:

Lizard - *Podarcis filfolensis maltensis***,

Black Whip Snake - *Coluber vividiflavus corbonarius***

Chamaleon - *Chamaeleo chamaeleon*** (photo below).



Ocellated Skink - *Chalcides ocellatus tiligugu*.

Mammals:

Bat - *Pipistrellus pipistrellus***

Hedgehog remains - *Erinaceus algirus***

Endemic Gozo shrew - *Crocidura sicula calypso*.(Micallef, S.A, *et al.* (1994))

Birds:

Several species were heard and nest remains observed on tamarisk trees indicate their presence, however only few of these were identified including: (Swallow) *Hirundo rustica* ** and (Swift) *Apus apus* **.

Closer year round observations would be required to corroborate the fauna species found at Ramla.

8. Ramla l-Hamra dune system's degradation:

Ramla is very important for the Maltese Islands since it supports most of the typical dune flora and fauna, with some species found only in this site, however the increasing human disturbance may threaten the biodiversity present here. E.g. the extinction of the reed mace, *Typha domingensis* discovered at Ramla by S.A Micallef (1994) is a demonstration of how biodiversity at Ramla may continue to be impoverished. Conservation management needs to be planned and sustained throughout the year, through monitoring of human activities and biodiversity.

Foot paths are not clear for all - trampling signs, rubbish left behind or blown around and fire remains from barbecues indicate that further effort toward monitoring and enforcement by wardens is required.



Increasing numbers of tourists and visitors all year round in a beach area of 17,000m². Recreational activities include: bathing, rambling, sea-sports, camping, barbeques and beach parties (such as the one reported on August 28th 2002, when about 433 foreign guests belonging to a tourist agency organized an exclusive treatment that included the use of both sand and sea. "After just one hour the sea at Ramla started to smell full of benzene" reports an observer in a letter to *the Sunday Times* on the 15th September 2002. Also the beach was reported on the 8th September 2002 in "*it-Torca*" pg. 23 to be filled with the beach party's remains that included plastic bottles and paper plates). Such activities if allowed, should be monitored and undertaken only under strict management plans.



Movement and removal of sand and pebbles.

Access to vehicles from land and jet skis/boats from sea.

Landfill (Xaghra) pollution and degradation of scenic beauty/value of the Bay. (The photo below illustrates the growing landfill on the right).



Sewage (San Blas) pollution: degradation of water and impoverishment of biodiversity typical of a healthy sandy and Posidonia meadow seabed.

Slow reforestation initiatives need greater protection and vigilance/monitoring for success.

Impacts of agricultural activities: use of pesticides, leachates as agricultural by-products affecting biodiversity in sand dune and sea, spread of cultivated species such as vines, and spread of pests and diseases to biodiversity in the protected area.

Lack of a long-term plan for the Ramla area that would include biodiversity conservation research, monitoring and management with adequate financial backing/support. Toward this limitation GAIA has approached organizations, such as BICREF, in order to start planning possible research and monitoring of Ramla's biodiversity for conservation management in the long term.

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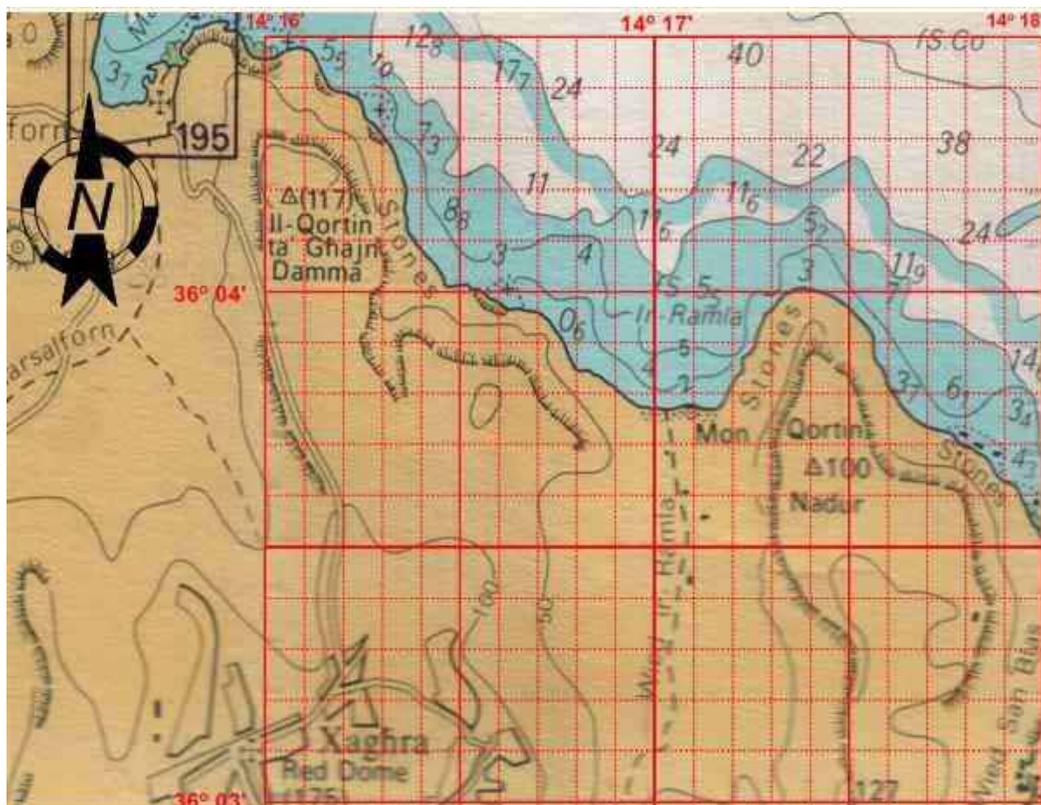
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MARINE SURVEYS

Baseline surveys of Ramla Bay's Marine life were undertaken by BICREF members, between September and October 2002 up to a distance of approximately 400m from the shore line. The following map illustrates the depth range found in the Ramla Bay region with GPS grid added.



The preliminary marine surveys closer to the shoreline were undertaken through snorkeling, while surveys, outside the 100m mark, were undertaken with scuba equipment and when possible with the support of a boat (made available by GAIA). Some photos and footage of marine life in the area were taken by BICREF members in order to record species observed.

A preliminary list of the marine organisms observed in the surveys conducted are the following:

September-October 2002

RAMLA SNORKLING SURVEYS approx. 20m to 80m from water line

Pebbles and further out larger boulder stones forming reef strips parallel to the water line

Different alga and different fauna:

Peacock's tail - *Padina pavonica*

Purse codium - *Codium bursa*

Cystoseira - *C. spp*

Dasycladus vermicularis?

Halopteris scoparia

Hermit crabs - *Clibanarius erythropus*

2cm long greyish shells - may be the common cerithe - *Cerithium vulgatum*

Common Octopus - *Octopus vulgaris*



Fish mostly juveniles in shallower water:

Goby spp - *Gobius* sp. such as *G. bucchichi*.

Painted comber - *Serranus scriba*

White bream - *Diplodus sargus sargus*

Two-banded bream - *Diplodus vulgaris*

Sharpsnout Sea Bream - *Diplodus puntazzo*

Striped bream - *Lithognathus mormyrus* (shown in photo below)

Saddled Bream - *Oblada melanura* - many young

Cow Bream / Salema - *Sarpa salpa* young and juveniles nearly adult (shown in photo above)

Rainbow wrasse - *Coris julis*

Corkwing wrasse - *Symphodus melops*

Ornate wrasse - *Thalassoma pavo*

Peacock wrasse - *Symphodus roissali*.

Striped red mullet - *Mullus surmuletus* - young



1st week of January 2003 - (Common Jelly fish) - *Aurelia aurita* were washed ashore.

SCUBA DIVING SURVEYS - September and October 2002

On alga/posidonia patches & reefs:



Some of the main algae species observed:

Jania rubens

Liagora viscida

Codium bursa

Sargassum vulgare

Caulerpa racemosa

Udotea petiolota

Padina pavonica

Marine plants species observed:

Posidonia oceanica

Posidonia reefs and later meadows are scattered beyond the 130m from the water line.

Marine organisms observed on or close to the alga/posidonia patches or reefs:

Sponges such as:

Potato sponge - *Chadrilla nucula*,

Orange sponge - *Spirastella cunctatrix*

Corals:

Star coral - *Astroides calycularis*

Mat coral - *Cladocora caespitosa*

Bivalve - *Pinna nobilis*
Opisthobranch - *Elysia viridis*
Common octopus - *Octopus vulgaris*
Common cuttlefish - *Sepia officinalis*



Red star - *Echinaster sepositus*
Common star (long limb) - *Ophidiaster ophidianus*
Burrowing star - *Astropecten irregularis*
Black sea urchin - *Arbacia lixula*

Fire worm - *Hermodice carunculata*
White tufted worm - *Protula tubularia*

Demsel fish - *Chromis chromis*
Comber - *Serranus cabrilla*
Painted comber - *Serranus scriba*
Ornate wrasse - *Thalassoma pavo*
Rainbow wrasse - *Coris julis*
Green wrasse - *Labrus viridis*
Longsnout wrasse - *Symphodus rustratus*
Annular Sea Bream - *Diplodus annularis*
Zebra Sea Bream - *D. cervinus*
Two-banded Bream - *D. vulgaris*
Saddled Bream - *Oblada melanura*

Pearly razor fish - *Xyrichtys novacula*
Red mouth goby - *Gobius cruentas*
Buchicchis or anemone goby - *Gobius bucchichii*
Wide-eyed flounder - *Bothus podas*
Sting ray - *Dasyatis pastinaca*
Moray - *Muraena helena*

Marine organisms observed on sandy seabed areas, (more surveys needed here due to larger area of sand and elusive/hidden nature of most organisms found here):

Sand hill forming organisms - *species still to be identified.*
Flatfish - *Platichthys flesus covered with sand and camouflaged.*
Yellow tube sponge - *Verongia aerophoba*
Striped mullet - *Mullus surmuletus - adults feeding and digging through sand.*
Sea turtle - *Caretta caretta.*

The line mark for boats to keep out also provides support of cuttlefish/squid eggs at a depth of 4m.

The observation of *Caretta caretta* so close to the sandy bay illustrates how Ramla could in the future still attract this Mediterranean turtle species to it for egg laying if encouraged to do so within a planned management project.

The *fishing activities* at and close to the Ramla bay may affect the survival of adult marine organisms found in the area and thus decrease the chances of these to contribute to the future generations for respective species. Though scuba diving is not allowed the shallow waters in the bay may still encourage snorkeling spear fishing.

RECOMMENDATIONS FOR CONSERVATION MANAGEMENT PLANNING AT RAMLA BAY, GOZO.

1. Conservation monitoring of the sand dune area and surrounding Ramla should include: a) regular visits with standard record keeping of both environmental and anthropogenic activities on site b) seasonal surveys undertaken in scientific manner, this may be undertaken in collaboration with other entities such as, BICREF* voluntary group or the Conservation Biology Research Section at the University of Malta.
2. The set up of a GIS system to incorporate the data gathering with the already established physical and human activities on site. Scientific analysis of ongoing changes and impacts.
3. Identify the keystone species of conservation value to plan detailed biological work at population level and thus predict possible declines in survival and plan contingency action/management. IUCN red lists are increasingly demanding on the biological information needed to accurately designate the status of an organism, therefore if detailed research/work is not undertaken, any status claims for the plants and/or animals in a location may only be tentative and of weak long-term conservation value.
4. Study the possible factors contributing to the ecosystem's impoverishment and degradation in more detail. Such as the effects of crop management in the near vicinity of the Bay, annual climatic changes, effects of invasive species, pest and disease control, damage to trees, accumulation of rubbish, sand or bay erosion factors.
5. Incorporate up to date information in educational programs with locals, local council, tourists and tourist agencies. E.g. Webpage on Ramla may be expanded. All stakeholders need to appreciate the rate with which this site may be degrading and thus losing its ecological and conservation area effectiveness.
6. During heavy human use in Summer, the presence of a warden on site to check that no vandalism or fires are actually on especially in the critical areas is recommended. Making sure that only the paths designated for walking on are utilized is also necessary. If these paths become less clear management plans to avoid trampling on growing vegetation is to be taken up. The warden may also check that the rubbish bins are always available and utilized by the users of the bay. The number of people utilising the beach should also be monitored to check and plan for any sudden increases in the number of individuals making use of the beach per day.

7. Focus on the marine life in the bay as well, including turtle presence and the possibility of reintroducing a turtle nesting area. This project could be developed hand in hand with ongoing research on sea turtles by BICREF and the Conservation Research Section at the University of Malta.

8. Monitor boat presence in the bay, sources of pollution and marine activities including spear/hook fishing. Sea water quality results for the Ramla bay would be required due to the landfill and untreated sewage outflow in the vicinity.

9. Educational courses on the importance of sand dunes and marine sandy sea beds may be introduced at the GAIA lecture building, so as to promote the work already underway and future needs to safeguard this unique and vulnerable habitat.

10. ***ALL the above may not be undertaken without appropriate financial support by both local and foreign sources.*** Fund raising campaigns are also recommended to support the conservation work required. The sale of products (e.g. T-shirts/booklets/videos) with an educational message regarding this sand dune area may be one way of achieving this.

* = The Biological Conservation Research Foundation - non-profit voluntary group.