
UNEP
MAP
COASTAL AREA MANAGEMENT IN MALTA
PRIORITY ACTIONS PROGRAMME

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AFM	Armed Forces of Malta
ALE	Administrative Law Enforcement (a unit of the police department)
BP	Blue Plan
CAMP	Coastal Area Management Programme
CoS	Central Office of Statistics
CPD	Civil Protection Department
CRAB	Coastal Resources Advisory Board
DAD	Diagnostic Analyses Document
EEA	European Environment Agency
EC	European Commission
EPD	Environment Protection Directorate
EU	European Union
FAO	The Food and Agriculture Organisation of the United Nations
FIPD	Final Integrated Project Document
GIS	Geographic Information Systems
ICAM	Integrated Coastal and Marine Area Management
IPCC	International Panel on Climate Change
ITS	Institute for Tourism Studies
MAP	Mediterranean Action Plan
MCAST	Malta College for Arts Science and Technology
MCSD	Mediterranean Commission for Sustainable Development
MEPA	Malta Environment and Planning Authority
MHRA	Malta Hotels and Restaurants Association
MMA	Malta Maritime Authority
MRA	Malta Resource Authority
MRI	Ministry for Resources and Infrastructure
MTA	Malta Tourism Authority
NGOs	Non-Governmental Organisations
NSO	National Statistics Office
NW	Northwest (of Malta)
PA	Planning Authority (now Planning Directorate)
PAP	Priority Actions Programme
ODZ	Outside Development Zone
OPM	Office of the Prime Minister (Government of Malta)
RAC	Regional Activity Centre
RO	Reverse Osmosis
SEA	Strategic Environment Assessment
SI(s)	Sustainability Indicator(s)
SoE	State of the Environment
SPA	Specially Protected Areas (RAC)
SPSA	Systemic and Prospective Sustainability Analysis
SD	Sustainable Development
ToRs	Terms of Reference
UN	United Nations
UNEP	United Nations Environment Programme
UNCCD	United Nations Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change
UoM	University of Malta
WSC	Water Services Corporation
WHO	World Health Organisation

The sea and the coast represent an exceptional fortune. In the Mediterranean, the greatest civilisations flourished in the coastal areas, considered since ancient times as ideal environment for living, activities and development, as a space that enables the man to fulfil most of his needs. Throughout the history, these areas were managed, exploited, disputed by the populations that inhabited them.

Faced by the advantages brought by economic development over the past centuries, the human wisdom and consciousness have too often and too easily been set aside, leaving the man to abuse the natural resources of this fragile environment. Fortunately, with the passing of time, he has realised that it was imperative to harness the negative impacts of his activities, reverse the processes leading to degradation of coastal areas, and act with moderation and good sense in order to save this heritage for the generations to come.

One of the forums created with this objective is the Mediterranean Action Plan (MAP) which brings together the coastal states in the effort to protect and improve the Mediterranean environment, both marine and coastal. One of the principal concerns of MAP, and particularly its Priority Actions Programme Regional Activity Centre (PAP/RAC), is integrated coastal area management (ICAM) which has, over the past decades, become one of the pillars of environmental action in the Mediterranean region.

Which results have been achieved by the efforts made by MAP and PAP/RAC to introduce into the Mediterranean region the principles of such management leading to the integration of environment and development? What are the effects of the documents adopted at the conferences in Barcelona, Genoa, Rio, Tunis, Johannesburg? How have the states benefited from the methodological, institutional, juridical... innovations offered to them by competent organisations to improve the state of their coastal areas? These are the questions to which we shall be able to answer owing to a series of reports made by the coastal states on the recent practice and developments in the field of planning and management of this unique and precious part of their national territories.

The present report, prepared for Malta, has the objective of presenting the characteristics of its coastal areas, the pressures to which they are exposed, the activities that the country is undertaking in order to combat the impacts resulting from those pressures, and, finally, the possibilities of an efficient ICAM.

This document describes the present status of coastal management in Malta and how coastal issues and conflicts are being addressed. Some examples of past experiences with ICAM are also presented as well as an overview of the current legislative structures which concern coastal issues within the Maltese Islands.

Most problems of land use in the Maltese Islands are focused along the coast. The small size of the Maltese Islands, their high population density, residential and tourist development, as well as coastal-oriented industries are all important factors which produce a continuous and ever-increasing demand for coastal resources and land use. This concentration of activities along the coast results in problems of acute competition between stakeholders.

Coastal issues need to be perceived in the appropriate context. Despite their small size, the Maltese Islands possess a richness of geological features and natural habitats. These are discussed in terms of the current status of their utilisation by the local and tourist population. Other coastal resources refer to social, cultural, and archaeological features. These include the current, as well as historical development of perceptions of the coast and special cultural attachments to the area. Such attachments lead to a particular sense of place which further conditions development along the coast.

The area can be perceived as a location of opportunity as well as a potential source of conflict. Shoreline residences, shipping, mariculture, oil bunkering, desalination, sewage treatment and disposal, fishing, water sports, yachting, scuba diving, and bathing are all examples of activities which require exacting standards in the quality of the marine environment. At the same time, they produce changes within that same marine environment which have to be tolerated by other activities. Under such circumstances, it is not surprising to observe that activities which have less economic significance, and the consequent political clout, have to suffer a diminishing level of accessibility to coastal resources. This is a problem which is characteristic of all commonly shared natural resources.

Tourism conditioned much of the more recent development within the Northern part of the island where the few beaches of the islands may be found. This is largely due to the fact that the sedimentary rock strata of the Maltese Islands dip towards the northeast. The coastal geomorphology of the northeast, therefore, presents a gentle slope right up to the shoreline thus permitting construction right up to the waterfront.

Harbours are major foci of human activity and reveal much about attitudes towards the coast. The two harbours surrounding Valletta present a striking divide. The western port (Marsamxett Harbour) is largely occupied with tourist-oriented activity and includes shipping and berthing places for the numerous sight-seeing ships that leave the port on a daily basis. Located on the eastern side of the Valletta peninsula, Grand Harbour is far more industrial in character. This harbour has long been dominated by the ship-building and ship-repair yards located within the sheltered creeks of the Three Cities. Shipping activity also includes container transport, grain silage, and petroleum tanking and bunkering services. Other intensive industrial activity is carried out within the vicinity of the Marsa Power Station and the Marsa industrial estate.

The measures put in place under the current legislative provisions have proved partially effective in protecting the environment but threats are still present, and new ones will continue to arise, from a variety of coastal activities. Problems of marine and air pollution are common to most Mediterranean islands while groundwater contamination, landscape degradation, and habitat loss are particularly sensitive problems within the Maltese context. A lack of awareness of the heritage of the Maltese Islands, coupled with uncoordinated policies between the different governmental entities, are major factors influencing the current situation. Furthermore, a lack of financial resources directed towards enforcement undermines many protection measures already carried out.

Spatial development and many activities in the Maltese coastal area have had a long but sectoral regulation. Many administrative and economic entities have striven to control this very important area due to its economic importance. More recently, with the setting up of MEPA, environmental and planning considerations have acquired more (and deserved) importance and coherence. However the holistic and integrated management of the coastal area has still to become a reality.

A Policy framework for integrated sustainable management of the coastal area has been outlined in the CAMP Malta report. This framework is reproduced in this publication and discussed in terms of current practices in coastal management. This is facilitated by a series of tables that outline the administrative, legal, and economic, responsibilities of various stakeholders in different sectors of coastal activities. Such stakeholders need to subscribe to a vision for the Maltese coast which should translate into achievable ICAM practices in the near future. The document concludes with some practical examples aimed at achieving this goal.

CHAPTER I
Introduction

1. PURPOSE OF THE REPORT

The small size of the Maltese Islands and their high population density, have resulted in a continuous and ever increasing demand for uses of the coastal area. In fact, most of the current industrial and commercial activities are concentrated around the main harbour-city conurbation and along the coastline. Urbanisation has expanded around the coast and the demand for coastal recreation and tourism development continues to increase.

Such concentration of demand and activities along the coast results in these activities competing amongst each other, as well as in conflicts with the legitimate and increasing demands for environmental, landscape and cultural heritage conservation.

This document aims to describe the present status of *integrated* coastal area management in Malta and how the issues and conflicts are being addressed. An overview of the current legislative structures is also given. Some examples of past experiences in ICAM are also presented.

Plate 1
Cart ruts in the town of San Gwann (Vella, 2004)

1.1 TRADITION OF ICAM IN MALTA

It is debatable when this archipelago of small islands, situated in the middle of this landlocked sea called the Mediterranean[1], received the first colonizers onto its shores.

It is plausible that they arrived from Mainland Europe, some 5200BC, by embarking on primitive craft from Sicily. Indeed these two Mediterranean islands are easily visible from each other on a clear day.

These colonizers thrived and erected many constructions such as standing stones (Menhir) and Capped stones (Dolmen), later also shrines, tombs and other elaborate monuments around the island, preferring coastal locations. Some of these are the oldest known constructions in the world and are included in the list of UNESCO list of World Heritage Sites.

Although detected in other Mediterranean sites, the Maltese landscape also contains impressive 'remains' of the enigmatic cart-ruts. These parallel tracks cut into the rock surface are generally thought to result from an as yet unknown human activity, possibly of a past transportation network.

Little is known about life at that time. In one of the earliest records[2], Homer describes how Calypso, the daughter of Atlas, 'entertained' Ulysses for seven years in a cave on the shores of GOZO.

Around AD 503, the Roman Emperor Justinian declared the air, running water, the sea, and consequently the shores of the sea as "common to all mankind", a declaration which was rekindled in more recent times by Malta during the process which lead eventually to the UN Convention on the Law of the Sea, and later in connection with "Climate" and (not by Malta) in "Biodiversity", even though these two latter instruments are not

1 Medi-terra-nean

2 The Odyssey

Plate 2
Temple complex at Mnajdra 3600 BC (anon)

as strongly or clearly worded as the former, in this respect.

The concept of "commonness" can also be found in initiatives taken by many other countries, all directed at regaining the coastal strip[3] for the enjoyment by the public. Important models now exist in France since 1975, implemented by the Conservatoire du Littoral, and even earlier (1895) in the UK by the National Trust. In Malta, this concept of 'commonness' and the freedom of accessibility to the coast (and its conservation and reinstatement where lost) is one of the policies set out in the Structure Plan for the Maltese Islands (PA, 1992).

In early times, the main coastal activities consisted of a flourishing corsairing which was based around the natural ports of the country. A corollary to this activity was the defence efforts to counteract hostile interest from others. This gave origin to a host of fortified towns and cities. Although many were originally located inshore to afford better defence possibilities, the later flourishing of these corsair activities, resulted in the establishment of important coastal fortified settlements.

This shift from walled and strongly defended *inland* cities to *coastal* cities resulted in profound psychological changes. Introspective and defensive viewpoints which considered the coast as a source of danger, exemplified by the city of Mdina were replaced by the more extrovert and open ones around Birgu and the three cities, where the coast is seen as a source of opportunity in trade and cultural enrichment. Coastal uses in Malta received new impetus following the arrival of the Knights Hospitaller {the Order of Saint John of Jerusalem} in Malta, which became their new homeland in 1530, given in tenure by Emperor Charles V, for the annual rent of one falcon. This transition reached a peak in the elegant planning adopted for the new city of Valletta.

The Knights quickly improved trade and commerce on the islands, built new hospitals and, most importantly, erected new strong coastal fortifications.

After their victory against the Ottomans, the Knights turned enthusiastically to the further development of Malta and Gozo. A golden era in culture, architecture and the arts followed. Several of Malta's most attractive buildings many of which are located on the coast, were built during this period. Valletta, the fortress city, was built and named in honor of the Grand Master Jean Parisot de la Valette under whose rule the Knights and the Maltese had defied the Ottoman onslaught.

3 This is generally of around 3 meter width, and dates back to the time of the Roman Empire.

Plate 3
Valletta, planning on a grid pattern (anon)

Plate 4
Coat of arms - Grand Master Jean Parisot de la Valette

Valletta is one of the earliest examples of a planned city built on the grid system. with a systematic distribution and division of streets and piazzas, using the open space between the buildings and the fortifications for troops to assemble. Sir Walter Scott described Valletta as "the city built by gentlemen for gentlemen". Later served as a planning model for other cities such as NewYork.

Plate 5
Qala Point Battery guarding the North Comino Channel (anon)

Today it is declared a World Heritage site by UNESCO.

On June 12th 1798, Napoleon having landed at Ramla Bay in Gozo (the same beach where Ulysses had spent his stay) entered Valletta bringing to an end 268 years of rule by the Knights of St. John.

The British (who were invited to replaced the French) military presence in Malta, did not seem to share such an enthusiastic appreciation of the coast. Rather, they viewed it with considerable concern, especially the northern coasts of Malta, with their sandy beaches, as well as the whole of Gozo, as being too difficult to defend. They entrenched (literally) themselves to the south of the main island behind a series of fortifications called the "Victoria Lines", leaving the defense of the landing beaches to the north, to state of the art fortifications on the coast, as exemplified by the Selmun Fort built on a peninsula, and which defends the beaches of Mellieha to the north, and that of St Paul's Bay to the south.

The British rule eventually came to a peaceful and ceremonial end on the coast of Birgu, on the 13th of December of 1979.

To replace the previous dependence on defense related income, Malta encouraged Industrialization and Tourism. The latter activity started as the traditional sun, sea and sand touristic offer, and resulted in a large uptake of coastal areas for the construction of the required facilities. A booming economy, largely based on the construction industry resulted in considerable areas of

Plate 6
Ramla Bay in winter Gozo (Vella, 2004)

Malta, many along the coast (Bugibba, Mellieha, Marsalforn and Xlendi) being built up.

An evident need to restrain land uptake and to control rampant (and at times illegal) development, at the same time introducing transparency in the process by removing previous Ministerial ruling, resulted in the creation in 1992, of the (then) Planning Authority and the approval of a Structure Plan for Malta.

The importance of the coast, and of coastal issues has molded the cultural, economic and the environmental scene throughout our history. To the present day it continues to exert a determining effect in everyday life. Indeed many of the most recent political events, including those which have brought Malta to become a European Union Member state can also be linked to issues originating in coastal management.

As a member state, Malta is required to formulate its own Integrated Coastal Zone Management Plan. The outputs of CAMP Malta, together with this document form a sound bases upon which this requirement can be finalised.

The importance of coastal issues, and the threats and pressures from their unsustainable management led major institutions in Malta to seek a new approach in coastal management, in partnership with PAP RAC, to provide technical and other know-how, to embark on a study of coastal issues, in a detailed but integrated manner. This study now known as CAMP Malta, was concluded in 2002 and resulted in, amongst other outputs, a "Coastal Declaration"[4].

4 Annex II

BOX 1

EU Coastal Zone Initiatives

The EU has recognised that coastal issues need to be given higher importance through a common approach.

The EU adopts a definition of a coastal zone which is very similar to that used in CAMP Malta. The coastal zone is defined as a strip of land and sea of varying width depending on the nature of the environment and management needs. It seldom corresponds to existing administrative or planning units. The natural coastal systems and the areas in which human activities involve the use of coastal resources may therefore extend well beyond the limit of territorial waters, and many kilometres inland.

The EU also recognizes underlying problems related to a lack of knowledge, inappropriate and uncoordinated laws, a failure to involve stakeholders, and a lack of coordination between the relevant administrative bodies, and that given the diversity of physical, economic, cultural and institutional conditions, the response must be a flexible strategy focused on addressing the real problems on the ground. It also needs to be integrated, and participative, so as to ensure that the management of Europe's coastal zones is environmentally and economically sustainable, as well as socially equitable and cohesive.

Following a demonstration programme running from 1996 to 1999, the commission has prepared a communication addressed to the Council and the European Parliament on "Integrated Coastal Zone Management: A Strategy for Europe" (COM/00/547 of 17 Sept. 2000), and a proposal for a European Parliament and Council Recommendation concerning the implementation of Integrated Coastal Zone Management in Europe (COM/00/545 of 8 Sept. 2000). This Recommendation was adopted by Council and Parliament on 30 May 2002.

The Strategy aims to promote a collaborative approach to planning and management of the coastal zone, within a philosophy of governance by partnership with civil society. The Strategy defines the EU's role as one of providing leadership and guidance to support the implementation of ICZM by the Member States, at local, regional and national levels.

Plate 7
Azure Window in Gozo (Vella, 2002)

CHAPTER II
The Maltese coastal environment

2. THE COASTAL ZONE

By standard definitions of the "coastal zone", the entire islands, with characteristics pertaining to medium sized Mediterranean islands, are considered to have the attributes of a coastal zone. Nevertheless, the immediate coastal strip, rich in its resources and variety, presents specific characteristics, due to the immediate impacts and interactions with the adjacent marine environment.

During the compilation of the Final Integrated Project Document for CAMP Malta, a clear unambiguous legal text of the definition of the coastal area was found to be lacking. Although it is generally intuitively understood what is meant by the coastal area, it is difficult to place precise boundaries around it, either landward or seaward (Vella *et al*., 2003).

The definition for the coastal zone boundary, as has been approved by MEPA in the Coastal Strategy Paper (Planning Authority, 2002) is the "coastal boundary identified on the bases of ecological, physical and administrative criteria. Consequently there are variations in the coastal widths between one area and another. The coastal zone boundary is significantly close to the coastline within coastal settlements and towns and is limited to the first road aligning the coast. In rural areas however the boundary is predominantly characterised by ecological systems and extends further inland". This definition is therefore adopted in this document.

Despite their small size, the Maltese Islands are rich in geological features and natural habitats. The following chapter gives a brief description of the main features and their importance vis-à-vis the coastal area.

2.1 GEOLOGY

The Maltese Islands are a group of small islands located in the central Mediterranean. The archipelago consists of three inhabited islands - Malta, Gozo and Comino, and a number of small uninhabited islets and rocks.

The Islands are composed almost entirely of marine sedimentary rocks, mainly limestone of Oligo-Miocene age, capped by minor Quaternary deposits of terrestrial origin. The Islands have an undulating tilt towards the northeast thus producing two types of coastline, a gently sloping rocky coast on the north eastern side and a steep cliff dominated coastline on the southwest and west side of the Islands.

The low-lying coast on the northeast side is more accessible than the cliffs on the northwest/southern side. This type of formation has influenced the general location and distribution of the various uses on the coastline. In fact, activities are concentrated on the more accessible low-lying shores, whereas agriculture dominates the cliff areas on the southern shores.

The Maltese Islands have been aptly described as "…a country of spectacular coastline which comprises steep, vertical cliffs within which are some of the most fantastic arches, caves, tunnels and other spectacular rock formations" (Middleton, 1997). The pattern of the landscape of the Maltese Islands is mostly influenced by the resistance each rock layer has to erosion, the amount of vertical displacement of faults and finally the gentle tilt seawards to the northeast.

The five main rock types of the Islands are: Lower Coralline Limestone, Globigerina Limestone, subdivided into three units – Lower, Middle and Upper Globigerina Limestones, Blue Clay, Greensand and Upper Coralline Limestone. *In situ*, the Globigerina limestone, the Coralline limestones and Blue Clay strata are important in terms of the Island's natural water resources. Rainwater percolates through the porous limestone rock and accumulates in natural underground water reservoirs, the aquifers, which are the only natural freshwater source of the country. The perched aquifers are situated in the northwest area of Malta whilst the mean sea level aquifer covers almost one third of the Island.

Differential rates of erosion acting upon horizontal rock strata exhibiting varying degrees of resistance create Malta's characteristic topography. The

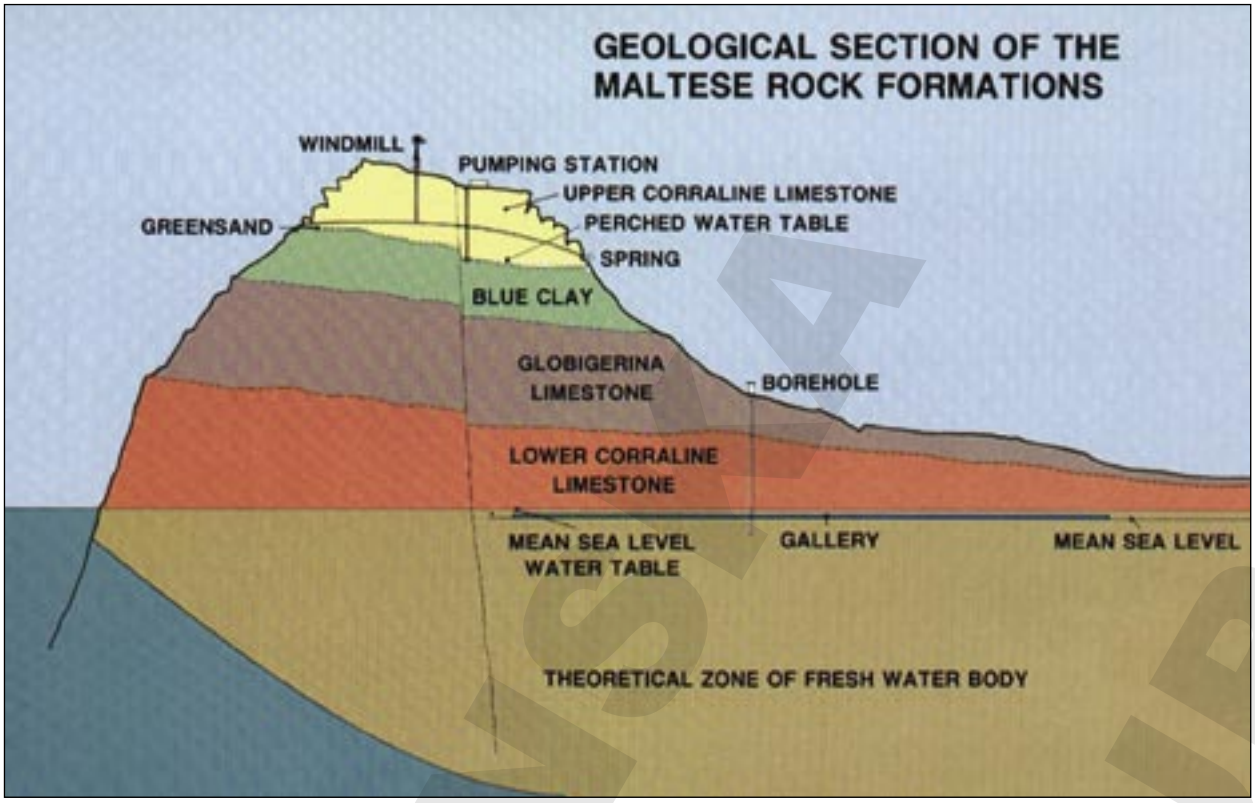

Figure 1
Geological strata in Malta

Lower and Upper Coralline Limestone form relatively dense, crystalline strata which are more resistant to erosion and produce characteristic steep slopes as well as the sheer cliffs found along the southwest coast of the Islands.

Maltese geomorphology is dominated by karst processes operating within a semi-arid Mediterranean climatic regime. Such landscapes contain solution features produced by groundwater flow, like spring lines caves and subsidence structures. In some case, spectacular landscapes are created through the collapse of large coastal caves enlarged through marine erosion processes. Such geological formations can also extend underwater and provide a rich source of underwater scenery.

The paucity of rainfall creates characteristic V-shaped valleys where initial vertical joints or fault lines develop as down cutting proceeds at a much faster rate than lateral erosion. Such steep sided valleys are normally along the south western shores where intermittent streams cut through the lower Coralline Limestone stratum. Other valleys can be found cutting through higher softer rock strata where drainage flow tends towards the northeast. The stratum gradient in these valleys is much less than the south western valleys and the resultant landscape is a series of relatively wide valleys with residential hills capped with Upper Coralline Limestone.

Weathered Globigerina Limestone, cutting back into gentle slopes forms features in the rock that has been traditionally exploited as salt pans. Most of these pans are still in use today and are the main producers of table salt for the Maltese Islands.

Several underwater caves were formed when the seafloor collapsed. Such structures are only known in Dwejra and Qawra, both in Gozo and form the most spectacular sea-scapes of the Islands. The popular and famous Azure Window in Gozo is a sea cave which has enlargened by continuous wave action into a natural arch.

2.2 CLIMATE

The climate of the Maltese Islands is characterised by the extreme seasonality of its precipitation regimen, with four to five months of drought coinciding with the hottest time of the year. The average annual rainfall is around 524mm and the temperature varies between 7°C and 15°C in January to between 25°C and 35°C in August.

Situated as they are, in the center of the Mediterranean, which is a transitional climatic region between the western temperate and the southern subtropical climate types, the temperature and precipitation patterns are particularly prone to climate change induced fluctuations. This seasonal pattern is modulated by the increasingly evident changes induced by global warming, and an

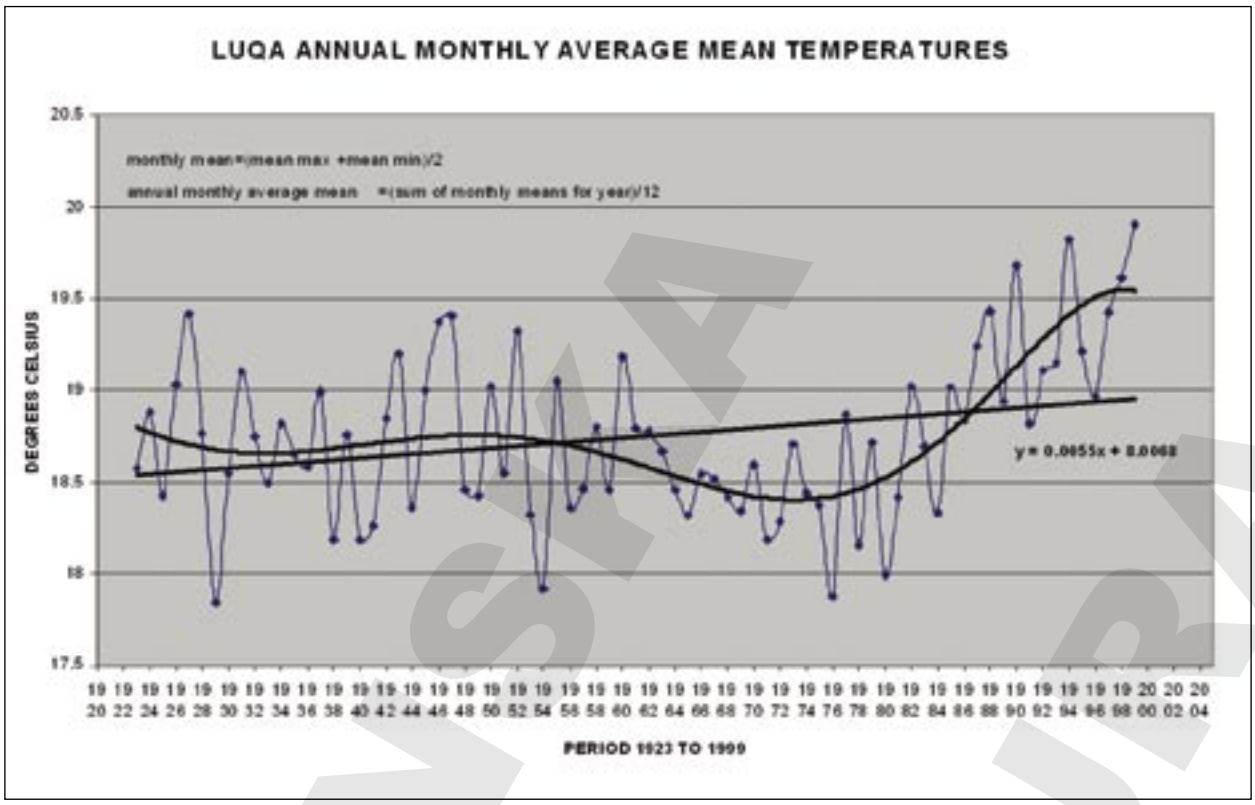

Figure 2
Average mean monthly temperature at Luqa 1920 - 2004

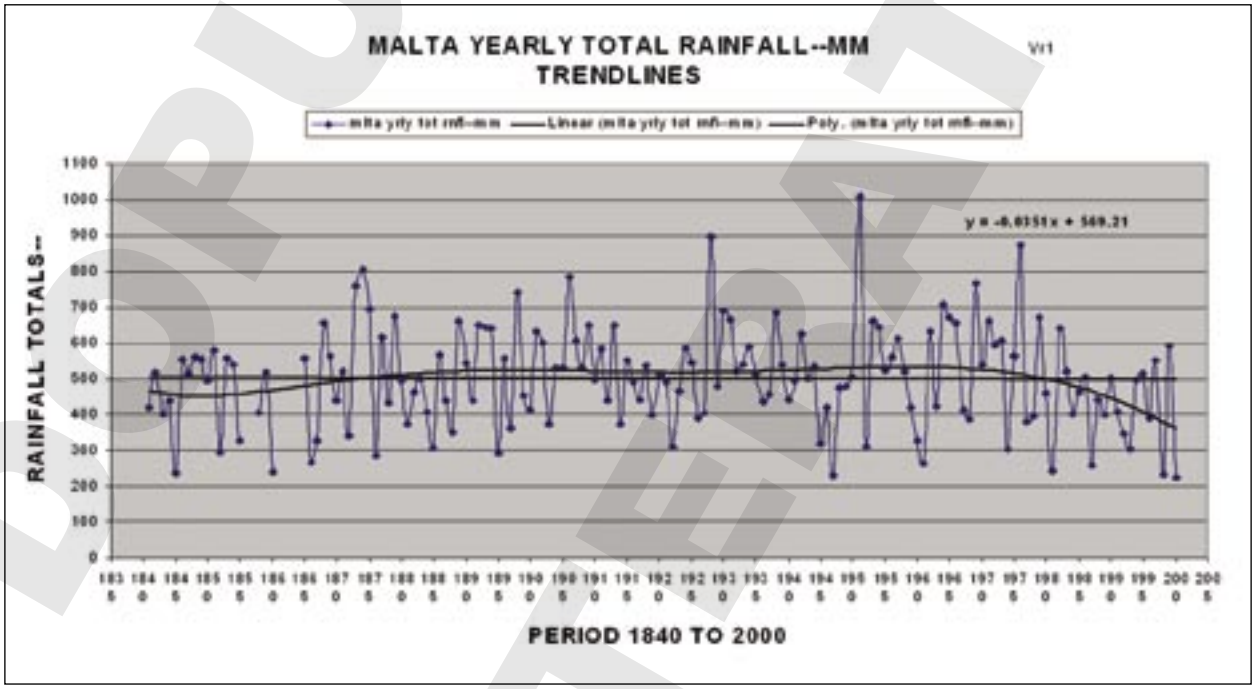

Figure 3
Malta yearly total rainfall (mm) 1840 - 2000

increase in extreme weather events. The plates below show increasing monthly average temperatures, decreasing annual rainfall and probabilities for short duration intense rainfall episodes.

Flora and fauna are thus generally adapted to variable temperatures, wind and precipitation.

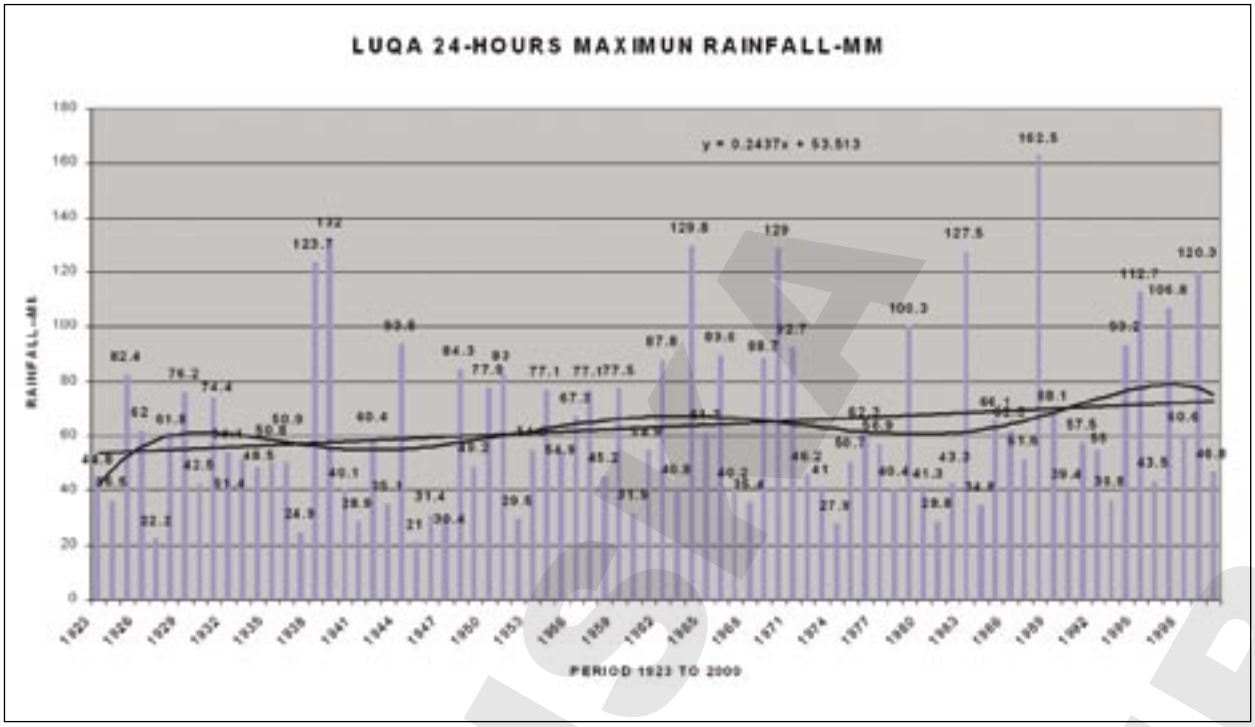

Figure 4
24 hour maximum rainfall at Luqa 1923 - 1998[5]

2.3 COASTAL HABITATS

With a total land area of approximately 315.4 km^2, the Maltese archipelago has a shoreline of about 190km. The Islands' coastal areas are generally characterised by cliffs, clay slopes and boulder rocks. About 57% of the coast is inaccessible, either due to its physical features or due to development.

Despite the continuous threat from anthropogenic influences, the Maltese coastline supports several important habitats and species. The overview of such habitats and their associated species is not meant to be totally comprehensive but more illustrative in nature, of the existing issues and highlighting the need for conservation.

2.3.1 Coastal wetlands

Saline marshlands are locally very scarce and vulnerable and are characterised by a muddy substratum on which a pool of brackish water collects in the wet season. They are maintained by seasonal fluctuations in precipitation, run-off, evaporation and seepage rather than by coastal tidal fluctuation. During the dry season the water becomes progressively more brackish until it becomes hyper saline and finally disappears completely, leaving the marsh dry until the following wet season.

The species found thriving in such areas are adapted to tolerate extreme flactuations in salinity. One such example is the endemic Killifish *Aphianus fasciatus* (Maltese *Buzaqq*) which is naturally found in only three locations in the Islands. The Sea rush *Juncus maritimus* (Maltese *Simar*) is also restricted to such brackish waters. Salt marshes also have a high ornithological value, since they are often resting places for wintering birds and waders on their migratory route across the Mediterranean (Box 4).

2.3.2 Sand dunes

Sandy beaches only make up two percent of the entire coastline of the Maltese Islands and thus sand dunes are extremely rare. The best example of dunes in the Maltese Islands is that found at Ramla l-Hamra, in Gozo, which supports several endemic and ecologically important species such as the Sea daffodil *Pancratium maritimum* (Maltese *Pankrazju*).

Due to their restricted distribution, these are highly threatened through intense human recreational activity, including camping, offroading, trampling and hunting.

2.3.3 Rupestral communities

Rdum (sheer cliffs) and screes are typical of the southern and western coasts of Malta and Gozo in particular. Due to their relative inaccessibility, such coastline provides refuge for many species

5 Referenced in Malta's First National Communication to the UNFCCC

Plate 8
Posidonia banquettes (Vella, 2003)

of flora and fauna, including a considerable number of endemic species. Worth mentioning are two palaeoendemic plant species - the Maltese Cliff-orache *Cremnophyton lanfrancoi* (Maltese *Bjanka ta' l-Irdum*) and the Maltese Rock Centaury P*alaeocyanus crassifolius* (Maltese *Widnet il-Bahar*), which is also Malta's National plant.

Moreover, the cliffs are important breeding grounds for birds. In fact, the northwestern cliffs of Malta, Gozo and the whole island of Filfla are declared as Important Bird Areas (Wild Birds Directive) (Box 4).

2.3.4 Low-lying maritime rock communities

Gently sloping shores are characteristic features of northeast Malta and Gozo. Erosion of this rock type forms small depressions which fill up with water to form rock pools. Those situated close to the shore line are inundated with sea water and thus support a variety of flora and fauna that are typical of the supralittoral zone.

Further inshore, halophytic (salt tolerant) vegetation such as the endemic Chamomile *Matricaria recutita* (Maltese *Kamumilla*), grows in isolated patches in the shallow saline soil which accumulates in the rock depressions, thus forming the maritime garigue.

2.3.5 Marine benthic zones

The supralittoral zone of the Maltese coast is characterized by the particularly valuable and unique vermetid platforms which consist of cemented and intertwined loosely coiled shells of vermetid gastropods (snails) embedded in a matrix of coralline algae. Subsequent generations of snails and algae enlarge this structure.

The infralittoral zone extends to depths where there is sufficient light for normal photosynthesis. In the Maltese Islands, the clear waters and visibility extend down to a depth of about 50 - 60m. This good visibility in deep waters enhances diving opportunities in the Maltese coastal waters.

The most important sublittoral biotic community is that of the Neptune grass *Posidonia oceanica* (Maltese *Alka*) which is a highly productive ecosystem. In more sheltered localities and in shallow water, the meadows are mostly based on the Lessser Neptune grass *Cymodocea nodosa* and the Red sea grass *Halophila stipulacea*. Both meadows are important benthic types since they serve as breeding grounds and refuge to a number of fauna. They are also the main oxygen providers to the sea while also acting as wave breakers, thus protecting sandy shores from erosion.

Another unique and important assemblage found off coasts of the Maltese Islands is maerl accumulations formed from unattached coralline algae. This maerl habitat is also rich in biodiversity where over 400 different flora and fauna such as echinoderms, polychaetes and molluscs were recorded.

2.3.6 Unique microhabitats

The importance of *Posidonia* banquettes is increasingly being recognized. The removal (where required) of these banquettes is thus limited to the touristic high season.

Plate 9
Traditional fishing craft berthed at Marsaxlokk (Vella, 2003)

2.4. NATURAL COASTAL RESOURCES

2.4.1. Freshwater

Natural freshwater resources in the Maltese Islands are scarce and depend entirely on rainfall, which is unpredictable and always insufficient. The aquifers are the Islands' primary source of natural water, mainly used for agriculture. There are no perennial surface water streams.

The quality of water in the aquifers affects the quality of potable water and agriculture produce; the soil structure and the productivity of agricultural land. An increasing demand for fresh water, mostly for agricultural purposes has led to the over-abstraction of water through boreholes which in turn lead to saline intrusions. The problem of water quality is aggravated by the increase in leachates mostly nitrates, from fertilizers (natural manure and artificial compounds) and to a more limited extent, from pesticides and herbicides.

2.4.2 Fisheries

The fishing industry in Malta is relatively small. More than 65% of landings by weight are taken up by large pelagic species. However, at local level, the social importance of fisheries far outweighs their economic output. This is due to the small-scale and traditional nature of local fisheries and to their role in supplying valuable food items and in satisfying the demanding request for high quality fish to the touristic hospitality industry.

Statistics issued in September 2001, showed that the total licensed fishing vessels were 1,411 in Malta and 325 in Gozo. Of these 1,736 vessels, only 45 were considered to be industrial vessels (i.e. over 15 m in length). These industrial vessels were mainly trawlers, long-liners and netters. The rest could be considered as multi-purpose, since they undertook all types of fishing, although on a smaller scale.

Due to their commercial value, the most targeted species were common dolphinfish (*Coryphaena hippurus*), northern bluefin tuna (*Thunnus thynnus*), swordfish (*Xiphias gladius*), stone bass or wreckfish (*Polyprion americanus*) and species in the Sparidae and Scorpaenidae families, such as dentex (*Dentex dentex*), common sea bream or red porgy (*Pagrus pagrus*) and black scorpion fish (*Scorpaena porcus*).

Other demersal species such as blue and red shrimp (*Aristeus antennatus*), rose shrimps (P*arapenaeus longirostris*), European hake (*Merluccis merluccius*), red mullets (*Mullus barbatus/ surmuletus*), common octopus (*Octopus vulgaris*) and various other species, including skates and rays, are caught by trawling. The total estimated catch in 2000 was 987 tons, with a value of about US$ 4.23 million. Almost all the fish are landed at Valletta, where there is the Island's only fish market (Department of Fisheries, 2004).

Fishing in Malta is mainly seasonal and, as a consequence, most full-time fishermen (i.e. whose main income is derived solely from fishing) own at least one small and one large vessel, which enables them to practice off-shore fishing during the milder seasons and coastal or inshore activities during the winter months. The average number of fishermen employed on each full-time boat is three during winter; when undertaking trips of more than two days, extra hands are sometimes recruited. The remaining 1,599 were registered as part-time fishermen, whose contribution towards the industry is minimal. Most of the full-time fishermen (42%) come from the south-eastern region (including Marsaxlokk Port), while 25% of the local part-time fishing population is also from this region.
The Maltese fishing industry is facing a number of problems, including the lack of deck hands due

BOX 2

Trends in offshore aquaculture in Malta
Christine M. Tanti

Malta's potential in the field of aquaculture is considerably high since the Maltese coastal waters offer favorable growth temperatures for fish and relatively clean waters. Moreover, the proximity to the main Italian market is an advantage. However, the local scale of production, together with taxation imposed on exports to European Union countries, rendered the local production of these species non-competitive with respect to other Mediterranean producers.

The Maltese aquaculture industry experienced significant changes after 2000, as a result of the introduction of tuna penning. Since then, the production of sea bass and sea bream have not remained the mainstay of the local aquaculture industry. The success of the tuna-penning venture prompted three of the existing farms initially culturing sea bass and/or sea bream to partly convert production capacity to tuna.

The offshore aquaculture industry has developed within the tight constraints of a National Aquaculture Plan and policy guidelines that ensure environmental protection and sustainable development. In 1994, the former Planning Authority issued a Policy and Design Guidance for fish farming in Malta which aimed to provide advice on applications for aquacultural units. This Guidance document also identified six 'search areas' for the location of these farms, which were based on the prevailing wind conditions.

These were revised very early, since practically all the proposed areas pose problems in one way or the other. The Environment Impact Assessment of a tuna penning application at Ta' Cenc (cliffs at the Northwest of Gozo) showed that the site was inadequate, since it would cause severe negative impact on important migratory bird colonies breeding on the cliffs at Ta' Cenc. Other areas are also problematic from a shipping point of view.

The above issues have led the former Planning Authority to delete the search areas from the Policy and guidance document of 1994, whilst a revised version is prepared. Although an amendment to the Policy and guidance document was issued in 2001, no specific sites were identified.

to the very hard work associated this trade. The younger generation prefers less arduous jobs on land which guarantee a steady income. The only boats which are still economically viable are those entirely owned and manned by families with a fishing tradition and trawlers.

The recent trends in the Maltese Islands are the increase in offshore fish farms and aquaculture. Fish such as sea bass is thus being bred to the size required by restaurants, diminishing seasonality and 'taking from the wild' thus giving some measure of conservation and sustainability to tourism demands.

Aquaculture is essentially based on large-scale commercial offshore units employing modern technology. The cost of producing farmed fish is still relatively high. The aquaculture production, which reached 1,746 tons in 2000, is almost entirely exported (95%).

Traditionally, the Maltese population is one of the least fish consuming communities in the Mediterranean, although it is a popular recreational activity. Some indiscriminate fishing however is still occurring, e.g. gill netting in enclosed bays which are nurseries for small fish.

2.4.3 Fisheries conservation zone

The waters surrounding Malta, are essentially of the oceanic type, and are poor in nutrients as compared to the waters around Sicily. This leads to very low productivity in the waters surrounding Malta. The surface and deep water currents also prevent the migration of water masses between the mainland and Malta, thus larval dispersal between fish stocks spawning on the shelf of Sicily and on that of Malta, is limited. Additionally fish stock prefer to spawn in shallow coastal waters on the Maltese shelf, and such stock in general can be considered as exclusive national resources.

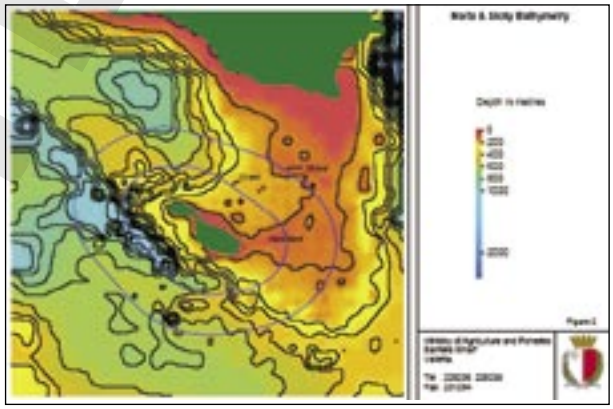

Figure 5
National Fisheries Conservation Zone (outermost circle)

BOX 3

Erosion risk areas in Northwest of Malta
Adapted from Tanti *et al.* (2002)

The growing impact of erosion processes and the risk of desertification as well as experiences in depletion of natural resources were mandatory to consider erosion and desertification control management in the efforts for sustainable coastal area management in Malta. Thus, a soil erosion/desertification control management component was included in the CAMP Malta Project. This activity dealt with the environmental problem of desertification was implemented following the Guidelines for erosion and desertification control management with particular reference to Mediterranean coastal areas (UNEP/MAP/PAP, 2000).

One of the main outputs of the activity was an erosion risk map for the NW. This map consists of a composite derived map based upon a set of physical factors (lithofacies and slope) coupled with a set of human factors (terraces/retaining rubble walls and land use).

The study showed that the greatest threat to soils occurs along the clay slopes which delineate the Upper Coralline Limestone platforms. Part of the problem lies in the difficulty that farmers have to face in attempting to construct rubble walls upon clay foundations.

Flat or low gradient slopes on the contrary are less prone to erosion. These areas are characterised by terraces and retaining rubble walls which are well constructed on sound, solid rock foundations on Upper Coralline Limestone platforms and the series of graben valley structures cutting across Malta in a northeast to southwest direction. These areas are also characterised by a very high percentage of irrigated cultivation.

Areas with moderate risk occur on terraced farmland which may have been recently abandoned, or are converted to hunting and trapping sites, or whose farmers may have allowed their retaining rubble walls to fall into some state of disrepair. Many of these fields are found on the lower parts of the clay slopes. Some of these fields often experience problems of rilling and gullying due to surface water runoff originating from much further upslope.

In some cases, neglect seemed to be historical where there were only remnants of old rubble walls with soil profile removal. These areas have been abandoned mainly due to low potential for agricultural production and difficult access to the fields. Some terracing with no obvious retaining rubble walls can occur at the coastal fringe and in garigue.

On the bases of this Malta has declared a national fisheries conservation zone extending out to 25 nautical miles, in which strict measures are taken to manage fish stock in a sustainable manner.

2.4.4 Agricultural land

Agriculture in the Maltese Islands is largely concentrated in the Northwestern region, where the highest percentage of agricultural land (57%) is located. About 77% of this land is dry farmed whilst only 11% is irrigated.

According to the latest agricultural census, Registered agricultural land in the Maltese Islands is 10,738 hectares, i.e. 34% of total land area (NSO, 2001). About 77% of this agricultural land is dry farmed land whilst only 11% is irrigated. Since most of the southern parts of mainland Malta are urbanized, the highest percentage of agricultural land (57%) is located in the northwestern region.

An increase in the drive to place more of the land under viticulture has been noted during the past few years. In part this has been brought about by the increased standard of living and the demands of the tourist industry for locally produced wines.

Much of this land has remained abandoned after the production of animal fodder for beasts of burden was no longer required due to the mechanization of agriculture, transportation and industry.

Viticulture and some small animal rearing in the countryside, is now a common countryside 'recreation' for city dwellers. Much of this is driven by the hard working newly rich middle class city-dwellers, many of whom have achieved social standing through the conscious or unknowing despoliation of the country's natural capital, but who now crave for 'nature' and a 'return to the old lifestyle'. This new phenomenon could also be a sign of the search for open spaces and an escape from a stifling and crowded urban lifestyle, if not an enhanced environmental sensitivity and consciousness. Such activities, if suitably regulated, could help to improve the landscape by providing greenery in the dry summer months. Moreover, rubble walls are repaired and maintained although there is a trend for a proliferation the building of illegal small 'rural rooms' and other structures, housing "city paraphernalia" which mar the traditional landscape.

2.4.5 Soils

The Maltese soils are traditionally characterized by their similarity to the parent rock material and their relatively young age. They are also generally infertile, shallow (~ 5cm) and prone to erosion.

Three main types of soil can be described. The Terra (Red Mediterranean) soil is a relic soil formed during the Pleistocene period and occurs where Coralline Limestone is located. This soil is mature and highly weathered, with a low calcium carbonate and organic matter content.

Xerorendzina is an immature soil with high calcium carbonate content and low in organic matter. This soil type develops on weathered Globigerina Limestone and deposits are found within valley beds.

The Carbonate raw soils are also immature soils with a very high calcium carbonate content and very low organic matter content. These soils develop mostly on weathered Quaternary calcareous sandstones, Greensand and the lower beds of the Upper Coralline Limestone, calcareous Blue Clay and Globigerina Limestone.

The greatest threat to soils is water and wind erosion (Box 3). This threat is higher on clay slopes which are particularly prone to soil erosion. Part of the problem in these cases is the difficulty that farmers have to face in attempting to construct rubble walls upon clay foundations.

On the other hand, flat or low gradient slopes such as the Upper Coralline Limestone platforms and the series of graben valley structures which cut across Malta in a northeast to southwest direction are less prone to erosion. Terraces and retaining rubble walls in these areas are often well constructed on sound, solid rock foundations. These areas are also characterised by a very high percentage of irrigated cultivation.

Another threat to soil is the trend for land abandonment, or agricultural land being converted to hunting and trapping. These activities do not respect and conserve the soil, and hence retaining rubble walls fall into a state of disrepair, and the slow wear and tear of time and the elements eventually lead to their disappearance from the landscape.

2.4.6 Salinisation of littoral agricultural fields

Salinisation of agriculturally important soils is generally on the increase. This phenomenon can be found in a greater degree in some coastal areas (which are not classified as aquifer protection areas) and are therefore allowed to be placed under irrigation from treated waste waters. Such treated waters are quite saline (exceeding 2000 micro -siemens), due to an input of saline sewage generally caused by (as yet) poorly controlled sea water infiltration into the sewage network.

A degree of successful agriculture thus depends on excessive irrigation quantities to wash the salt down into the ground and to natural 'cleansing' during the winter months when the rain would flush away the salt. With unpredictable and highly variable precipitation (a possible effect of climate change), this washing out does not take place reliably and crop quality and quantity suffer.

2.5 LANDSCAPE AND NATURAL VALUES

The Maltese Islands have been aptly described as "…a country of spectacular coastline which comprises steep, vertical cliffs within which are some of the most fantastic arches, caves, tunnels and other spectacular rock formations" (Middleton, 1997).

The pattern of the landscape of the Maltese Islands is mostly influenced by the resistance each rock layer has to erosion, the amount of vertical displacement of faults and finally the gentle tilt seawards to the northeast (Pedley *et al*., 2002). These factors have led to an interesting and contrasting variety of relied features of the Islands.

2.5.1 Faults

These features form the most spectacular topographic elements in the Islands. Two major faults the Maghlaq fault occurring in a NW to SE trend and the Great Fault bisecting Malta perpendicular to its long axis. A system of ridges and valleys are found between these two major faults.

These faults give Malta and Gozo their characteristic topography of plains and shallow depressions separated by low hills and plateaus. The plateau surfaces form karstic limestone surfaces which support garigue habitats, whilst the hillsides and plains are mostly used for agriculture.

The Lower Coralline limestone formation (the oldest rock formation on the Maltese Islands) makes up main part of the towering sea cliffs/ *rdum* at Dingli, Malta and Ta' Cenc in Gozo. These topographic features are of importance since they support many endemic flora and fauna species. Nearly all such features are protected by law.

Plate 10
Fishing community turned touristic attraction in the sunken doline of Dwejra in Gozo

2.5.2 Shore platforms

Shore Platforms form as a result of weathering on the vertical surface of heavily burrowed Globigerina limestone. The ensuing characteristic honeycombed surface has been copied by masons on many prestigious buildings such as the Old Opera House in Valletta to enhance their appearance (Pedley *et al.*, 2002).

Another characteristic shore formation is a layer packed with the flat sub circular shells of a burrowing sea urchin *Scutella*. This scutella bed occurs at or very close to the top of the lower Coralline limestone and is common at Dwejra Gozo.

Xwieni coast in Gozo also provides another characteristic feature. This consists of weathered globigerina limestone, cutting back into gentle slopes. This feature has been exploited and salt pans were dug out on this platform. These pans are still in use today and are the main producers of table salt for the Maltese Islands.

Blue clay weathers easily to form the typical low or rounded clay thalli found at for example Qarraba, Ghajn Tuffieha. The clay thallus is slippery when wet and is therefore covered with landslip debris. Apart from their aesthetic value, these clay slopes also support an important semi-climatic steppic community dominated by the Esparto grass *Lygeum spartum* (Schembri, 1994).

2.5.3 Other features

The limestone rock and the maritime environment has led to the formation of several caves and dolines.

Several underwater caves were formed when the seafloor collapsed. Such structures are only currently known in Dwejra and Qawra, both in Gozo and form the most spectacular sea-scapes of the Islands. The popular and famous Azure Window in Gozo is a sea cave which has enlargened by continuous wave action into a natural arch.

Several dolines can be identified in the Maltese Islands. Perhaps one of the most known is il-Maqluba (which literally means inverted). This sub circular sink hole represents a relatively recent collapse of limestone surface which formed the roof of a fairly large cave. Natural regeneration has occurred within this subsidence and today harbours one of richest and untouched maquis communities of the Islands.

Plate 11
Terracing in Xlendi Gozo. DeRedin Tower in the foreground (Vella, 2003)

2.5.4 Terracing

The rural landscape of Malta today is widely dominated by man - made terracing. The phosphatic conglomerate beds within the Globigerina limestone weathered into flat lying layers forming steps in the landscape. These steps have been accentuated in many areas by humans, resulting in the building up of the natural step into a terrace wall between field levels.

2.6 BIODIVERSITY AND PROTECTED AREAS

Despite their small size, the Maltese Islands support a variety of habitats and is particularly rich in flora and fauna diversity. A considerable number of species and subspecies are in fact endemics, some with a restricted Mediterranean distribution. The species recorded to date in the Maltese Islands are listed in Annex I, Annex II, and Annex III.

During the past 15 years or so, the drastic increase in development and urbanization has resulted in the complete obliteration of habitat types. Moreover, other habitats, such as salt marshes and sand dunes supporting specialized species, have become endangered and scarce.

The three nature reserves found in the Maltese Islands include the small uninhabited islands of Filfla (Northwest coast of Malta), Fungus Rock (Dwejra, Gozo) and Selmunett Islands (Northeast coast of Malta). The protection afforded to these sites includes the prohibition of access and landing on the islands. It is also illegal to capture, collect, trap, keep in captivity, and to stuff and commercially exploit, pick and hunt any species of flora and fauna in or from these islands. Although at present only the terrestrial biota is protected, there are plans for the extending this protection to a delineated part of the marine environment around them.

Bird sanctuaries are declared according to Schedules forming part of bird protection regulations. As the name implies, the 20 designated bird sanctuaries afford protection to the avifauna and thus are actually managed as such (Box 4).

Similarly, tree protection areas are declared according to Schedules forming part of the Tree and Woodlands protection regulations. A total of 29 sites in the Maltese Islands have been declared as tree reserves.

The EU Council Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) known as the "Habitats Directive" calls for the establishment of a European network known as Natura 2000, of Special Areas of Conservation (Natura 2000). To date, 35 terrestrial sites have been designated as a candidate Natura 2000 site in the Maltese Islands. These include all sites that have been protected via the Environment Protection Act as nature reserves and/or bird sanctuaries.

Following the establishment of the Planning Authority, a number of areas have been scheduled due to their ecological importance under the Development Planning Act. Some habitats and biocoenoses are also afforded protection through Structure Plan policies which institute Rural Conservation Areas, Areas of Ecological Importance (AEIs) and Sites of Scientific Importance (SSIs).

Plate 12
Citrus Orchards on terraced coastal slopes. San Blas Gozo (Vella, 2002)

Thus, to date, all sandy beaches/sand dunes, saline marshlands, coastal wetlands, valleys, forest remnants and woodlands, coastal cliffs and clay slopes have been scheduled.

This scheduling affords blanket protection from certain activities but does not provide for management of the areas. Conservation Orders which specify management requirements for a scheduled site can however be issued.

BOX 4

Ornithology in coastal areas of the Maltese Islands
Christine M. Tanti

Several bird species feed, breed and winter along Maltese coastal areas, in particular along the coastal cliffs and in salt marshes, hence their local and regional importance.

The cliffs are usually honey-combed with caves, crags and fissures. Since these features are situated at different heights, they offer ideal nesting sites for certain birds. The boulder screes that form at the foot of the cliffs increase availability of the nesting sites.

The main breeding bird colonies in cliffs are the Cory's Shearwater Calonectris diomedea and the Levantine Shearwater Puffinus yelkouan, which are important both on a national scale as well as being important on a Mediterranean scale.

Two sites, Ghadira (l/o Mellieha) and Simar (l/o Xemxija) have been modified to facilitate the development of a managed habitat for attracting migratory bird species, such as herons (Ardea spp.) and egrets (e.g. Egretta garzetta). Both sites are designated as Bird sanctuaries under the EPA (Act XX of 2001) and as Important Bird Areas/Special Areas of Conservation (Habitats Directive and Wild Birds Directive). Ghadira is also designated as a Ramsar site (Convention on wetlands of international importance, known as the Ramsar Convention).

Both sites are currently being managed by local NGOs. The management of these sites has been successful since they have provided a breeding habitat for certain species such as the Moorhen Gallinula chloropus and the Reed warbler Charadrius dubius.

Plate 13
Simar Bird Sanctuary

Plate 14
Ghadira Bird Sanctuary
Source of photographs: www.birdlifemalta.org

Plate 15
Dense conurbation around the ports. Anti Clockwise: *Left* - Sliema & Gzira, *Center* – Valletta Floriana Hamrun and Marsa, *Right* – Kordin, Senglea, Birgu & Ricasoli (anon)

CHAPTER III
Social, cultural and archaeological features of the coastal area

3.1 SOCIO-CULTURAL FEATURES

The coastal regions of Malta are influenced by a number of physical, cultural or sociological characteristics. Some of these can be considered to be real and tangible, whilst others are of a more tenuous nature. Some may appear to be somewhat strange on an island just 28 km long by 15 km wide, Non the less they have a considerable, indeed in some instances a profound effect on coastal issues. It is to be stressed that many of these divisive influences are indeed real and there is statistical data in their support.

It also note worthy that some of these characteristics are now only evident in the larger island of Malta and are essentially absent from, or much attenuated in the smaller island of Gozo.

3.2 MALTA / GOZO GEOGRAPHICAL INDUCED DISTRIBUTIONS

Many years ago, living in Gozo was a serious disadvantage. Almost all economically and culturally important activities, took place exclusively on Malta, and thus Gozitan residents missed out on the benefits of these activities. Transportation infrastructure was very poor and dangerous (by today's standard) and consequently Gozo was culturally, socially and economically underserved.

The situation has now changed dramatically when the Maltese 'discovered' the potential for relaxation in the sister island. With the birth of internal tourism, life in Gozo today reaches an enviable level of quality, although still retaining most of its rural charm.

There is now a strong movement and feeling in Gozo, that the previously underserved and "underdeveloped" area should reap the same economic benefits which Malta has apparently secured from its building boom. This translates into a strong wish to build touristic and other accommodation, and to generally develop the land. On the other hand, many Maltese who retreat to Gozo for relaxation seem to be worried and alarmed at the ever increasing construction taking place, particularly in the countryside.

3.3 NORTH / SOUTH CULTURAL INDUCED DISTRIBUTIONS

The concept of a North-South divide is an imported term that has been applied to the Maltese case to highlight inequalities in the geographical distribution of socio-economic, and even environmental, variables. The concept, originally, reflected geographical divides expressed at a continental scale and hardly conforms to the geographic realities of Malta. In fact, a more accurate divide would be aligned along an East-West axis where the Valletta peninsula separates the more affluent western (Sliema/St. Julian's) residential areas from the poorer eastern, Cottonera area.

This divide gives rise to concerns since there is statistical evidence showing that standards of living, earnings and educational levels differ in the two areas. Many political initiatives have been taken to address this imbalance. They are mainly concerned with encouraging more investment and job creation in the South, by promoting tourism, industry, cultural and sporting initiatives and education.

3.4 COASTAL / INLAND INDUCED DISTRIBUTIONS

A large proportion of the Maltese live in the central urban agglomeration around the Capital of Valletta. Most Maltese own the property where they live. Property has considerable status implications, in general, owning a large dwelling (on a densely populated island where land and space are very limited) caries considerable social and status benefits. In order to augment such a status, dwellings are elaborately and expensively furnished and (thus) difficult to clean and maintain.

Since nearly a century it has been customary for any self respecting family, to own a summer residence at a seaside resort. The urban areas would be deserted on the commencement of the scholastic vacation period, and most town dwellers and entire villages would migrate[6] to summer coastal residencies which were smaller and more

6 This may be compared to the alpine transhumance practice.

frugally furnished (easy to keep clean), and cooler due to the daily sea breezes.

The importance of "owning" a coastal location persists to the extent that when Local Councils were introduced in Malta in 1993, special efforts seem to have been made to maximize the number of councils having some jurisdiction over a coastal area, particular attention being given to an equitable division of desirable locations such as beaches and coastal promenades.

3.5 AGRARIAN / INDUSTRIAL DISTRIBUTIONS

As indicated earlier, the main industrial areas are mainly to be found in the coastal areas. This persists to this day. Industry in Malta established itself initially, around the dry-docking and ship repair facilities set up by the Knights around Birgu and Senglea. These activities were then much reinforced with the introduction of mechanization starting from the time of the presence of British Navy in Malta.

In the middle 60's, when efforts to introduce manufacturing industry in Malta started, many of the Industrial zones which were designated for this purpose where also located in the vicinity of the coast. Industrial estates such as those of Marsa, Kordin, and Bulebel are typical.

Other activities apart from ship repair include the traditional fish markets, and more recently the booming yachting harbors and the activities connected with them. Recent major development has been driven by the perceived benefits of associating with these new marine leisure activities and include new touristic development, such as hotels, casinos, and a cruise liner terminal. This process of industrialisation has resulted in a clear division, with industrial areas located in the vicinity of the coast, and agricultural areas (and open spaces) concentrated in the center and towards the West coast which has no easy access to the coast.

3.6 LAND / SEA AS RECREATIONAL SPACES

The space at sea also offers great scope for many new types of "Sport". These include traditional events such as water polo, races of many types, diving, sailing and rowing, hunting, amateur fishing, and more extreme types of sports such as para-gliding, jet skies, wind surfing and power boat racing.

The land space is quite heavily urbanized or otherwise unavailable for many types of sport requiring wide open areas. Thus the development of golf courses gives rise to public controversy and planning concerns on the part of regulators. Similarly the introduction of sporting events such as Formula 1 racing, has been mooted, but as yet remain unrealizable for this reason.

It has been observed that the extreme demand for open space on land has generated a shift in certain activities from land to sea. Prime examples include the letting off of fireworks from anchored barges during village festas as well as the staging of operas on floating stages.

It is a well-known fact that Maltese and Gozitans alike make most of the cool summer sea breeze by traditionally having bar-be-ques on the beach. These often start late afternoon, continue at night and keep on till the early hours of the morning. This late night activity is a good example of the multiple use of scarce resources since it avoids competition for the same space with the influx of tourists during the summer days.

On the other hand, the continued use and occupancy of the beaches make maintenance and cleaning operations nearly impossible, resulting a degradation of the small sandy beaches. Such maintenance can only be carried out manually whilst the coast is still "in use". Areas taken over by beach umbrella "forests" and rocky coastlines are particularly difficult to clean and maintain, because of the difficult terrain, the former created artificially, whilst the latter is of natural origin.

The lack of beach space for recreation coupled with less clean beaches has resulted in the rapid increase of Maltese owning a speed boat/sailing boat/yacht.. Not only can these boaters enjoy beaches and areas which are inaccessible from the land, they can also enjoy cleaner waters and less-crowded areas.

The lack of space on land and the competition for different activities is increasingly becoming a limiting factor. This problem has seen migration of traditional land-based activities to offshore locations. This includes offshore aquaculture (Box 3), and bunkering operations, and for the future, wind generation and land reclamation.

3.7 RELIGION

The coast is strongly associated to the birth of Roman Christianity in the Maltese Islands, where the shipwreck of St. Paul's on one of the reefs just off the mainland Malta (Box 5) features high in Maltese history. The islands of Malta are still deeply religious, the majority professing to belong to Roman Catholicism[7] which was brought to the

7 In Malta there is complete freedom of religious practice.

Plate 16
Inter Island transport is a key element in the development of tourism and industrial activity (Vella, 2004)

Plate 17
Erosion and degradation caused by off-road activities (Vella, 2004)

Islands in 60AD, by the Apostle Paul, although it is nearly certain that this was lost (and regained) a number of times according to the fashion or appropriateness under various rulers and colonizers. Under the Spanish rule (1283 – 1530), the Maltese acquired a taste for the dramatic externalization of their beliefs. Today, this has developed into quite elaborate spectacles as evidenced in the traditional village feasts, especially those connected with the major events such as Good Friday, Easter, Mnarja (St. Peter and St. Paul), and 8th September. Many towns and villages organise complicated enactment's and processions which could involve the enthusiastic participation a large proportion of the local residents. These semi-religious events include the participation of bands and a conclusions with fireworks display. Many of these events are associated with the sea. Thus the 8th September festivities involve Regattas with traditional and colorful boats' races in the Grand Harbour. Some other coastal village feasts take place on the coastal promenade, or involve religious activities (e.g. blessing of fishing vessel or statues transported on boats) carried out at sea.All these traditional events have found new importance through the work of the Malta Tourism Authority, as important touristic products.

3.8 TRANSPORTATION

The public transport system in Malta has, by tradition, developed on a radial system. All buses start and end their journey from the capital Valletta. This has been recognised as being unsatisfactory and new routings for route busses are being proposed, involving a diversity of termini.

Way back in the early 40's, a ferry service from Marsamxett (Valletta) to Sliema and vice versa was a quick and effective means of transport. Although this service is still available today, it is only considered by most as a tourist attraction. The possibility of diverting some of the daily commuter traffic to and from Valletta, by using ferries and water taxies is also being considered, in view of the favourable distribution of the main residential areas around the two main ports (see Plate 16).

The inter-island ferry service is well developed and offers a reliable communications route. The service is being strengthened by the upgrading the ports of Cirkewwa in Malta and Mgarr in Gozo.

The coastline remains the main recreational area for residents and tourists alike. The open space at sea also offers great scope for many sports, including traditional events such as water polo, sailing and rowing and amateur fishing. Extreme sports such as para-gliding and jet skies have also become popular 'overnight'. Many such activities can and are, also amenable to winter recreation. Thus, such sports also maximize the use of beaches and coastal cliffs, by utilizing them when they are less in demand. The disadvantages of these practices include disturbance of habitats and perhaps a greater sensitivity to environmental damage such as erosion, both aspects of which have not yet received sufficient investigations.

The diving industry in the Maltese Islands has also seen a rapid increase and year after year, more diving holidays are being organized to Malta, particularly Gozo which in the recent years has developed as an all-year round diving destination (Middleton, 1997).

3.9 TRADITIONAL BELIEFS

The coastal regions are inexorably linked with religious and cultural beliefs. The most important of these concerns the shipwreck of Saint Paul of Tarsus, in AD60. There is still no better text than that set out by the Evangelist Saint Luke in chapters 26 and 27 (Box 5).

BOX 5

The shipwreck of St. Paul

…But soon a tempestuous wind, called the northeaster, struck down from the land; and when the ship was caught and could not face the wind, we gave way to it and were driven…

As we were violently storm-tossed, they began next day to throw the cargo overboard; and the third day they cast out with their own hands the tackle of the ship. And when neither sun nor stars appeared for many a day, and no small tempest lay on us, all hope of our being saved was at last abandoned….

When the fourteenth night had come … about midnight the sailors suspected they were nearing land. So they sounded and found twenty fathoms; a little farther on they sounded again and found fifteen fathoms…

Now when it was day they did not recognize the land but they noticed a bay with a beach, on which they planned if possible to bring the ship ashore. So they cast off the anchors and left them in the sea, at the same time loosening the ropes that tied the rudders; then hoisting the foresail to the wind they made for the beach. But striking a shoal they ran the vessel aground; and bow stuck and remained immovable, and the stern was broken up by the surf…

After we had escaped, we then learned that the island was called MELITA. And the natives showed us unusual kindness, for they kindled a fire and welcomed us all…

BOX 6

Legends and myths
Christine M. Tanti (adopted from Bezzina, 1991)

The lure of Calypso
Perhaps one of the best known legends in the Islands regards the stay of Ulysses, the Greek warrior on Gozo while returning home after the Trojan War. Perched on the edge of Xaghra village, overlooking Ramla bay lies the case of nymph Calypso. Ulysses is shipwrecked on an emerald isle, where alder, poplar and sweet smelling cypress grew from every crack, flowers bloomed profusely and trees were heavily laden with fruit. Amidst the luxuriant wood is a cave. Ulysses made his way into the cave. Calypso kept him under her lure for seven long years with the promise of the island's kingdom and eternal youth and happiness. The Gods finally pitied Ulysses and let him go back to his wife and son.

San Dimitri
On the westernmost point of Gozo, beyond the village of Gharb, there is small rural chapel dedicated to Saint Dimitri, a soldier martyr. In this chapel, St. Dimitri is pictured on a white stallion with an old lady imploring his help on the left. An old widow, Zgugina, lived in a small room not far from the chapel with her son Matthew. Every morning she passed the chapel and made a special prayer to St. Dimitri to safeguard her beloved son. On her return home in the evening she repeated this procedure.
One middle summer night, the dreaded corsairs broke into her poor abode. There was hardly anything to take away but her young son would fetch a good price in the slave market. They quickly bundled him away and disappeared in patch darkness.
The corsairs had also broken into the chapel, taking everything expect the painting of St. Dimitri. Whilst Zgugina was praying for a miracle, St. Dimistri began to move, his stallion made a step forward and he hovered towards the open sea. St. Dimitri re-appeared with Matthew holding fast to his waist.
It is said that the original chapel was submerged intact in a landslide and the lamp that Zguguna lit is still burning in the submerged church. Next to the present chapel, folk can point out in rocks the marks left by the hoofs of Dimitri's stallion when he landed with Matthew.

Plate 18
St Paul's Islands: Nature reserve and cultural site (shipwreck of St. Paul)

3.10 COASTAL ARCHAEOLOGICAL, CULTURAL AND HISTORIC SITES

3.10.1 Marine archaeology

The Maltese Islands are rich with historical and archaeological remains which span over several epochs. Coastal locations further reflect the fact that the Islands' culture is a product of the unique geographical characteristics of archaeology.

A number of remains have been discovered at sea. Subsidence and sea level change have led to the submersion of archaeological features, e.g. Roman bath remains at Ramla l-Hamra in Gozo have been completely buried in the sand. The Knights constructed an underwater stop wall in the same bay so as to hinder vessels from gaining access to shore.

The Bronze-Age silos at St. George's Bay, Birzebbuga are another example. Artifacts purposely or accidentally thrown overboard have also been found, mainly in the port area. These include roman anchors, amphorae, cannon and shot, smoking pipes, ceramics and glass.

There are a number of wrecks in Malta, including ships of all ages, submarine and aircraft which are now also considered of archeological importance. They are important diving sites, attracting local and foreign divers.

Moreover, recently ships and small vessels have been scuttled in suitable locations. The 40m tug *Rozi* is perhaps one of the most known and photogenic wrecks to be found locally and internationally. These all provide added attractions to the economically important diving industry, offering novelty and wreck dives. They also reduce pressure from other more ecologically sensitive locations.

The strategic siting of the creeks and embayments resulting from natural geomorphic processes has been developed for maritime transport and defense. This includes the development of the capital city of Malta, Valletta.

Shipping activities (i.e. Dockyard/Ship repair), industry (i.e. salt pans and quarries) and defense structures are common features along the Maltese coastline. The magnificent fortifications found in the Grand Harbour, the coastal towers established under the Knights of St. John and the forts and military outposts constructed under the British period are some other remarkable coastal landmarks.

Plate 19
Coastal fortifications around Valletta (Vella, 2003)

CHAPTER IV
Development pressure

In a country which is noted for its maritime tradition as well as for its lack of industrial natural resources, the Maltese coastline has become the most hotly contested real estate in the nation. A wide variety of activities compete for an extremely limited stretch of coast. Shipping and fishing were the traditional users of the coast, but new demands for coastal locations are now made by the tourist industry. Such demands are all too often respected by politicians and other policy lobbyists since the industry now accounts for more than 40% of foreign currency earnings and is a major source of employment. This has given rise to some concern as the local population sees a highly visible process of greater privatisation of the coastline and, therefore, face the prospect of their ever diminishing access to the coast.

The coast is, therefore, a location of opportunity as well as a potential source of conflict. Shoreline residences, shipping, mariculture, oil bunkering, desalination, sewage treatment and disposal, fishing, water sports, yachting, scuba diving, bathing are all examples of activities which require exacting standards in the quality of the marine environment. At the same time, they produce changes within that same marine environment which have to be tolerated by other activities. Under such circumstances, it is not surprising to observe that activities which have less economic significance, and the consequent political clout, have to suffer a diminishing level of accessibility to coastal resources. This is a problem which is characteristic of all commonly shared natural resources.

This is reflected in land and marine use planning priority schemes. A key coastal planning policy enshrined within the 1990 Structure Plan for the Maltese Islands (Government of Malta, 1990) stated that privatisation of the littoral areas needed to be halted and, where possible, government needs to recover land which had been lost to private interests. Within the decade that followed however, development permits were, in fact, granted to a number of projects that resulted in further privatisation of the coast despite public protest.

4.1 POPULATION OF COASTAL AREAS

Just like in many other countries, coastal residential properties in Malta command premium prices on the real estate market; the term "unobstructed sea-views" works magic in the industry. In line with these market forces, the Sliema-St.Julian's foreshore has seen spectacular re-development over the last two decades. Practically all of the single family terraced residences that faced the sea have been torn down and rebuilt into multi-storey apartments.

Anecdotal information claims that owners of such houses were given the penthouse apartment plus a sum of money to allow their houses to be demolished. In other cases, the land previously occupied by residences was rebuilt into multi-story hotels.

This, naturally, has been the source of some controversy between residents of the area. Owners of properties which were not fortunate enough to possess seaside frontage complained that their residences were suddenly obscured by a virtual wall of multi-storey development in the direction of the seafront. Concomitant problems of construction nuisance, noise, parking and vehicular congestion created considerable tension. Despite all of this, demand for residences within the Sliema-St.Julian's area remains high and

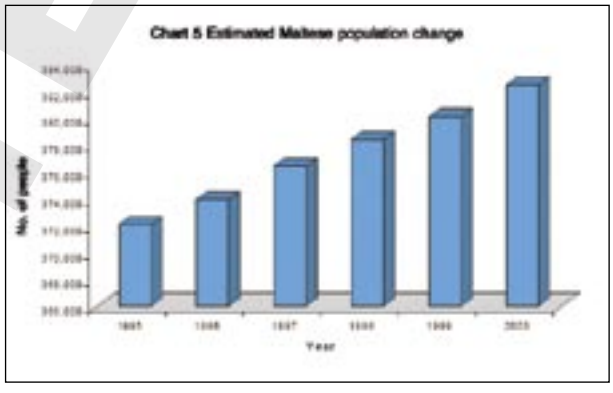

Figure 6
Population growth for Maltese Islands for last 6 years (reproduced from NSO)

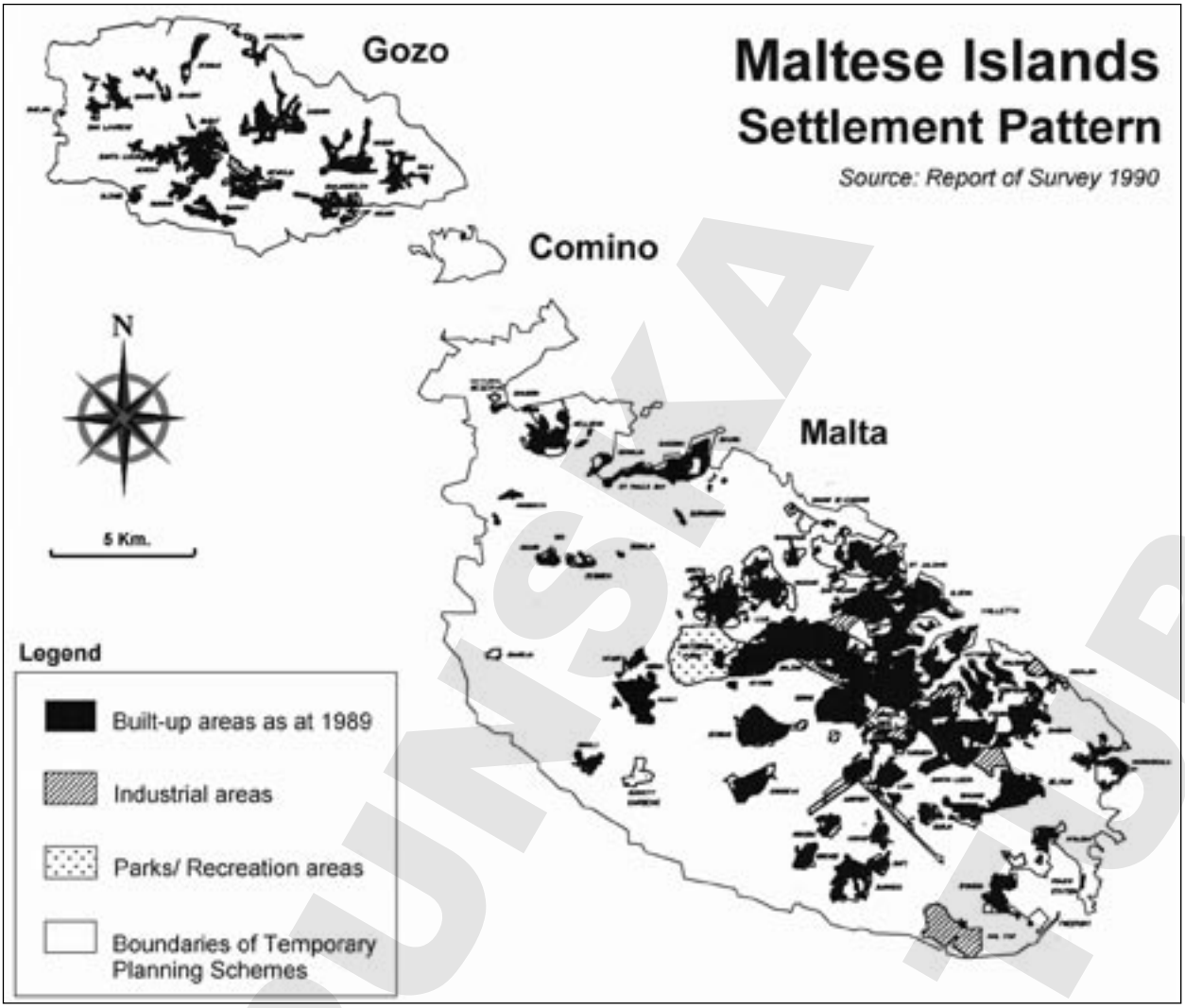

Figure 7
Settlement patterns in Malta

still commands high prices. A cross-section of properties along an imaginary line perpendicular to the coast shows high-rise, and high cost properties on the coast, and shorter buildings of more moderate cost inland, with some relatively poor and depressed (literally as well as socially) areas further inland.

Plate 20
Large scale coastal development (anon)

The main driving force behind the overnight development of Bugibba and Qawra tends to lie more in the demand for summer residences by Maltese families as well as holiday flats for tourists. For a while, such apartments were perceived as the only low key investment available within a very restricted set of investment opportunities in the 70s and 80s. Coupled with the rather discretionary and "elastic" land use planning policies of the time, such market forces resulted in a sprawling mess of aparthotels, holiday apartments, hotels, tourist-oriented shops, and bars and restaurants. Many of these former holiday apartments have now been taken up as permanent residences by Maltese families and the Bugibba/Qawra area has now taken on the form of a true Maltese town; complete with the traditional Catholic church and *pjazza*.

Mellieha experienced phenomenal growth over the last three decades and has developed as the northernmost tourist and residential node. Early problems associated with construction on clay slopes does not seem to have deterred real estate interests and such areas are fast disappearing

under new residences commanding views over the Channel separating Malta from Comino.

In stark contrast to all of this northerly development, the area which lies west of Malta's Grand Harbour has experienced very slow growth and virtual decline. Such locations are largely associated with the ship-building and repair industry and suffer from the decline of the industry. Pollution is another significant problem in the area. Past episodes of soot from the Marsa power station, grit blasting aerosols, and the sewage outfall at Wied Ghammieq still cast an overall negative image which deters future residents.

4.2 ECONOMIC CHARACTERISTICS

Up until the late 70s, the Maltese economy was largely dependent on the servicing of the British garrison that was stationed in Malta for almost 200 years. During these last few decades the islands have experienced a massive transformation in their economic structure which has resulted in a re-orientation of industry now geared towards light manufacturing and a wide variety of services. In order to appreciate the extent of this transformation it is important to note that the islands lack practically all of the natural resources needed to initiate a strong industrial development program. The tourist sector played a crucial role in this respect. An agreeable climate, clean seas, and a welcoming disposition amongst the local population led to the phenomenal increase in tourist oriented development.

Tourism conditioned much of the more recent development within the Northern part of the island where the few beaches of the islands may be found. This is largely due to the fact that the sedimentary rock strata of the Maltese Islands dip towards the northeast. The geology of the northeast, therefore, presents a gentle slope right up to the shoreline thus permitting construction right up to the waterfront.

The two harbours surrounding Valletta present a striking divide. The western port (Marsamxett Harbour) is largely occupied with tourist-oriented shipping and includes berthing places for the numerous sight-seeing ships that leave the port on a daily basis. Additionally, this area contains large yacht marinas which have been extended considerably over the last few years. At present, a large tourist-oriented project, the Manoel Island-Tigne project, is underway within the area and this should result in a greater influx of tourism within the area.

Located on the eastern side of the Valletta peninsula, Grand Harbour is far more industrial in character. This harbour has long been dominated by the ship-building and ship-repair yards located within the sheltered creeks of the Three Cities. Shipping activity also includes container transport, grain storage, and petroleum tanking and bunkering services. Other intensive industrial activity is carried out within the vicinity of the Marsa Power Station and the Marsa industrial estate.

The establishment of the Malta Freeport, bonded stores, and the construction of the new Enemalta power station at Marsaxlokk Harbour has created a pole of industrial attraction shifting industrial interest further to the southeast. This is expected to renew development interests at Hal Far and Bulebel industrial estates.

4.3 SOCIAL ISSUES

Land speculation has long been a major social issue. This is hardly surprising in such a small country as Malta where the availability of land suitable for development projects is in great demand. Therefore, land speculation and development is often perceived as a quick and dependable lucrative activity. In this respect the granting of development permits for projects has often been the subject matter for some considerable controversy and political bickering. MEPA is currently entrusted with the responsibility of issuing development permits that do not discriminate between political allegiances.

Accessibility to the coastline and privatisation of the waterfront are major issues which have been debated during the last few years (Suncrest and Sunnycoast cases at Bugibba/ New Dolmen Hotel; Comino Hotel and Alternattiva Demokratika; the Hilton Project). In fact the newly elected Labour Government of 1996 experienced considerable internal strife over, amongst other issues, its planned privatisation of the Cottonera waterfront. In the end, it had to resort to calling fresh general elections over the Cottonera Development project and lost the 1998 elections in the process.

Sale of residences to overseas buyers poses severe problems for Maltese nationals. Maltese salaries are significantly lower than most western European countries (%) and the buying power of newly married couples seeking residences is correspondingly lower than that of retired couples who wish to settle in Malta. This has become a major issue in Malta's negotiations with the European Union and resulted in special restrictions placed upon foreign residents purchasing property in Malta.

Plate 21
Hard-stone quarrying (Vella, 2003)

Waves of speculation have also occurred during the last few years. It is widely believed, though no reliable Plates are available, that several foreign (mostly Russian) buyers bought considerable property on the island just before and during the early 1990s. This resulted in a prompt acceleration of the price of residences during the late 80's and early 90's.

4.4 URBAN DEVELOPMENT

The settlement pattern for Malta can best be perceived as a series of concentric rings of urban development centred on the Valletta/harbour area. Outlying villages and towns have experienced considerable growth during the past 50 years. In fact there have been so many cases of coalescence of villages and towns that an urban continuum can be traced for a good one-third of the country. (Fig. 7)

Urban expansion owes it origins to several factors other than simple population growth. In fact, the rate of population growth in Malta is very low by Mediterranean standards (see Fig. 6). The more pertinent factors include successive governments' policies of fostering home ownership through the donation of building plots on state-owned land. Such schemes often resulted in building booms which set a boom-bust economic pattern.

Much of the new residential development was located on the periphery of existing settlements and contributed to the coalescence of villages and towns. On the other hand, several older residences located within village and town cores have become vacant. Recent surveys indicate a vacancy rate of 23%. This is largely due to Maltese tenancy protection legislation acting in combination with antiquated laws of inheritance.

4.5 AGRICULTURE, FORESTRY AND FISHERIES

Only a very small amount (%) of the total land area of the Maltese Islands is forested. It is commonly believed that the islands were once covered by a climax vegetation of sclerophyllous forest; largely composed of Aleppo pine (*Pinus halipensis*) and Evergreen oak (*Quercus ilex*). Unfortunately, only a tiny remnant of these forests still exists at Wardija and this has been reduced to some dozen individual specimens. Reforestation schemes have met with some moderate success at Mizieb and L-Ahrax (Marfa Ridge).

Littoral agriculture is often beset with problems originating from salt-laden winds in exposed areas. Most of these are located in low-lying land and valleys formed by block faulting. Soil salinisation problems are expected to increase in time within places like Pwales and Burmarrad valleys since groundwater abstraction used for irrigation far exceeds the safe well yield. Arable cultivation in such areas is also under threat from physical (mechanical) soil erosion which occurs during torrential autumn rainstorms. The western cliff margin, on the other hand, possesses some interesting terraced fields located, practically, right up to the cliff edge. Most of these fields are high enough in elevation to overcome the problem of sea spray but problems of accessibility and steep slopes render their productivity somewhat marginal.

Much of the arable land available within the urban precincts of the harbour areas has long been lost to expanding urbanisation. The agricultural loss, in this case, was even greater since most of the soils within this area were relatively productive due to their origins as alluvial sediment. Another fertile agricultural area that has experienced more recent rapid urbanisation is the central part of Malta.

Fragmentation, soil erosion, and land abandonment Plate prominently as factors that contribute towards land degradation and desertification. These factors Land speculation - viticulture expansion often limited in coastal locations due to salt laden winds.

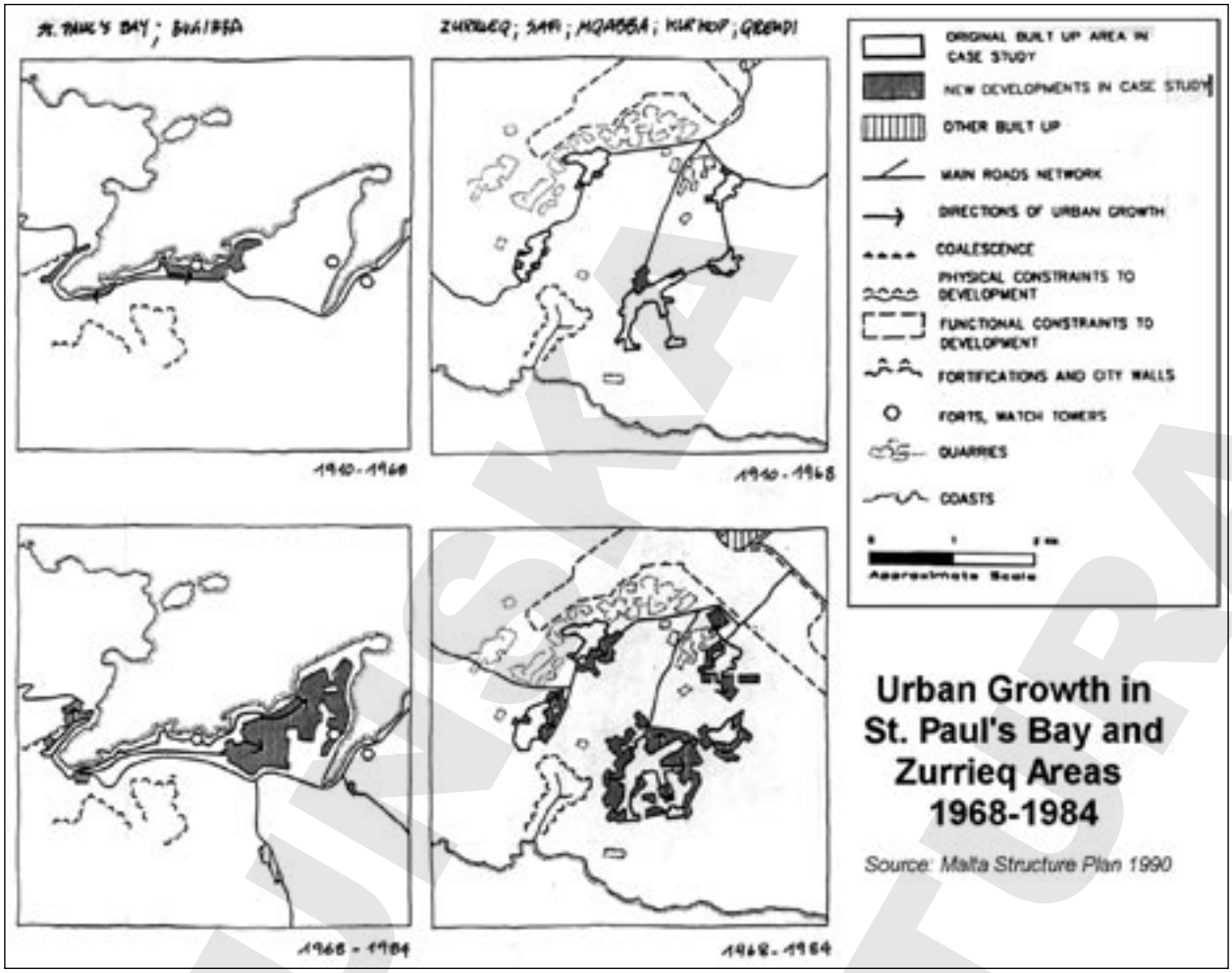

Figure 8
Urban growth in St. Paul's Bay and Zurrieq

4.6 INDUSTRY AND MINING

Most of the manufacturing industries in Malta are concentrated within six "industrial estates". Two of these (Hal Far and Ricasoli) are located right up to the shoreline despite the fact that they make little use of their littoral location. In fact, their products are trucked to the nearest harbour; (either Grand Harbour or the Freeport at Marsaxlokk) in normal containers bound for overseas destinations. Hal Far industrial estate is sited along a cliff shoreline but has easy access to the Freeport container depot. The Ricasoli and Marsa sites are similarly serviced by Grand Harbour but the comparatively short distances pose no problems for access to the Freeport at Marsaxlokk.

Other industries require coastal locations. Power generating plant need coastal locations to minimise the cost of fuel shipments as well as to ensure a steady supply of cooling water. The old power station is located at Marsa which is the innermost part of Grand Harbour. This location ensures calm seas but cooling water from the sea is slightly higher in temperature at this site. This is also partly due to the fact that the outlet is also located within the area and, consequently, warmer water is circulated continuously within the harbour and through the plant. Fuel (currently fuel oil) is conveniently shipped right up to the plant. The Marsa power station can also utilise coal and did so up to 1994.

During these years, coal was offloaded haphazardly onto the wharf at the Menqa, in Marsa, and then trucked to the power station over the hill. This resulted in a fair degree of resentment amongst Marsa residents who complained of the

Plate 22
Soft-stone quarrying (Vella, 2004)

coal burning emissions as well as the coal dust generated during coal transport to the plant.

The new power station located on the Delimara peninsula (within the Marsaxlokk Harbour area) was constructed in 1987 and was meant to cater for Malta's growing energy requirements. It draws fuel oil from Enemalta's (the state energy supplier) extensive fuel infrastructure within the area. Cooling water is drawn from the harbour and is discharged outside the harbour in a small embayment known as Il-Hofra z-Zghira.

Shipbuilding and ship-repair have served as the backbone of the country's heavy industry for hundreds of years and it is very unfortunate that this activity has suffered seemingly irreversible recession during the last few decades. Six main Drydocks are employed for ship repair and these are located within the Grand Harbour's eastern area. They range in size from dry-docks that can service luxury yachts to No. 6 Dock (Red China Dock) that can service 100,000+ ton tankers. The location of each of the dry-docks utilises the calm waters of the creeks that penetrate deep into the Cottonera area. This locality has also, traditionally provided much of the skilled workforce that is employed within the industry.

One of Malta Drydocks' subsidiary industries is the Tank Cleaning Farm located at Ricasoli. This is an essential service for tankers that are about to undergo any substantial repairs or maintenance at the Yard. It is rather unfortunate that much of the infrastructure of this activity (settling tanks, storage tanks, pipelines etc.) is located within the precincts of the old Ricasoli fortification and may inhibit restoration and rehabilitation of the site.

Shipbuilding is located at Marsa (the innermost part of Grand Harbour) where the yard commenced its latest operation during the mid 70s. The persistent worldwide recession in shipbuilding as well as severe competition from Far Eastern shipyards culminated in the 'yard's incurring of heavy losses. This situation was further exacerbated by the disastrous termination of contracts with the ex-Soviet Union for eight timber carriers which the 'yard had been working on.

The dissolution of the Soviet Union in the 90s resulted in the 'yard having to sell the ships at a bargain basement price to alternative buyers. Recently completed contracts for three new ferries that operate between Malta and Gozo have delivered some respite for the industry but the financial outlook is still very gloomy. In fact, the Maltese Government is currently holding negotiations with the General Workers' Union leading to a restructuring exercise which should place the yard on a more competitive footing.

The only commercially significant mineral on the islands is the limestone which is quarried for the construction industry. Two types of such quarries exist. The first utilises machinery to cut stone blocks from the soft globigerina limestone. Such blocks have traditionally been used for the construction of domestic and commercial buildings instead of concrete or kiln-fired bricks.

A second type of quarry uses explosives to blast a dense, crystalline limestone. The resulting material is further crushed, on site, into gravel and sand which is used as aggregate for concrete slurries. Consequently, the environmental impact of hardstone quarries is more severe than that of softstone quarries. With the exception of the Dwejra quarries in Gozo, all globigerina quarries are located away from the littoral area. On the other hand, most of the hardstone quarries are located in close proximity to the coastline. This is partly due to the fact that the Lower Coralline limestone outcrops along the northwestern shoreline to form cliffs. Practically all of the hardstone quarries located further inland utilise the Upper Coralline limestone which has similar structural properties and yields comparable aggregate for construction purposes.

Offshore exploration for petroleum deposits has progressed, somewhat sporadically, over the last three decades. The earliest exploration occurred to the south of the islands where, it was believed that proven oil-bearing strata which were being exploited by Libya, extended out to the Medina Bank. This resulted in a somewhat serious territorial dispute with Libya and further exploration within the area was halted until the boundary demarcation was finally determined

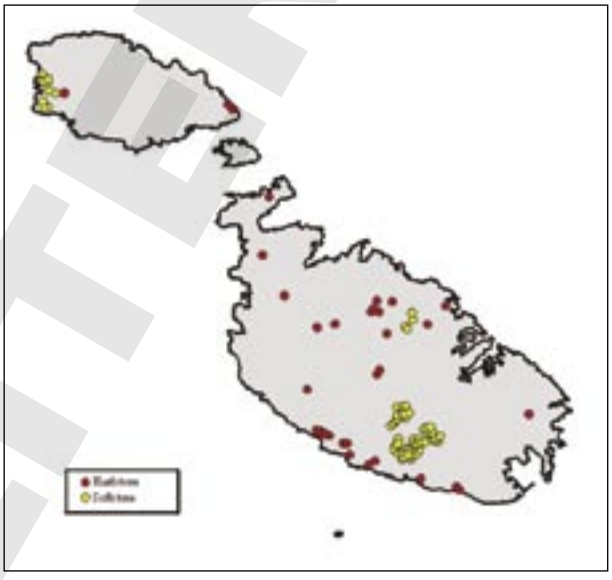

Figure 9
Existing quarries (Malta Resources Authority, 2003)

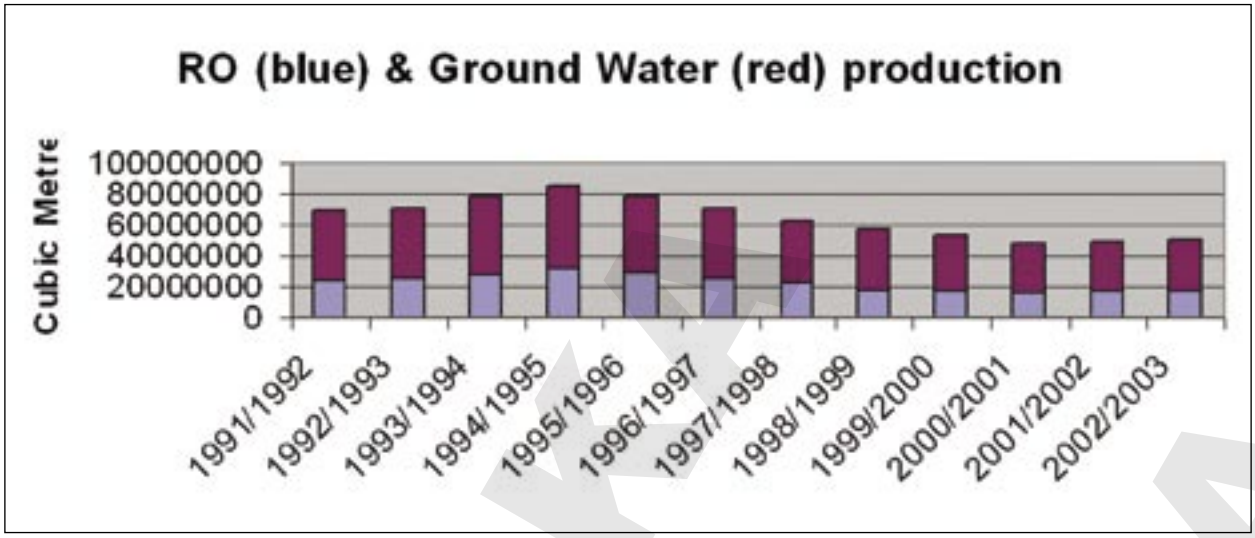

Figure 10
Total water production for the years 1991 – 2003 (based on Water Services Corporation Annual Report 2003)

peacefully at the United Nations International Court at The Haag. More recent explorations have focused north of the islands. Once again, it is hoped that oil-bearing strata may extend southwards from proven reserves in the Sicilian offshore sites located at Gela. Only one attempt has ever been made to drill an exploratory well on land. That occurred in 1998 at a location in Gozo aptly named "Madonna taz-Zejt". Unfortunately no commercial finds had been recorded and the well was abandoned after reaching depths in excess of 6,000m. The social and environmental impact of the discovery of a major oil field within Maltese territorial waters would be considerable.

4.7 INFRASTRUCTURE

Desalination (Reverse osmosis) plants have become a vital component in Maltese domestic and industrial infrastructure. This is due to the fact that in the semi-arid climate of the islands precipitation cannot supply enough water to satisfy an ever increasing demand. This problem is exacerbated by the process of urbanisation which is sealing formerly rural areas and promoting surface runoff during rainfall events. This increase in the coefficient of runoff results in lower infiltration rates and reduces the total amount of water which replenishes the groundwater. The water present in the islands' aquifers is the only natural reserve of fresh water available and this has been subjected to extreme stress over the last few years. Indiscriminate abstraction exceeded the safe well yield for several years and this resulted in saltwater intrusions into the sea-level aquifer through the creation of cones of ascension. Another major threat to the aquifers is posed by pollution; much of this is caused by agricultural activity, including animal husbandry practices, and the dumping of domestic and industrial refuse. The problem of accelerated demand for water and diminishing groundwater reserves has been tackled through the construction of large scale desalination (reverse osmosis) plants. Three such plants were operational by the year 2000 since a further plant, located at Tigné, has been decommissioned.

Plans for the construction of yet another plant in the southern part of Malta, however, have been shelved. This is because of an extensive upgrading of the national distribution network which targeted leakage control. In fact, Water Services Corporation statistics show a decline in leakage levels from 19m3/km/day in 1995 to 9.5m3/km/day in the year 2000. Progress has also been realised in terms of energy consumption. RO plants are energy intensive activities but innovative energy-efficient and energy recovery technology (e.g. Pelton wheels) and falling demand following a pricing structure reflecting the true costs of production and distribution, resulted in a drop in energy consumption from 130,860 MWh in 1997/8 to 99,553 MWh in 1999/2000.

The road network for the island of Malta is essentially radial; focusing on the two main hubs of Marsa and Msida. Both of these are located in the innermost part of the two main harbours (Grand Harbour and Marsamxett Harbour respectively) surrounding Valletta. This pattern is also reflected in the public transport system of the island where passengers are largely constrained to follow radial bus routes which terminate at Valletta as the main hub of the network. Very few cross-linkages exist.

This pattern is similar to the network in Gozo. This, smaller island of the Maltese archipelago,

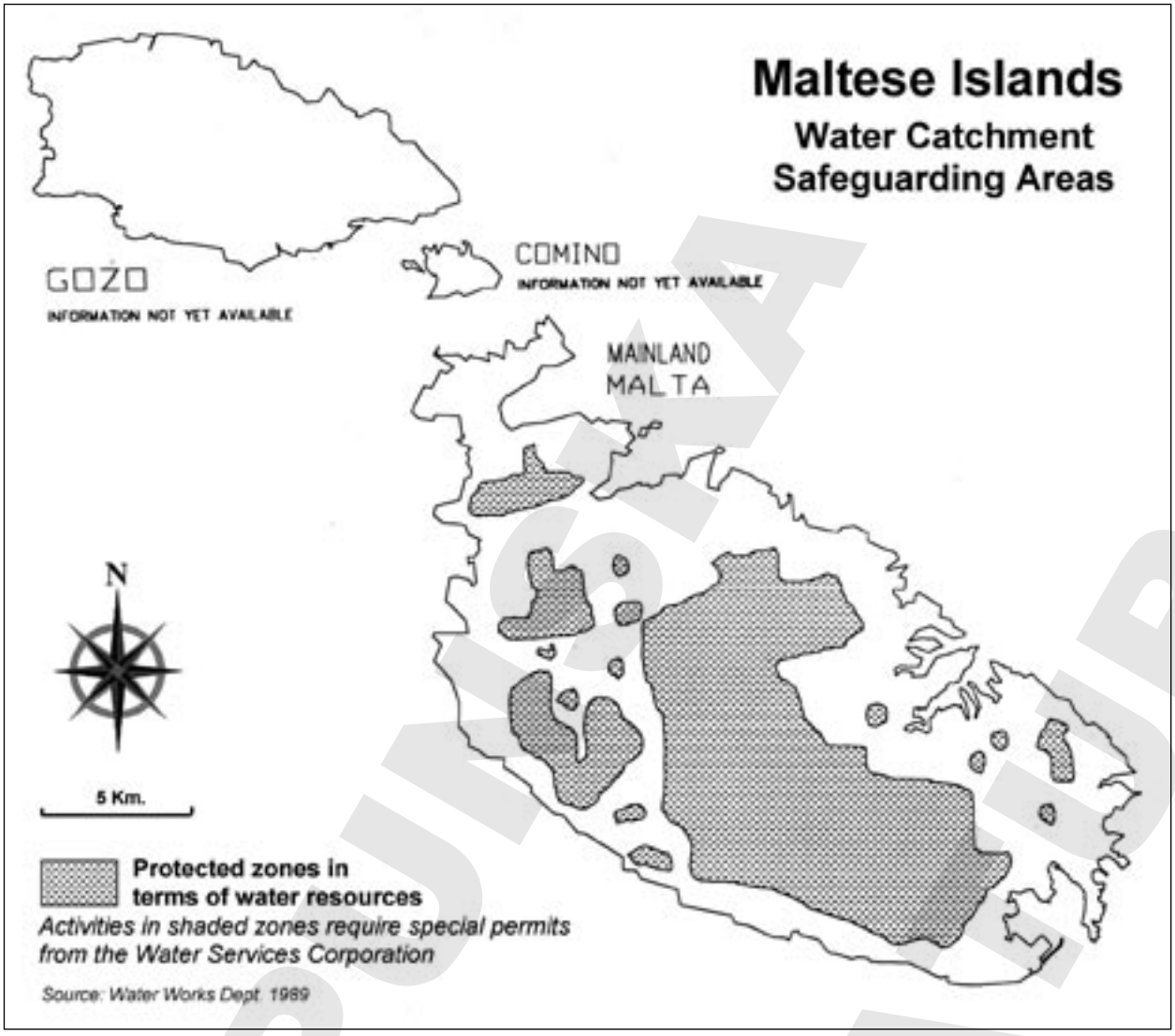

Figure 11
Water catchment safeguarding areas

has Rabat (Victoria) as the main transport hub and all arterial roads converge on this principal settlement.

The radial character of the transport networks of both islands are, therefore, similar and contribute significantly to traffic congestion especially during peak commuting hours. There is, however, a major difference in that both of the traffic focal points on the island of Malta (Qormi/Marsa and Msida) occur where major valley systems meet the sea. They are thus located at low elevations and are far more prone to flooding. In fact, during torrential autumn rainstorms, urban surface runoff converges right onto these areas causing major disruptions to the main islands' transport network.

4.8 TOURISM

Most of the tourist development that has occurred over the last few decades has been oriented towards the Northwestern shores of the island. This is where almost all of the bathing beaches and water sports amenities are located. The accommodation aspect of the tourist infrastructure consists of a wide variety of hotels and self-catering holiday apartments. Many of these are located within three main hubs (Sliema, Bugibba, and Mellieha). The Sliema-St.Julians-Paceville axis is the largest of the three hubs and includes a considerable amount of amenities like restaurants and night spots. The Bugibba-Qawra area has grown enormously over the last three decades but is hindered by its chaotic urban fabric; a relic of unplanned development practices which seems to have characterised much of its early life.

4.9 ENERGY

The two thermal power stations of the Maltese Islands burn heavy fuel oil in traditional steam generating plant and in the newer combined cycle plant. There are also a number of gas (diesel) turbines utilised to make up for any temporary surges in demand. Both power stations are located within the two major ports of the island of Malta. Due to deficiencies in the distribution network, the aging Marsa power station still supplies the bulk of electricity to the urban hub of the island. This old plant at the Marsa power station is meant to be modernized in the near future once the new power station can fully absorb the accelerating demand for electric power. The newly constructed Delimara power station is located within Marsaxlokk Harbour and possesses room for expansion. This location holds considerable advantages over Marsa in terms of dispersal of air pollutants. It also draws cooling water from the wider Marsaxlokk harbour while its outfall lies outside the harbour at Il-Hofra. This affords greater cooling efficiency over the Marsa plant. An underwater power cable supplies electric power to the smaller islands of Gozo and Comino.

Alternative energy sources are still very poorly exploited. Solar energy, in particular, is surprisingly largely confined to a few domestic residential users despite the bountiful supply of insolation due to the islands' low latitude and clear skies. One of the factors that accounts for this is the disproportionately high initial cost of purchasing a solar hot water system. This seems to have been recognized by the energy company, EneMalta, which announced in 2002 that households purchasing such systems would be refunded the connection fee to the energy grid (70 Maltese Liri - approx. US$ 175).

A development proposal for a wind energy farm is currently being discussed but this will account for only a very small percentage of total demand for energy. It is important to note that all fossil fuels in Malta are imported and this places a heavy drain on the national budget. This also has severe implications for national security.

Petroleum exploration in Maltese territorial waters is still in progress but no commercially feasible finds have been reported. A more interesting development is the feasibility of a link to the proposed gas pipeline that is planned to connect Sicily with Libya. Such a scheme will permit the generation of electricity from natural gas, with concomitant reduction in many pollutants. This will also permit Malta to immediately achieve its targets under the Kyoto Protocol.

DOPUNSKA LITERATURA

CHAPTER V

Environmental and spatial impacts

The problems and issues pertaining to the coast of the Maltese Islands are not much different from those in other Mediterranean coastal areas. These are however enhanced due to the relatively small size of the Islands resulting in greater competition for space and land use.

The measures put in place under the current legislative provisions have proved effective in protecting the environment to a certain but as yet incomplete degree. Threats are still present, and new ones will continue arise, from a variety of coastal activities. A lack of awareness of the heritage of the Maltese Islands, coupled with uncoordinated policies between the different government entities are a major factor influencing the current situation. Furthermore, a lack of financial resources directed towards enforcement undermines many protection measures already carried out.

5.1 MARINE POLLUTION

Marine pollution originates from two main causes.

Land based pollution occurs during periods of intense rainfall, which wash the hard impervious surfaces such as roads and paved areas, and the roof tops of houses, carrying pollutants deposited thereon. Similar but of much more concern is the land based pollution originating from contaminated sites, mainly the landfills which are located near the coast.

Other forms of Marine pollution arise from the discharge of (as yet) untreated sewage at marine outfalls. The sea has traditionally been a convenient recipient for the disposal of waste water originating not only from coastal settlements but also from further inland. Shoreline outfalls have long been accepted as practice for Malta. The Knights built 5 outfalls for the sewage of Valletta which drained into the harbour area, while the British built a massive scheme to take this sewage away from the harbour to Wied Ghammieq (NW Malta). Further outfalls were added over the years, the one at ic-Cumnija (also NW Malta) and Ras il-Hobz in Gozo being the latest built. The two outfalls at Wied Ghammieq, and Ras il-Hobz are equipped to carry the raw sewage far offshore. The former is equipped with a diffuser port at the outfall, therefore pollutants and other microbial pathogens are diluted, facilitating degradation. The outfall at Ras il-Hobz discharges at great depth, which is below the thermocline, preventing the diluted sewage plume from surfacing and contaminating bathing waters.

The construction of a sewage treatment plant at M'Skala (South Malta) in 1990 proved that sewage could be treated and reused safely. In fact, about 120 hectares of agricultural land in the South of Malta are benefiting from treated water.

In order to be compliant with regional requirements all sewage produced will have be treated before discharge. This will be remediated in a negotiated phased manner so that by 2006 all sewage will be treated and reused, any discharges being fully compliant with the relevant EU and Barcelona Convention requirements. The problem with sewage pollution however lies whenever there is a malfunction in the system. In this case, untreated sewage is discharged directly into bays and creeks, to the detriment of the environment and public health.

Newer forms of Marine pollution arise from fishfarming operation, from some industrial discharges (mainly power stations and reverse osmoses plants).

Until a couple of decades ago, when aquaculture technology was less intensive, fish farming was generally considered as an environmentally sound activity. A major change in perception has occurred in recent years with the adoption of more intensive techniques of production and as evidenced by the results of environmental monitoring of water quality and the status of the benthos under and in the vicinity of the sea cages which revealed several impacts. The area under the cages is usually drastically impacted and scavenger fauna are no longer able to cope with the organic input. Conditions are significantly anoxic and bacterial mats thrive.

Posidonia meadows under and around the cages were also modified due to the high nutrient input. These were greatly degraded and the seabed consisted of dead *Posidonia* matte, anoxic sediment and bacterial mats. The *Posidonia* meadows in such areas were in a clear state of regression. Studies have also indicated that the impact of a farm results in changes in *Posidonia* morphology and epiphytic load in meadows 170m away from the cage site (Dimech *et al*., 2000).

Oil pollution is closely associated with the geographical location of Malta which is in the midle of the routs of oil tankers transporting crude oil to European ports from the North African coast and elsewhere, as well as from the local ship repair industry. Sources in the Maltese waters may originate from dumping from passing ships, from the operational discharge from ships and from accidental release from ships either whilst passing or during repairs in the ship yards. Other major risks exist during bunkering operations.

Around 60% to 50% of potable water is produced through desalination processes, mainly membrane technology. Large quantities of brine are discharged to the marine environment. Although the impacts have not yet been studied, it is believed that they would be small and limited to very circumscribed areas mainly due to the high energy nature of the coastlines where discharge takes place.

5.2 AIR POLLUTION

The main sources of air pollution in Malta arise from power generation, transportation and inappropriate waste disposal practices.

There are two fossil fuel power stations in Malta, one located in the central densely urbanized area in Marsa, and another located at the Southern end of the Island in Marsaxlokk. Both are located on the coast so as to utilise the adjoining sea for cooling purposes and for the importation of liquid fuels via Oil Tankers.

The Station located in Marsa has been in operation for over 50 years, and although plant has been changed and upgraded periodically, it does not comply with the current EU requirements as to emission controls. An improvement plan is being implemented to correct the situation. The Station located in Marsaxlokk is of more modern design and can be made compliant with EU requirements, mainly by utilizing low sulphur fuels. The generating plant is of the combined cycle type, which offers improved generating efficiencies and thus a lower carbon dioxide emission per KWhr generated.

Around 20% of electricity consumption is used for the production of potable water by RO desalination.

Transportation accounts for nearly half the total immision of air pollutants. The Maltese population is very mobile, travelling extensively over the small spatial area of the country. There are 269,452 registered vehicles, around 2.2 per household. Vehicle occupancy rate is very low.

Measurements of ambient air pollution shows considerable variations in direct relation to the morning and evening rush hours, together with other peaks which can be correlated with general diurnal lifestyle patterns.

Much of this excessive use of private transport means has been brought about by the declining standards in public transportation services. Steps are being taken to correct these aspects, and to introduce a modern public transport system and vehicles.
The coastal areas are influenced with this daily air pollution pattern, however there is a more marked effect during the summer months when many Maltese choose to live in summer houses located in coastal resorts, but travel to and from their place of work every day. Additionally, the coastal areas receive a greater influx of visitors who congregate there to enjoy the beaches and coastal entertainment facilities. The pollution of the air therefor takes place throughout the day and the nighttime.

Other (as yet) undetermined potential sources of air pollution could arise from the many village festas which take place throughout the island over the summer period. The pyrotechnics in use certainly seem the generate considerable amounts of particulate and heavy metal emission. The ground level displays have a localized but more intense effect, whilst the emissions from arial displays are more dispersed over larger areas.

5.3 SOIL CONTAMINATION

Contamination of the soil is unlikely to have occurred on a large scale, even though no detailed studies have as yet been carried out. This is due to the lack of large scale manufacturing processes such as chemical or extractive industries. Small areas used as shooting ranges for clay pigeon shooting are contaminated with lead shot. The same problem exists on a wider but more diffused scale, originating from hunting activities. Lead pellets are known to be carried by storm runoff, and to congregate in rock pools and similar pockets. The soil in Malta is however of an alkaline nature which tends to bind many metallic species.

Of concern is the ingestion of lead pellets by grazing animals, a matter which also needs to be investigated.

Hydrocarbon pollution is known to occur under old petroleum storage sites, notably on the coastal location of Birzebbuga. This hydrocarbon is being collected and the site will be restored for future uses.

The improper management of animal manure also results in soil contamination. Such contamination is mainly organic and from nitrates, which can be easily remediated by good management practices.

Over the years a number of sites were used for disposal of solid wastes. Records show that during the last thirty years 15 such sites of various sizes were in existence at some time or other. Of these 15 sites only 2 are currently in operation, one at Maghtab (Malta), occupying an area of approximately 600,000m^2 and one at il-Qortin ta' Ghajn Damma at Xaghra (Gozo), with an area of approximately 34,000m^2. All of these are to be considered as contaminated sites, and future uses will depend on the degree of remediation which will be undertaken the future.

5.4 POLLUTION OF GROUND WATER

The natural fresh water resources of the Maltese Islands consist of two types of aquifers: a group of five *perched* aquifers and a *sea-level* aquifer. The perched aquifers are located above the impermeable Blue Clay geological stratum and are separated by valleys dissecting the Upper Coralline plateau. The sea level aquifer is present throughout the islands and forms a lens of fresh water "floating" on a layer of denser salt water which permeates the entire lower geological strata of the islands. In theory, one metre of fresh water above the sea level depresses the underlying salt water by forty metres. This groundwater is the most important reservoir of fresh water on the islands but it is extremely vulnerable to pollution and over-abstraction.

Figure 12
Nitrate map of the Mean Sea Level Aquifer

Nitrate contamination is being controlled through an agricultural code of practice, whilst overabstraction still needs to be effectively controlled mainly by identifying illegal bore-holes and wells.

5.5 LANDSCAPE DEGRADATION

Land degradation in Malta can be described according to a spatial gradient of intensity of human land use from rural to recreational, industrial and urban (Role', 1998). In the past 50 years or so, land has been lost or become highly degraded as a direct or indirect result of urbanisation and infrastructural development. Whereas in 1910 less than 6% of the Maltese Islands were inhabited, in 1991 this rose to 21% (Report of Survey, 1991).

Urban development is one of the most effective agents of land degradation in the Maltese Islands. This situation, which is translated into complete obliteration of previously untouched agricultural land and natural habitats, also involves the replacement of permeable surfaces and soil covered areas by artificial impermeable surfaces, thereby increasing run off to percolation ratio (Camilleri, 1998). This situation is enhanced by the small size of the Islands and the large population density. Urbanisation, touristic and industrial development has been accompanied by the increase in the length of roads on the Islands, approximately 1,500 km in 1987 (Report of Survey, 1991).

Land abandonment, in common with other areas in the Mediterranean region, generally takes place on marginal terraced slopes where poor soils, difficult access and small size of fields make the farmers' work uneconomical. The steepest terraced slopes need a lot of maintenance in order to achieve slope and soil stability. Once the fields are abandoned, rubble walls collapse, leading to land degradation and eventually soil erosion. In some cases all soil horizons are stripped away from the abandoned field leaving an exposed bedrock. However, where vegetation in such fields takes over rapidly, a steppic community, which in time may evolve into maquis, develops (Tanti *et al*, 2001). A substantial amount of funds under the EDRP (European Development and Research

Pogramme) have been made available to local farmers in order to repair and maintain retaining rubble walls.

Another factor that is peculiar to the Maltese Islands is land speculation where the demand of land rezoned for urban purposes has been created. The fragmentation of land holdings (as a consequence of inheritance laws) leads to land being totally unsuitable for modern methods of agriculture and the consequent abandonment of land.

Urbanization has inevitably been accompanied by the sprawl of quarries and related development in the otherwise unspoilt countryside. Apart from the obliteration of the habitat, quarries have an indirect affect on the surrounding agricultural land. Farmers are therefore discouraged to cultivate the land and often abandon the fields due to dusts emitted from the quarry operations, and which settle as layer of dust on the surface of fields and crops (Tanti *et al*, 2001).

The landscape of the Maltese Islands is slowly changing. Agricultural land is being levelled out to form trapping sites, where herbicides are regularly sprayed to prevent vegetation growth. The invasive, fast growing *Eucalyptus* sp. (which also attracts birds) has been indiscriminately planted all over the countryside. This is leading to the creation of small rectangular plantations of trees which are visually discordant, and are harming endemic biodiversity, since they inhibit growth of other vegetation.

It is estimated that an individual trapping site occupies about 100 - 200m^2 (Camilleri, 1999). The total obliteration of the habitat is aggravated by the erection of small hides built in close proximity of such sites, the whole most often taking up good agricultural land. Trappers also 'improve' access to these sites by the creation of new access roads and asphalting or concreting of these roads. Extensive use of herbicides is also made to prevent growth of vegetation, which would tear nets (Tanti *et al*, 2001).

5.6 BIODIVERSITY LOSSES

The main problem facing conservation of natural resources is the apparently never-ending process of urbanisation within the islands and the resulting human impact. Much of this urban expansion has displaced formerly agricultural land use but, in several other cases, ecologically important sites (e.g. garigue and maquis communities) have been replaced by urban or suburban development. Moreover, human impact on surviving natural environments has been severe and includes pollution, dumping, and even recreational activity like off-road driving, hunting and trapping.

5.7 DAMAGE TO NATURAL AND CULTURAL RESOURCES

Much like many other Mediterranean countries, Malta has been blessed by a rich and varied natural and cultural heritage. At the same time, the protection and conservation of such a heritage poses severe financial and logistic problems for a somewhat limited national economy.

The main problem facing conservation of natural resources is the apparently never-ending process of urbanisation within the islands and the resulting human impact. Much of this urban expansion has displaced formerly agricultural land use but, in several other cases, ecologically important sites (e.g. garigue and maquis communities) have been replaced by urban or suburban development. Moreover, human impact on surviving natural environments has been severe and includes pollution, dumping, and even recreational activity like off-road driving, hunting and trapping.

Cultural resources also face similar threats from urban expansion and related activities. The most publicized threats are faced by the oldest free-standing human constructions in the world: the Megalithic temples of the islands. These have fallen prey to despicable acts of vandalism which include the spraying of graffiti and outright partial demolition of one of the apses of Mnajdra temple in 2001.

Other threats are more subtle but equally destructive if allowed to proceed unchecked. Many of the coastal fortifications, some of which date back to the fifteenth century, have been allowed to fall into disrepair while others were utilised by a wide variety of inappropriate agencies. These include tank cleaning farms, warehouses, bonded stores, boathouses, discotheques, and even pig

Plate 23
DeRedin Tower at Pembroke besieged by hotel development (Vella, 2004)

Plate 24
DeRedin Tower at Ghajn Tuffieha in pristine isolation (Vella, 2003)

farms! Some of the most seriously affected include the larger fortifications of Ricasoli, Rinella, and Saint Angelo and the Victorian fortifications of Selmun and Bingemma. The chain of seventeenth century coastal defense towers popularly referred to as the DeRedin towers (named after Grand Master Martin DeRedin who financed many of them) has been similarly affected. In other cases, the construction of particularly insensitive hotels has virtually cocooned fortifications which formerly commanded strategic locations thus robbing them of their landscape context. Examples of these include the towers at St. Thomas (Marsascala) and Selmun.

Plate 25
Incorporation the old with the new: Tigne Development project

Thankfully, some smaller forts have been restored to their former glory, during the last few years, through the initiatives of local (NGO) heritage organisations mostly financed by private enterprise. These include Ghallis Tower, Torri Mamo, and St. Agatha Tower. Local Councils have also been instrumental not only in drawing attention to their local cultural monuments, but also in financing the restoration of fortifications which fall within their jurisdiction. However much still needs to be done.

5.8 WASTES MANAGEMENT

Traditionally, waste disposal sites have always been located at coastal locations so as to protect the ground water resources located in the center of the islands. Over the years a number of sites were used for disposal of solid wastes. Records show that during the last thirty years 15 such sites of various sizes were in existence at some time or other. Of these 15 sites only 2 are currently in operation, one at Maghtab (Malta), occupying an area of approximately 600,000m^2 and one at il-Qortin ta' Ghajn Damma at Xaghra (Gozo), with an area of approximately 34,000m^2. These are contaminated sites and further uses will depend on the degree of remediation which has to be undertaken in the future. With the adoption of the EU environmental aquis, new locations for landfills are being sought. These have to conform with the latest EU requirements for containment and the treatment of leachate and emission of greenhouse gasses.

BOX 7

Coastal cultural resources – their fate?
Christine M. Tanti

Construction works and recreational activities are the main threats to the cultural heritage along the coast. The introduction of new building material and design as well as increased building heights along coastal settlements has replaced traditional facades along the waterfront (e.g. Sliema). The strategic location of some coastal towers has been obliterated with the large-scale development (e.g. M'Scala) and include structures such as hotels (St. George's Bay, St. Julians), boat houses (e.g. along Armier entrenchment wall) and kiosks (e.g. Ramla Bay, Gozo, prior to their relocation outside the beach).

1. **St. Thomas Tower, M'Skala**: A total of seven coastal fortifications (Towers) were built in 1610 by Grand Master de Wignacourt. These massive structures were built to dominate the coastline, mounting batteries of heavy artillery on their roofs and garrisoned by sizable detachments in times of war. One such Tower was that of St. Thomas Bay, which was built in 1614, after a Turkish battle exposed the limitations of the defense of the area. In 1828, the British abandoned the Tower from any Military use. Although this Tower is currently being restored to its former glory, its strategic location on the coast has been lost by the construction of a hotel exactly in front of it.

2. **Ghajn Mixkuka Tower, Ghajn Tuffieha**: This Tower, also known as Ghajn Tuffieha Watch Tower, was built in 1637 during the reign of Grand Master Lascaris. This Tower is located on the extreme edge of the Ghajn Tuffieha headland. This Tower was restored in 2002 as part of an Integrated Coastal Zone Management Plan for Ghajn Tuffieha, which was implemented by an environmental NGO, the Gaia Foundation. The restoration of this Tower was carried out with the collaboration of the Works Department and Din l-Art Helwa, a cultural NGO.

3. **Victoria Lines**: The Victoria Lines are a series of fortifications following the contours of the Great Fault which cuts across Malta from the western coast to the eastern coast. These fortifications which span 12km were built by the British Armed Forces between 1870 and 1899. Apart from forming an intrinsic part of Malta's historical heritage, these fortifications provide some of the best vantage points from where to enjoy the beauty of Malta's open countryside. After being left neglected for the past 100 years or so, part of the Victoria Lines were restored through an EU funded project MED-URBS (Cachia Zammit, 2003). This 3-year project involved the reopening of footpaths and the establishment of a nature trail. This initiative is currently being extended to other parts of the Victoria Lines (late 19th century British defensive line at Ta' Kaduma, Mosta) with the financial assistance of MEPA. The interventions include the removal of rubble and other debris, the re-establishment of the original patrol path along the infantry wall and the reconstruction of parts of the wall (MEPA, 2004; FWA, 2003).

4. **Fort Delimara, M'Xlokk**: This was built on the promontory of Delimara to protect Marsaxlokk harbour. Recently, this has housed a pig farm but now lies abandoned and is liable to extensive fly tipping. Close by lies **Fort Tas-Silg** which was converted into a dog sanctuary. This is still functional today. On the rear of Fort Tas-Silg, is **St. Paul's Battery**, built to defend Xrobb l-Ghagin and St. Thomas Bay. The ditch surrounding this battery is sadly filled by rubbish, while the battery itself is in a very bad state and most of its features are lost.

Certain other waste management practices have potential impacts on the coastal resources including the marine environment, such as the chronic habit of disposing of wastes, particularly from agricultural activities (including plastic film and materials) within water courses. This material chokes valleys and eventually finds itself within the coastal areas into the sea and on the coast.

Modern waste management practices depend to a large degree on the motivation and education of citizens, and much still needs to be done in this area. Sustainable waste management also needs considerable (as compared to the existing low standard) financing through the 'polluter pays principle'. This is not easy to accept if there is no motivation achieved through education, and recent measures to minimise and segregate waste streams show the usual temporary increase in illegal dumping and fly tipping, in an effort to circumvent stricter and more costly alternatives. Such practices can (and are) only be controlled through rigorous enforcement of the law.

5.9 NOISE

As an island having a typical Mediterranean culture, the Maltese habitually live in relatively noisy communities. Although this 'noise' is interpreted as a meaningless cacophony by many foreigners, particularly those not of a Mediterranean origin, it is in reality an essential medium for neighborhood communication. All the

sounds convey information and help to knit the local society into a homogeneous entity.
The local inhabitant will however object to noise to which he is not culturally attuned. Thus the blaring of music from pubs, discos and other establishments is found to be highly intrusive and unacceptable. Special concerns are raised by Bingo operations! Another concern is the loud music on the beach, in particular at night times. The shift in the times of use of the coast by the locals from the day time to night is being reflected by the considerable number of beach barbecues. The majority of these users prefer a quiet atmosphere thus are easily annoyed by the continual hum of generators and of particularly loud music.

Traffic noise is as yet not a major issue in the coastal areas, except when it occurs in residential areas.

CHAPTER VI

Policy responses and practices

6.1 INTRODUCTION

In Malta, spatial development and many activities in the coastal area have had a long but sectoral regulation. Many entities have an interest on and thus have striven to acquire 'rights' on the regulation and control of this very important area. The main thrust has however remained focused on the thin coastal zone due to its economic importance.

The recent setting up of MEPA attempts to promote the integration of environmental and planning considerations into one regulatory authority In this manner it is anticipated that ICZM will acquire more (and deserved) importance and coherence. However the holistic and integrated management of the coastal area has still to become a reality. Only when integration is fully and reliably achieved, can the maximum environmental, economic and social benefits be secured.

This chapter examines the current policy framework and its implementation.

6.2 CURRENT PRACTICES IN COASTAL MANAGEMENT

The common element in current coastal management is the sectoral approach. A tradition established under British rule, to have discrete departments with specific responsibilities, has somewhat been altered since the early 1990s with the establishment of a number of agencies, having broader responsibilities.

Unfortunately many overlaps in responsibilities were created since the existing legislation and institutions were not brought up to date with emergent legislation. Consequently misunderstandings on operational procedures in certain sectors were created stalling many efforts from different entities.

A number of other significant changes had also occurred during the period of the CAMP – Malta project, mainly as a result of the harmonisation requirements with European Union Aquis. These included the adoption of legislation such as that governing Fisheries, the Environment and the setting up of the Malta Resources Authority, and of the Malta Environment and Planning Authority respectively.

Although there are eleven (11) out of the fourteen (14) ministries in the Maltese Islands that are directly involved in regulating coastal areas and uses, yet there is no specific reference in current legislation to the coastal zone and coastal zone management.

There are also new agencies that are now also involved in regulating major coastal activities. It must be noted that other smaller agencies and departments may also be involved at some stage, within particular activities, e.g. the Veterinary Service that is involved in aquaculture. Additionally, whilst the MTA has no direct involvement in the regulation of the sectors mentioned, it plays an important consultative role on the effect of such regulation with respect to the Tourism Industry. The Ministry for Gozo on the other hand deals with all matters related to Gozo.

The only current legal document that makes reference to coastal zone management is the Structure Plan, a legally recognised document that regulates development, (currently in the process of revision). There is also no reference for policy co-ordination or co-operation between government entities in their policy formulation stages with the exception of the Development Planning Act, regulating the functions and obligations of the Planning Authority.

Numerous Legal Acts and regulations identify responsibilities affecting the majority of coastal uses. The only major loophole that exists relates to the marine environment and its administration, with respect to property rights.

In practice however, a number of inter-agency/ inter-department networks already exist, as outlined above. This is testimony to the fact that co-operation can be achieved. The areas where such co-operation exists include pollution control, water quality monitoring and enforcement of

regulations relating to swimming zones. The most obvious one is the co-ordinated effort towards combating and monitoring pollution, between the Civil Protection Department, the Malta Resources Authority, the Malta Maritime Authority and the Health Division. This type of integration could not however fully develop due to the lack of any legal commitment towards such efforts.
Through the participation in CAMP Malta, many of these entities, have come to increasingly understand, that most activities are inter-related and the benefits of policy co-ordination amongst agencies and departments is now being acknowledged. More effort is needed to facilitate this co-ordination in other sectors as well if integrated coastal areas management is to be attempted. In the absence of specific legislation calling for such policy integration, the next best solution is for the institutions involved to clearly identify and acknowledge their responsibilities.

Thus, in order to ensure a seamless coverage in coastal area management, and to avoid duplication and wastage of scarce resources, many agencies, departments and ministries are currently working on the formulation of formal and binding memoranda of understanding which set out the respective responsibilities and fields of action of each body. These will eventually ensure a better integration of policies and plans, which also benefit the sustainable management of the coastal area.

6.3 POLICY FRAMEWORK

A Policy framework for the sustainable management of the coastal areas has been outlined in the CAMP Malta report. Although the participating institutions subscribed to these recommendations, as evident from the endorsement given at the final presentation conference of the results of MAP-CAMP, they still require to be put into effect These recommendations encompassed a number of areas:

1. Governance
   The term governance refers to those processes through which policies and plans originate. These enable the central and/or local government, and associated agencies and NGOs to address issues related to the sustainable use and management of coastal resources.
2. Legal action
   Legal action follows from the above process. It refers to the drafting of the verbalised 'political' concepts and includes such technical aspects as are deemed fit and relevant, together with the methodology for their enforcement and the sanctions to be made in the event that they are infringed.
3. Capacity building
   This refers to the human, material and financial resources (including costs recovery), necessary to put into effect the expressed wishes of the policy maker/legislator. This would also include a component designed to assist, advise and promote the sustainable use of the coastal resources amongst all coastal users.
4. Knowledge and information
   This involves the collection, assessment, analyses and quality control of data which will be of use to policy makers and coastal users. Its main use will be to influence policy formulation and amendment and to verify the success or otherwise of this policy and the degree of sustainability achieved. An important component of this category includes mechanisms for the free dissemination of information and the promotion of information exchange related to activities concerning coastal issues.
5. Economic instruments
   Sustainable management of the coast also requires adequate economic resources in order to ensure its feasibility.
6. Technological innovations
   This class of actions include new techniques, tools and methodologies which promote and ensure sustainable coastal management.
7. Protection of coastal resources
   The protection of coastal resources refers to actions aimed at the conservation and enhancement of coastal resources. These projects are guided by the same principles which provided the main driving force of the entire CAMP project.

6.4 INSTITUTIONAL FRAMEWORK

6.4.1 Coastal legislation

The current process whereby protection is afforded to the natural and cultural heritage is through the legal mechanisms provided by the Environment Protection Act, 2001[8] (EPA) and the Development Planning Act, 1992 (DPA).

The EPA enables the designation of nature reserves, bird sanctuaries and the protection of particular species of flora and fauna. The Development Planning Act (DPA) affords protection through the Scheduling Process whereby the Planning Authority can designate areas, buildings, structures and remains of geological, palaeontological, archaeological, architectural, historical, antiquarian or artistic importance, as well as areas of natural beauty,

8 An Act to Protect the Environment Act XX of 2001 of 18th September 2001

ecological or scientific value as scheduled property and make conservation orders to regulate their conservation.

The national framework safeguarding cultural heritage is embedded in the Antiquities Protection Act (1925), the Environment Protection Act (1990) and the Development Protection Act (1992). The Antiquities Act affords automatic protection to archaeological and historical artifacts present in the Maltese Islands for at least 50 years, and it includes the marine environment as well. Protection measures implemented under the EPA is limited to the Legal Notice L.N 160 of 1997 directed towards the Conservation and Maintenance of Rubble Walls and Rural Structures. Through the period covering 1994-1999, a number of Sites of Archaeological Importance or Areas of Archaeological Importance on the coast have been scheduled under the DPA. These include the Hagar Qim and Mnajdra Temples, which are designated as a World Heritage Site under the Convention Concerning the Protection of World Cultural and Natural Heritage (1972). With regards to the archaeological sites within marine environment, only three localities have been scheduled to date. These are Ramla Bay in Gozo, Salina Bay and St. George's Bay, Birzebbuga. The areas of cultural heritage afforded protection include the salt pans along the coast.

As a Party to a number of international conventions that aim to safeguard cultural heritage, Malta has an obligation to implement the agreed protective measures. World Heritage Sites have already been designated under the 1972 Convention.

Under the European Convention on the Protection of the Archaeological Heritage (1992), each party has to institute a legal system for the protection of archaeological heritage through the provision of an inventory and physical protection preferably *in situ*. The Convention also calls for the creation of archaeological reserves even where there are no visible remains on the ground or underwater, for the preservation of material evidence to be studied by later generations. The United Nations Convention on the Law of the Sea (1982) also calls for the protection of archaeological and historical features found at sea.

The Development Planning Act of 1992 and the subsequent amendments in Act XXIII of 1997 regulate development control in Malta. The Planning Authority's jurisdiction for development control and planning extends to both land and sea. Development in the marine environment includes land reclamation, aquaculture, beach developments and their related uses.

The Structure Plan policies together with the zoning given by the Temporary Provisions Schemes are the main strategic instrument through which development on the coast is controlled. There are over 50 policies within the current Structure Plan that address the coastal area. These policies range from specific policies promoting coastal management, restrictive policies on specific sites and activities, to policies addressing issues within particular sectors. This section looks at how the current planning policy has influenced the coastal zone within the Maltese Islands.

Although the current Structure Plan has only three policies that specifically address Coastal Zone Management, there are more than 50 policies that directly or indirectly have an impact on the coastal zone. This section looks at the existing policies to identify their effectiveness and suitability with respect to coastal planning at a strategic level.

6.4.2 Existing strategies and policies for ICAM

Coastal *planning* requires a holistic approach to address all the demands and impacts arising from development on coastal resources and uses, within the identified geographical space. The Structure Plan contains a number of distinct policies which directly or indirectly influence the development in the coastal Zone. These are described in Annex III.

6.4.3 Existing institutions and responsibilities

There has never been a tradition for the holistic or integrated management of the coastal area in Malta.

This has resulted from the custom to have discrete departments with specific responsibilities, many of them originating as and when the need arose, or was perceived to require some form of Government intervention or regulation, or when a source of additional government revenue was identified through licensing and permitting.

This has somewhat been altered in the early 1990s with the establishment of a number of agencies namely the Planning Authority and Malta Maritime Authority. This was further strengthened in 2002 with the amalgamation of the former Environment Protection department and the Planning Authority to form the Malta Environment and Planning Authority, (MEPA) which is now Malta's biggest and strongest regulatory authority. These two bodies are perhaps now, the only agencies with an all-encompassing responsibility extending over space and activities. Environment protection and development planning and control over land and sea is the remit of MEPA, whereas the MMA is responsible for all maritime activities.

The Malta Tourism Authority is responsible for tourism planning and management whilst the Police, the Armed Forces of Malta, and Local Wardens are responsible for enforcement of different aspects of regulations and security.

There is such a dynamic relationship between coastal uses and resources such that the only approach to manage them is through policy integration between government and other regulatory agencies. It is certainly much easier and quicker for agencies to co-ordinate policies and actions, than to establish another entity to take on the mammoth task of coastal management. To this effect some of the main issues concerning law and practice are described below to highlight overlapping responsibilities, sectors/area not covered by any institution and common needs.

6.5 COASTAL MANAGEMENT IN PRACTICE

6.5.1 Introduction

In Malta an integrated approach to coastal zone management and spatial planning is still missing. Highly sectoral and uncoordinated policy making, regulation and enforcement compound this deficiency. The agencies having a stakeholder interest or a regulatory function need to adopt a new approach to the implementation of their respective roles so as to ensure a truly sustainable use of this important area. These functions, and in particular that of policy making, should also be exercised in a participative manner with other stakeholders including NGOs and the public. Integration of many viewpoints and concerns also maximizes the specific skills and knowledge base of all the entities participating in the process, and makes maximum benefits from scarce financial and other resources.

Following the process of the legal harmonisation with the acquis of the European Union, it is increasingly being felt that at the national level there should now follow a rationalization of the many new legal (and other) obligations arising from this political process. The aim should be to bring within logical entities, the many duties and powers created by accession, and to thus streamline many processes which in turn would lead to improved efficiency and economy in policy making and implementation.

The main source of the current problems may thus be attributed to a lack of a focus and the lack of a holistic approach within legislation which in turn reflects a lack of understanding of integrated resource management by many law-makers and their respective advisors. The following elements of Maltese Coastal Zone Management serve to illustrate some current practices and to highlight the some deficiencies and conflicts which require to be corrected.

The table is a selection some of the important stakeholder concerns, the agencies which are primarily charged with the responsibility for these sectors, and the other stakeholders which are involved or which are required to make inputs into the process, or which are directly or otherwise affected by the policy or regulatory decisions taken in these sectors.

SECTOR:	TOURISM			
Regulatory institution, dept. or agency	**Area of responsibility / Function**	**Legislation**	**Policies and strategies relevant to ICAM**	**Planning tools and methodologies relevant to ICAM**
Ministry of Tourism and Culture	Sets policy, monitors implementation of the Malta Tourism Authority's Strategic Plan. Sustains the development of Malta's human resources to meet the tourism industry's needs. Oversees the monitoring and enforcement of regulations, standards for accommodation and catering establishments.	Ministry of Tourism Act (Chapter 274)	CAMP Tourism and Health Thematic Activity Tourism Master Plan	Social surveys regarding tourist and health (CAMP) Carrying Capacity Studies
Department of Tourism	Strives to implement the Ministry's objectives. Beach cleaning			
Malta Tourism Authority (MTA)	Advances the economic and social activity of tourism by working with all stakeholders to develop a sustainable industry. Setting standards; enforcement of regulations.	Malta Travel and Tourism Act (Chapter 409) Regulations regarding the licences of scuba diving schools	SCUBA diving promotion Winter removal of Posidonia mattes exposes beaches to erosion	Need strategic plan to address scuba diving as ecotourism Beach replenishment studies
Malta Maritime Authority	Management of marinas, shipping, bunkering activities. Shoreline installations.	Malta Maritime Authority Act (Chapter 352)	Management of conflict of maritime activities (e.g. jet skis, paragliding, and other water sports)	Promotion and management of yacht marinas Zoning of bathing areas
Heritage Malta	Management of Museums and heritage sites	Cultural Heritage Act (Chapter 445)	Mnajdra/ Hagar Qim Heritage Park	
Curator of Cultural Heritage	Safeguards and protects cultural resources	Cultural Heritage Act (Chapter 445)	Protection of wrecks, coastal fortifications, temples, and other similar sites	Needs policy tool to guide on the accessibility and utilisation of cultural sites
Federation of Associations of Travel and Tourism Agencies	Industry lobby of providers of tourism services			
Maltese Timeshare Association	Industry lobby of providers of tourism accommodation services			
Malta Union of Tourist Guides	Industry lobby of providers of tourism services			
Professional Diving Schools Association	Industry lobby of providers of recreational diving services		Promotes sports diving Actively discourages underwater (spear) fishing Promotes MCA's as diving locations to view marine life	
Gozo Tourism Association	Industry lobby of providers of tourism services in Gozo.			

SECTOR:	TOURISM			
Regulatory institution, dept. or agency	**Area of responsibility / Function**	**Legislation**	**Policies and strategies relevant to ICAM**	**Planning tools and methodologies relevant to ICAM**
Malta Hotels and Restaurants Association (MHRA)	Industry lobby	Statutory consultative institution	Vast majority of hotels located along coast. Development pressures on the coast and pressure to remove incompatible land uses e.g. landfills	Industry surveys regarding performance of the sector
Rent-a-Car Association	Industry lobby group		No known policies regarding coastal issues	No known coastal tools and strategies
Din L-Art Helwa	Cultural heritage NGO	Statutory consultative institution	No known policies regarding coastal issues but has been involved in several restoration projects involving coastal fortifications	Commissioned reports regarding coastal heritage but mostly ad hoc, project specific documents - participation in EIAs
Fondazzjoni Wirt Artna	Cultural NGO specializing in Military Heritage		Policy of preservation and appropriate use of coastal (and other) military heritage. Introduced military re-enactment festivals	
Nature Trust	Natural heritage NGO	Statutory consultative institution	Is instrumental in highlighting the importance of coastal issues and lobbied against privatisation of coastal resources	Reports regarding natural environment - participation in EIAs

SECTOR:	TRANSPORT			
Regulatory institution, dept. or agency	**Area of responsibility / Function**	**Legislation**	**Policies and strategies relevant to ICAM**	**Planning tools and methodologies relevant to ICAM**
Ministry of Transport and Communications	Administration of legislation regarding transport. Generation of policy regarding the transport sector.	Malta Transport Authority Act (Chapter 332)	No definable legislation specifically designed for the coast	Traffic Flow studies which apply to the coast
Malta Transport Authority	Management of the transport sector (not including marine); licensing; public transport regulation. Regulation of inter island and coastal ferry services.	Malta Transport Authority Act (Chapter 332)	No definable legislation specifically designed for the coast	Traffic Flow studies which apply to the coast. Parking requirements. Traffic calming and routing measures.
Malta Maritime Authority	Management of maritime transport within territorial waters; management of ports, bays, marinas and harbours	Malta Maritime Authority Act (Chapter 352)	Management of conflict of maritime activity (e.g. jet skis, paragliding, and other water sports). Extension of harbor facilities and marinas.	Zoning of water sports in bays Delineation of shipping lanes, spoil zones, dumping grounds
Rent a Car Association	Industry lobby		No known policies regarding specific coastal issues	No known tools and strategies specifically targeted at transport along the coast.
Armed Forces of Malta (AFM)	Enforcement of regulations regarding maritime transport and zoning regulations within bays and territorial waters	Enforcement of Acts and Regulations administered by other Government Agencies	No known policies regarding specific coastal issues Manages many coastal locations as operational sites.	No known tools and strategies specifically targeted at coastal issues.

SECTOR:	SECURITY			
Regulatory institution, dept. or agency	**Area of responsibility / Function**	**Legislation**	**Policies and strategies relevant to ICAM**	**Planning tools and methodologies relevant to ICAM**
Armed Forces of Malta	Coastal Patrols Border Security. Control of fishing activities in the fisheries conservation zone.	Territorial Waters and Contigious Zone Act (Chapter 226). Continental Shelf Act (Chapter 194). Libya / Malta Median Line agreement.	Detection of illegalities around the coastal waters. Search and Rescue. Control of Immigration. Detection of pollution incidents such as oil pollution.	Security contingency plan. Search and rescue plan. Oil Pollution contingency plan.
Police Department	Control of illegal activities on the land side of the coast.	Code of police laws. Control of hunting laws, including at sea.	No specific policies known. Implements policies established by law or administrative order.	
Local Wardens	Delegated functions such as traffic management and littering	Local Wardens Act	No specific policies known	No specific tools known
Fisheries Department	Protection of fishing resources	Fisheries Conservation and management Act (Chapter 425)	Conservation of habitats and species in the coastal waters	Fisheries conservation zone and fish stocks management. Registration of fishermen and of vessel allowed to harvest resources from the sea. Allocation of fishing rights (Lampuki). Control of areas where trawling is permitted. Determining annual catch of protected species harvested (e.g. Tuna).
Civil Protection Department	Protection of civilians and economic resources in cases of emergency	Civil Protection Act (Chapter 411)	Oil Combating contingency plan	Sensitivity map of the coastal areas

SECTOR:	SPORT AND RECREATION			
Regulatory institution, dept. or agency	**Area of responsibility / Function**	**Legislation**	**Policies and strategies relevant to ICAM**	**Planning tools and methodologies relevant to ICAM**
Ministry of Education, Youth and Employment Includes responsibility for sports	Runs "Skola Sport" a voluntary sport training scheme which includes boating and sailing		Promotes and disseminated formal education including on many coastal related issues. Promotes sporting and educational activities.	No known specific tools
Malta Tourism Authority	Promotion of SCUBA diving Promotion of Malta as a sailing base in the Mediterranean. Promotion of boat races.	"Notice to Mariners" issued by MMA	Blue Dolphin award for underwater photography	
Malta Maritime Authority	Creation and delineation of bathing zones	MMA Act "Notice to Mariners" issued by MMA		
Local clubs and NGOs	Water Sports e.g. Water Polo			
Various commercial enterprises	Beach Activities, beach "concessions" hire of water craft		Planing Guidelines	

SECTOR:	NATURAL RESOURCES			
Regulatory institution, dept. or agency	**Area of responsibility / Function**	**Legislation**	**Policies and strategies relevant to ICAM**	**Planning tools and methodologies relevant to ICAM**
Fisheries Conservation and Control Division, Malta Centre for Fisheries Sciences	Administration of legislation regarding fisheries. Regulation and management of Fisheries.	Fisheries Conservation and Management Act. Tunny Fishery (Shares) Act. Fishery Regulations. Fish Marketing Regulations. Slipway (use) Regulations. Berthing Regulations. Marine vegetation license Regulations. Aquaculture Regulations. Sale of fish Regulations. Prohibition of sale of sea food Regulations.	Fisheries Conservation Zone	Fisheries Conservation Zone Malta / EU agreements
Malta Resources Authority (MRA)	The Malta Resources Authority regulats of water and energy utilities, exploitation of resources such as oil exploration, quarry operators and private abstractors of groundwater, and retailers, operators and tradesmen in the regulated sectors.	Malta Resources Authority Act of 2000.	Strategy aimed at sustaining safe abstraction yield of groundwater. Policy to prevent contamination of acquifer recharge zones.	
Directorate for Water Resources (of MRA)	Ensure proper and sustainable use of all water resources in the Maltese Islands while respecting hydro-environmental and socio-economic constraints; also responsible for economic regulation.	Malta Resources Authority Act of 2000. Water Framework Directive 2000/60/EC. Groundwater Directive 80/68/EEC.		Water Framework Directive 2000/60/EC and the Groundwater Directive 80/68/EEC are useful groundwater management tools that have been transposed in the local legislation.
Directorate for Minerals Resources (of MRA)	Responsible for promoting & regulating exploration and development of Malta's mineral resources; facilitate the development of mineral extractive industries.	Malta Resources Authority Act of 2000	Implement monitoring and enforcement; maintain historical geological database; review of legislation and policy to ensure that the extractive industry continues to provide a competitive environment for resource development on sound economic, social and environmental considerations.	Mineral Resources Development Strategy that is guided by long-term national development plans.

SECTOR:	NATURAL RESOURCES			
Regulatory institution, dept. or agency	**Area of responsibility / Function**	**Legislation**	**Policies and strategies relevant to ICAM**	**Planning tools and methodologies relevant to ICAM**
Oil Exploration Department	Administration of petroleum exploration and production in and around Malta; provides technical support to Government in the form of advice, analysis of data; surveillance of exploration activity on Malta's continental shelf.	Petroleum Production Act, 1958 Continental Shelf Act, 1966 Petroleum (Production) Regulations, 2001		
Malta Environment and Planning Authority Environment Protection Directorate	Responsible for the establishment of long and short-term objectives and strategies in the environment field; for the setting of environmental standards, guidelines and regulations; control and management of activities having an impact on the environment through a licensing and permit system.	Environment Protection Act, Act XX of 2001 Filfla Nature Reserve Act, Act XV of 1998 Development Planning Act, XX1 of 2001 Flora, Fauna and Natural Habitats Protection Regulations, 2003 (Legal Notice 257/03) [Transposition of the Habitats Directive and Natura 2000] Legal Notice 160 of 2002 Convention on Biological Diversity (Incorporation) Regulations	Structure Plan for the Maltese Islands Designation and management plans for Special Areas of Conservation Designation and management of Marine Protected areas	Biodiversity Action Plans Species Action Plans EIA's for developments proposed in the coastal area Management agreements with NGOs for Natura 2000 sites/ Special Areas of Conservation Local Plans Policy documents on CZM Policy document for Marinas Policy document of Hard Standing for boats.
Rural Development Department	Strengthen the agricultural sector, improve the competitiveness of rural areas and preserve the environment and rural heritage.	Rural Development Regulation 1257/ 1999 EU Council Regulation 445/2002.	Rural Development Plan for the Maltese Islands	No known policy specific to the coastal areas.
Department of Agriculture Lands and Water Section	Responsible to safeguard fertile soil, caters for the clearing and storing of fertile soil and supplying farmers with soil; responsible for the distribution of treated sewage effluent to the local farmers.	Fertile Soil Preservation Act. (1973) Agriculture and Fishing Industries (Financial Assistance) Act Pesticides Control Act Plant Quarantine Act Wine Act Producer Organisations Act		

SECTOR:	NATURAL RESOURCES			
Regulatory institution, dept. or agency	**Area of responsibility / Function**	**Legislation**	**Policies and strategies relevant to ICAM**	**Planning tools and methodologies relevant to ICAM**
Water Services Corporation	Achieve a more rational and economic use of water in the Maltese Islands through the maintenance of an equilibrium between supply and demand, and to support the general social and economic development while protecting the environment.	Water Supply Regulations, 1948 as amended. Water Services Corporation Act, XXIII of 1991 as amended by Legal Notice 129 of 1992 and Acts XV of 1995, XVI of 1997 and XXV of 2000.		Desalinization of sea water] Decrease in demand and use of groundwater Policy for the location of RO plants and well fields.
Water Services Corporation Institute of Water Technology	Established in 1993 with the mandate to undertake research, development, investigation education and international exchange in the field of water related issues.			No known policy, but strong supporter for ICZM

SECTOR:	WASTE			
Regulatory institution, dept. or agency	**Area of responsibility / Function**	**Legislation**	**Policies and strategies relevant to ICAM**	**Planning tools and methodologies relevant to ICAM**
Ministry for Resources and Infrastructure	Formulation and implementation of waste management strategy			
Malta Environment and Planning Authority Environment Protection Directorate	Regulation and monitoring of waste management activities.	Environment Protection Act, Act XX of 2001 Development Planning Act, XX1 of 2001	Polluter Pays Principle Best Available Techniques Integrated Pollution Prevention Practices	Waste Subject Plan Minerals Subject Plan
Ministry for Resources and Infrastructure	Mainly responsible for major infrastructural works and projects that are carried out throughout the Maltese Islands; promoting and managing major construction projects and public cleansing; safeguarding the interest of the construction industry.			
WasteServ Malta Ltd.	Established in January 2003, responsible for organizing, managing and operating integrated systems for waste management including integrated systems for minimisation, collection, transport, sorting, reuse, utilistation, recycling, treatment and disposal of solid and hazardous waste.			Operating, monitoring and managing waste management facilities including the composting plant, the material recovery facility, engineered landfills and the Gozo waste transfer station; rehabilitation of landfills such as Maghtab, Qortin and Wied Fulija, in order to develop environmentally sound strategies for their rehabilitation.

Table 1
Responsibilities, and stakeholder interests of some main institutions

6.5.2 Data collection and management

One major other issue which has been identified, relates to the scarcity or unavailability of comparable and, in some cases, reliable data. Although whatever little data which is collected is generally freely available, there is an evident lack of accessibility. The lack of data seriously hampers the participation of stakeholders and the public, and especially the compilation and analyses of relevant indicators. Thus no regional benchmarking can be made to enable our situation to be assessed in terms of the state and pressures of the marine and coastal environment. This makes considerable impact on the effectiveness of decision making.

Thus data on the marine environment particularly on physical parameters (such as sediment transport and currents) and resources (both natural and cultural) is scant, with the exception of a number of localised benthic surveys conducted as part of EIAs and Local Plan formulation and as a demonstration for the recently concluded CAMP. Such data would allow for strategic plans to be developed concerning zoning of activities, particularly when coupled with data on land. It would also allow for effective contingency plans in case of emergencies which would assist decisions in terms of managing oil spills to prevent negative impacts.

6.5.3 General conclusions

Today, the common element in coastal management is the sectoral approach. A tradition to have discrete departments with specific responsibilities has somewhat been altered since the early 1990s with the establishment of a number of agencies, having broader responsibilities.

Unfortunately overlaps in responsibilities were created since the existing legislation, administrative procedures and institutions were in some cases not brought up to date with the emergent legislation. Consequently misunderstandings on operational procedures in certain sectors were created stalling many efforts from different entities.

A number of changes also occurred during the period of the CAMP – Malta project itself. These include the adoption of legislation governing fisheries, the environment and the setting up of the Malta Resources Authority, and of the Malta Environment and Planning Authority respectively. Lately a new organisation called Heritage Malta has also been set up to coordinate all issues in this specific sector.

Eleven out of fourteen ministries in the Maltese Islands are directly involved in regulating coastal issues, areas and uses, yet there is still no specific reference in current legislation to the coastal zone and coastal zone management.

It must also be noted that other agencies and departments may additionally be involved at some stage, within particular activities, e.g. the Veterinary Service that is involved in aquaculture. Similarly, whilst the MTA has no direct involvement in the regulation of the sectors mentioned, it plays an important consultative role on the effect of such regulation with respect to the Tourism Industry. The Ministry for Gozo on the other hand deals with all matters related to Gozo.

The only current legal document that makes reference to coastal zone management is the Structure Plan, the legally recognised document that regulates development. There is also no reference for policy co-ordination or co-operation between government entities in their policy formulation stages with the exception of the Development Planning Act, regulating the functions and obligations of the Planning Authority.

The numerous Legal Acts identify responsibilities and regulations affecting the majority of coastal uses. The only major loophole that exists relates to the marine environment and its administration, with respect to property rights.

In practice however, a number of inter-agency/ inter-department networks already exist, as outlined above. This is testimony to the fact that co-operation can be achieved. The areas where such co-operation exists include pollution control, water quality monitoring and enforcement of regulations relating to swimming zones. The most obvious one is the co-ordinated effort towards combating and monitoring pollution, between the Civil Protection Department, the Malta Resources Authority, the Malta Maritime Authority and the Health Division. This type of integration has been limited by the lack of any legal commitment (including formal memoranda of understanding) towards such efforts.

Through the participation of many entities in CAMP Malta, it has became increasingly understood that most activities are inter-related and the added benefits of policy co-ordination amongst agencies and departments is being acknowledged. More effort is still needed to facilitate and extend this co-ordination to other sectors as well, if integrated coastal areas management is to be attempted. In the absence of specific legislation calling for such policy integration, the next best solution (and in any case as a prerequisite) is for the institutions involved to clearly and formally identify and acknowledge their responsibilities in coastal management.

6.6 INTRODUCTION OF NEW TOOLS AND METHODOLOGIES

MAP-CAMP Malta introduced several innovations to Malta. The thematic activity entitled Systemic and Prospective Sustainability Analyses resulted in the introduction of one element which had a marked general and specific influence throughout the whole process.

The concepts initiated by Blue Plan Regional Activity Center who were leading this activity have been developed to a high degree in Malta by the consultants[9] engaged by BP. The methodology developed in Malta has been found to be particularly valuable as an innovative and bottom up approach whereby stakeholders together developed commonly understandable indicators and their bands of equilibrium between the extremes of 'excessive' and 'deficient', appropriate for each indicator so as to ensure a balanced and eventually a sustainable rate of development. The concept of this methodology needs to be introduced into many other fields of development in Malta. Concomitant with the correct application of the methodology is a strengthening of common understanding (and appreciation by all stakeholders, as to the requirement to adopt specific policies which may appear at face value and in the short term, to be needless if not even creating excessive hardship.

A key element in the CAMP project was the development, at the local parochial, council or stakeholder level of a number of indicators, based on crude date already available, or generated through the project, which were of some importance to those themselves who developed them. Thus farmers themselves decided on what proportion of length of collapsed rubble walls was acceptable or tolerable, and that which was not, and about which some action would need to be taken. Similarly divers decided on the number of divers which a particular diving location could sustain. These stakeholder groups then negotiated between themselves to modify the bands of equilibrium when they recognised that what could be a good situation for one group may have been disadvantageous to another. These discussions resulted in a true and lasting understanding of "sustainability" and "integrated management". Some of these "indigenous" indicators are listed in Annex IV.

Apart from these 'CAMP developed' indicators, some of which are very specific and meaningful to certain groups of stakeholders, one also needs to compile other internationally endorsed indicators which reflect issues affecting the coastal area. Some of the data collected to develop these indicators is managed by the National Office of Statistics, however the concept of the very localized indicators still needs to be developed and formalized, perhaps at Local Council level.

These indigenous (to CAMP Malta) indicators may be compared to those formulated on a regional scale for Coastal Zone Management

Thus, at the European level many countries have elaborated sets of indicators which are of particular relevance to the specific state. At the community level, the European Environment Agency is also elaborating a set of indicators which will permit a common understanding of key issues in an effort to assist in the formulation of policy relevant to the protection of Europe's coasts. These indicators may eventually become, an integral part of each member state's reporting obligations.

These obligations will be based on the DPSIR (Driving force, Pressure, State, Impact and Response) framework, combined with an issues/ thematic approach, to enable links to be identified between pressures on the environment, such as direct inputs and emissions and their impact or changes on the ecosystem, resources or human health, so as to facilitate policy formulation.

In the area of "water", a core set of 86 indicators has been proposed, covering eutrophication and organic pollution, hazardous substances,

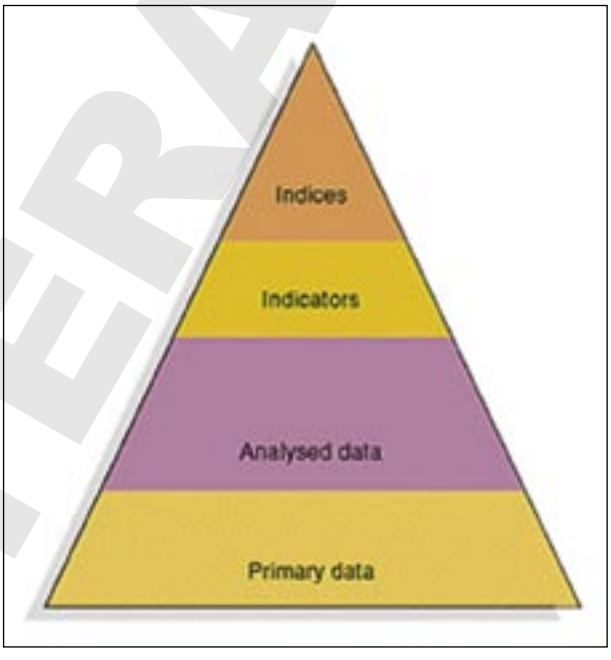

Figure 13
Data aggregation to develop indicators[10]

9 Simon Bell and Stephen Morse.

10 Reproduced from "Integrated coastal area management and agriculture, forestry and fisheries, FAO 1998.

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Ghajn Tuffieha

groundwater quality and quantity, water stress, climate change, drinking water quality, microbiological contamination, impacts of fishing, ecological quality, aquatic biodiversity and integrated coastal zone management.

The core set will be modified, improved and developed over time as more comparable and spatially extensive datasets become available as the Water Framework Directive is gradually implemented by the Member States.

As regards indicators specific to the ICAM process, these are still of an essentially sectoral bases, such as 'fisheries' 'sediment management', 'water quality' etc., which are insufficient to gauge the many and conflicting issues, and the general lack of integration in coastal zone management, which thus continues to take place along sectoral lines. Further more, ICZM indicator development (indeed to the ICZM process itself) requires an input not only from natural scientists, but also from economists, social scientists, and others so as to secure a balanced and holistic treatment. Many of the issues in this field were highlighted in the European Commission's Demonstration Programme on Integrated Coastal Zone Management (ICZM) which ran from 1996 to 1999.

6.8 PUBLIC PARTICIPATION

Until recently, the protection and the management of the environmental resources of the country were considered solely the task of government. This was usually carried out by enacting laws and then enforcing them. There is now a strong awareness that the population as a whole together with Government and all other stakeholders, are jointly responsible for the preservation of our environment.

This "public role", however, is a relatively new phenomenon in the whole decision making process. "Public responsibility" needs to be developed and encouraged so that it may influence the decision-making process.

CAMP Malta played a very important and innovative role by promoting and implementing a bottom up approach as against a top down methods as practiced today. During CAMP, stakeholders were contacted at the inception of the project, before any plans were made. The public and NGOs and stakeholders were given information on the current situation, and then together plans were made for their correction or resolution. This contrast with the previous methods whereby plans and programmes are prepared by a central agency and then approval from the public sought as a conclusion and endorsement of such plans. It has always been felt by the public that at that stage they had no real opportunity to make any significant changes.

Such efforts at engaging the public need to be maintained so that Malta may eventually move into a new era of participative policy making.

6.9 DISSEMINATION AND EXCHANGE OF EXPERIENCES AND INFORMATION

Coupled with the development in the areas of data collection and public participation is a need to disseminate the information acquired. Although modern trends seem to favour electronic formats and methods for such dissemination, it is felt that these methods are rather 'remote' and 'detached' in their delivery. They may convey the information, but not the understanding.

It is felt necessary for those who work in policy development, as well as those in enforcement roles, to regularly and frequently meet with stakeholders to discuss the issues involved and to gauge current opinion on various matters. Such dialogue needs to take place in non-threatening settings and circumstances, and is an essential step in participative policy making.

CHAPTER VII

General issues relating to ICAM

MAP-CAMP showed that, in order to achieve sustainable development in the coastal area, Malta has an urgent need to introduce and apply the new tools acquired and refined during the project.

MAP-CAMP Malta also showed that many of the main environmental pressures in the Maltese territory are generated in this space, however the activities and studies carried out as part of the project also confirmed that many of the impacts can trace their origins in the hinterland either as specific and well defined 'hot spots' such as quarrying or animal husbandry related activities, or in practices of a more diffused manner, thereby affecting whole valley systems or watersheds.

Other pressures put upon the marine side of the coastal zone, could arise from activities and incidents originating in the internal or territorial waters, as well as from transboundary effects such as pollution (such as oil spills) incidents originating in neighboring states or on the high seas.

Integrated Coastal Area Management is directed at joining up and treating in a holistic manner all the different actions and policies which have or may have an effect on coastal regions.

7.1 GENERAL ISSUES

In Malta, CAMP has shown that the key issues of concern, relating to the coastal areas are:

Water shortages and water pollution	Mineral extraction
Population growth	Over fishing and aquaculture
Urban expansion, tourism and recreation	Transport congestion
Air pollution	Endangered species
Sediment movement and coastal erosion	Habitat loss

7.2 MAJOR LEGITIMATE EXPECTATIONS

The major legitimate coastal use which requires a coastal location, as identified in the CAMP are recreation, and the demand for free and the equitable access and multiple use of coastal areas for such purposes.

It is clear that in such a small island, most development types requiring a coastal location are requesting the same space that is being sought for informal recreation by both locals and tourists alike. The current policies are not sufficient to protect coastal areas, even along urban areas, for public use. If no policy changes are made, coastal areas available for informal recreation will continue to decrease. Unless protective policies are formulated, coastal spaces will continue to be removed from the 'public domain' in spite of the clear requirements of the Structure Plan. In addition the losses of coastal heritage, both natural and cultural, will be irreversible.

With the potential of marine related development still not fully exploited, it is probable that future development proposals for marine uses will also increase. In the absence of a holistic policy direction, the potential for conflicts between marine uses as well as coastal activities, is high.

It is evident that the natural characteristics as well as the type and level of development present have created marked differences within the coastal zone on the Maltese Islands. As a result of the small size and high population there are no places in the Maltese Islands that can be considered to be remote and thus safeguarded from human activities. This applies especially to the coast. A strategic approach is thus required to ensure that these varieties are retained within a framework that safeguards both the natural and cultural heritage as well as to ensure adequate use of the coast by legitimate coastal uses.

The scope of this part of the report is to make suggestions as to the future of ICAM over the forthcoming 20 year period It is envisaged to guide the actions of relevant concerned, and interested stakeholders, including regulatory agencies, and

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The public expects equitable access to coastal areas

the public and NGOs who in many cases provide a 'voice' for the expectations of the public, and act as a watchdog over the performance of the official entities and agencies.

The following strategies are suggested for more detailed studies and the preparation and adoption of policies and performance indicators.

7.3 CULTURAL RESOURCES

With respect to cultural resources legal protection has been effective in controlling the types and level of activities permissible within Scheduled Areas. Similar protection of other areas, particularly within the marine environment is necessary, following the compilation of a detailed inventory. The cultural heritage along the coastal zone, including that found underwater, has to be safeguarded, within a framework that acknowledges the presence of other legitimate coastal activities and uses. Any coastal uses present in the vicinity of such remains have to be regulated so as to preserve such structures as well as their contextual landscape. This would also have to apply for rehabilitation projects of derelict waterfronts where the maritime activities that characterised the area need to be incorporated within the new projects in order to retain the vitality of our heritage.

7.4 TOURISM DEVELOPMENT IN COASTAL AREAS

Tourist development should be carried out in such a way as to ensure that the environmental, cultural, and social diversity is protected and enhanced. First and foremost, it needs to meet the needs of the local community without compromising the natural or cultural values which are attractive to tourists in the first place, or the economic viability of existing sustainable commercial activities. Inland as well as offshore attractions should be promoted to relieve pressures on the immediate coastal areas.

Zoning of coastal lands for specific recreational uses, seasons, or for nature and wildlife conservation should be encouraged, and allow for the possibility of establishing disturbance-free zones in the habitats of threatened or endangered species.

The officially adopted TOURISM CARRYING CAPACITY ASSESSMENT carried out for the Malta Tourism Authority by PAP can ensure an optimal sustainably managed future tourism activity when merged with the coastal areas management programme in an overall markedly improved sustainability in the inland and especially the coastal areas.

Specific issues concerning tourism that need to be addressed by a coastal strategy are directed primarily at safeguarding popular tourist areas, including dive sites, from incompatible uses. Measures to protect existing sandy beaches and low-lying rocky shorelines within popular bathing areas from development are also necessary. The

provision for and protection of access facilities along the coast is another issue which has to be provided in recreational/touristic areas, giving due consideration of other legitimate coastal uses to avoid unnecessary negative impacts. Additionally, areas where potential off-shore development related to tourism is possible may be identified.

7.4.1 Sporting activities

Many of the coasts of the island are of outstanding significance in regard to beauty and biodiversity. Indeed they form large percentage of our protected areas. At the same time, touristic pressure on our coasts is disproportionately high. Several touristic and locally oriented 'extreme' type of sporting activities, such as rock climbing, abseiling and para-gliding, impact upon these last outposts of nature. One consequence of this is that the biological diversity of Malta is steadily declining. A process leading to a drop in species diversity and a loss of intact, 'functioning' habitats, from an ecological standpoint, may already be in progress.

Other coastal areas could however benefit from the development of sporting facilities. The area of recreational and competitive boating and sailing needs to be further developed. Recent events have shown that the Maltese have an aptitude for these disciplines and can succeed in international competitions even at Olympic level. These could divert sporting activities from the hinterland, where space and ecological constraints work against such land intensive sport as golf, car racing and flying. It is also recognised that such coastal facilitates could be shared by tourists during the periods when they are not in use by locals (e.g. during weekdays), thus leading to an new tourism product.

7.5 MARITIME ACTIVITIES

These activities are still expected to continue at an increasing level, within the coastal areas. The spatial requirements for these activities need to be safeguarded but not at the expense of the coastal characteristics, both from a natural as well as a cultural perspective. Other legitimate uses that take place within harbour areas need to be safeguarded as well. Similar considerations need to be taken with respect to the yachting industry, which requires space on the coast for hard standing. The development/maintenance of Cirkewwa and Mgarr harbours, so as not to displace activities such as diving and fishing. The selection of bunkering sites as well as offshore spoil grounds need to be considered within a much broader context than one based solely on issues of safety to navigation, in order to safeguard the natural resources as well as existing and potential coastal and marine uses.

7.6 FISH FARMING

With respect to aquaculture, the ecological and geomorphologic characteristics and the presence of other users within and along such a limited coastline make it particularly difficult for this industry to expand unless cage units are taken further offshore within sites specifically zoned and prioritised for this type of activity. Recent technological advances in the operational aspects of fish farms, particularly in anchoring methodology, seem to indicate that they can now be relocated further offshore and in deeper waters where their spatially related impacts can be better absorbed.

Fish farming and aquaculture activities will probably expand. This could be driven by increased profit margins, but also by stricter measures on the conservation of wild fish stocks, which, if the supply of fish proteins in our diet is to be maintained, will lead to farming as a substitute activity.

7.7 SECURITY ISSUES

The coastal areas are *effectively* (but not legally) the most evident and convenient demarcation of National Territory from where jurisdiction over territorial sovereignty is exercised up to the internationally accepted limits. Guarding sovereignty involves operations of physical and electronic surveillance. Both require operational bases and sites. The fortifications erected in medieval and later periods have been pressed into use to cater for this function. A high standard of living makes Malta attractive for illegal immigration. All these geopolitical elements could increase the demand for coastal resources to cater for this new need.

7.8 DESIGN AND PLANNING

The possibility of refurbishing existing (especially if dilapidated) buildings and facilities should be fully explored before any new construction is considered. Where these are considered necessary, they should be compatible with the architecture and environment of the surrounding area. Buildings which impair the quality of scenic views should be avoided, indeed equitable planning should ensure that the availability of 'views' are secured for the maximum number of residencies. Innovative designs, technologies and construction techniques which minimise resource use in

Plate 28
Collecting salt from pans at Qbajjar in Gozo (Vella, 2003)

construction and future operations of the building should be encouraged and supported.

Once facilities are built, efforts should be made to monitor impacts on the coastal environment. If unforeseen impacts arise, activities should be modified to minimise or mitigate environmental impacts.

7.8.1 Siting of buildings and infrastructure

Development which does not require a coastal location can be concentrated outside of the coastal strip.

7.8.2 Wind energy farms

There is a strategic and environmental need in Malta to diversify energy sources. There is also a commitment to reduce our emissions of greenhouse gasses. The erection of wind farms can be one way to generate "green electricity", and coastal sites are prime locations for such farms. Their siting and any resulting impacts of such emergent and innovative development still need to be ascertained.

7.8.3 Land reclamation

This is a potentially attractive method of using inert rubble and stone. However due the small size of the Maltese Islands and the intensity of coastal uses, there is a considerable limitation on the extent of possible development projects necessitating land reclamation from the marine environment.

7.8.4 Beach nourishment and marina development

The perception that tourists need to spend time on sandy beaches, the perception that some sandy beaches have regressed due to natural transport of sand has lead to the desire to artificially augment the sand on beaches. Many new hotel development also strive to achieve a 'postcard' appearance and location, and seek to have an adjacent sandy beach concession.

Marina development is also connected with increased affluence amongst local residents, and the drive to attract to the island a new type of tourist desiring a cruising type of experience. This translates in the development of cruise liner terminals and the development of marinas to enable cruising yachts and super yachts to spend time in Malta.

7.8.5 Quarrying

The main issues relating to mineral extraction are related to the different stages of quarry development and abandonment. The selection of sites for future quarry operation has to give deeper considerations to the impacts to the natural environment. Implementation programs for restoration schemes for both existing and future quarries need to be developed in line with the existing characteristic of the adjacent coastal areas, both in terms of topography, and resources utilisation, with the objective of rehabilitating these sites for multiple uses. Areas known to have mineral reserves should as far as possible be protected from certain types of development.

Plate 29
Elevated road across valley which allows movement of wildlife and sediments across (Vella, 2002)

7.8.6 Salt pans

With respect to salt production the main concern is related to lack of adequate protection and the identification of suitable alternative use. Some of these have been in operation from the Roman period and many from medieval times. They are also important resting grounds for waders in transit to and from Europe.

7.8.7 Roads

Although access to the coastline, particularly in urban areas is essential, land take up from undeveloped low-lying shorelines is to be used for this purpose should not be encouraged. There seems to be a need for small car-park facilities to be identified along certain coastlines, following consideration of the environmental and amenity characteristics of each particular area. The policy of road building adjacent to the coastline also needs to be revisited since roads could form barriers to the movement of sand, flora and fauna, from the coast to and from the hinterland.

7.8.8 Promenades

The new construction of traditional (and popular) shoreline promenades should be avoided, as these will disturb coastal dynamics in much the same way that roads, rows of hotels, and other such barriers do. It is more profitable to upgrade existing locations, because where this has been carried out they serve to attract considerable numbers of people away from beaches and other sensitive locations, to the promenades where they can exercise, interact socially as well as participate in formal and informal recreation, in restaurants and informal eating places, in a manner which is without great impacts to the environment.

Interference with natural run-off patterns should also be avoided. Activities which increase the volume or toxicity of run-off should be avoided. These include extensive paving (roads, country roads and parking spaces), destruction of (even by neglect) of rubble walls and similar structure, bad animal waste management practices which pollute ground water and particularly water courses during intense periods of rainfall,

It is also essential to ensure ecological corridors which ensure the continuity, integrity and ease of the flow of runoff waters, sand and sediments, as well as of flora and fauna to and from the coast and into the hinterland. The construction of impervious roads and structures which impedes such a flow should be stopped and where they exist remedied.

7.8.9 Landscaping

Designs should ensure that natural vegetation is left intact as much as possible. Where this is not possible, indigenous species should be used for landscaping. These species can also help to bind soils reducing water induced soil erosion.

Landscaping should be planned so as to avoid the need for excessive watering (and appropriately treated effluent should be used for watering vegetation).

7.8.10 Pipelines and cables

The main issue is related with safeguarding this economically important infrastructure from incompatible development. In turn such infrastructure, and their maintenance and or periodic replacement require works such as land and marine side trenching, dredging and placement of moorings. These activities can be very disruptive and damaging to coastal ecosystems.

7.8.11 Oil exploration

The major issue concerning oil exploration is relate to the potential impacts arising from the industry with respect to coastal and marine resources as well as uses. Impacts can arise at the exploration site itself, as well as at the operational base where equipment and material are stockpiled and personnel congregate.

7.9 SOLID WASTE COLLECTION AND TREATMENT PROGRAMMES

Tourism also has impacts on environmental quality. The collection, treatment and disposal of solid and/or liquid wastes, particularly during peak tourist seasons, may be inadequate. This applies to many of our secluded bays and stretches of coastline which are being 'discovered' by beach users intent on getting away from crowded locations. These changing patterns of use, where different 'clients' use the coast at different times, but which in effect results in the coast being 'in use' continuously leads to difficulties in management such as maintenance, cleaning and waste collection and disposal.

Provisions for the handling and treatment of solid waste generated by tourist facilities should be arranged prior to their development in close co-operation with local authorities.

A main issue is the location of new waste transfer, treatment and disposal sites which are currently located in the coastal zones. These have potential impacts on the coastal resources including the marine environment, arising from potentially inappropriate waste management practices. Another waste related topic concerns the chronic habit of disposing of wastes, particularly from agricultural activities (including plastic film and materials) within water courses. This material chokes valleys and eventually finds itself within the coastal areas and into the coast.

7.9.1 Litter

Provisions should be made to keep beaches clean and free from litter, by providing and managing adequate waste receptacles, sanitary facilities, and carrying out regular beach clean-ups, etc. Shops, restaurants, hotels and other businesses located near the seafront should adopt proper waste management practices, including reducing their wastes and preventing it from escaping into the marine environment. They should also make efforts to reduce litter generated by their customers, including by providing sufficient waste receptacles. Efforts to recycle should be encouraged by making make waste separation receptacles conveniently available
Businesses should be encouraged to avoid the use of disposable products (plates, utensils, table cloths, cups, toiletries). When disposable products are used, they should be made of recyclable materials, preferably paper.

7.10 SEWAGE

Sewage treatment plants in Malta are coastal development projects. The provision of suitable locations for the proposed sewage treatment plants needs to ensure that impacts on other uses as well as on the coastal resources are minimised. There is also a need to distribute treated waters to where they will be used, in an economic and energy efficient manner. From a strategic point of view this is translated into the prevention of incompatible development from taking place in the vicinity of the proposed locations. Second class water produced from treatment plants will result in a considerable additional amounts of available water for irrigation and other uses. There will certainly be a larger proportion of land under permanent irrigation, especially in low lying areas. The coastal implications need to be assessed.

7.11 EDUCATION

Informing locals, tourists, tour operators, and staff about ways to reduce environmental impacts should be an integral component of tourism development plans. The Institute of Tourism Studies should reinforce its activities in this area. Coastal visitor and information centers should be made interesting and attractive to encourage tourists to make use of them. Educational materials and exhibits emphasising respect for the local environment and culture should be provided by all major hotel establishments.

7.12 RECREATIONAL ACTIVITIES

Access to previously undeveloped coastal areas for recreational purposes should only be permitted if the nature and/or character of the area will not be harmed. Facilities for sports which attract large numbers of spectators should not be sited on the coast.

7.12.1 Changes in recreational patterns

Malta is a small island and consequently has a small length of coastline. Nature has thus endowed the country with limited beaches. An even smaller proportion consists of the more popular sandy type. These beaches cannot cater for all these users. There has however been a process of adaptation in that users have chosen to utilise beach resources at what may appear to be rather unusual hours. Many users utilise the beach from sunset up to very late at night. These leaves the morning hours essentially for tourist use, and for the use of relatively young persons. Night time use is essentially reserved for older independent users and family groups. This is a good example of multiple use of scarce resources. Typical night time uses are mainly barbecues and on occasion discos and similar public activities.

7.13 HEALTH AND SAFETY ISSUES

As many beaches and rocky costs should be covered by the services of beach patrols, lifeguards and first aid stations. Warning systems in case of danger from water and climatic conditions should be posted and advertised.

7.14 BEACH MANAGEMENT PLANS

Plans for the management of both rocky as well as sandy beaches should be drawn up.

CHAPTER VIII

The future of ICAM in Malta

8. INTRODUCTION

This chapter proposes to suggest how the 'vision' concepts, outlined in the previous parts of this document, could be realistically put into practice. Although they have received a high degree of consensus during the CAMP programme, and during its concluding conference, they still need to be brought into effect. It also needs to be emphasised that any such plans and guides would require periodic formal review, potentially modifying the suggested action programmes so as to make them better equipped to deal with any new pressures and impacts which may arise over the intervening years. This is especially important now that as a member of the EU, the many opportunities becoming available could facilitate rapid development which could affect the coastal areas, requiring the urgent need to adopt integrated coastal area management practices. This requirement is indeed recognised at the community level.

In order to achieve the transition from theory to reality key institutions and agencies need to:

1. Make advances towards achieving an integrated and ecosystem approach of the coast, by giving consideration to the interrelation of physical, biological and geomorphological processes, and relevant aspects such as biodiversity, social progress, degree of satisfaction, and particularly advances towards devising objective economic valuation techniques for externalities of main impacting activities.
2. Emphasise the need to agree upon a common understanding of the "coastal zone" in functional terms, and a common sense of vision of how we wish the coast to meet the needs of current and future generations as well as the interpretation of ICAM as a pro-active tool to facilitate appropriate development of coastal areas and resources.
3. Consider the urgent need to define precise scenarios and their probable consequences, in co-ordination and *with the further assistance of* the relevant International Bodies, such as UNEP MAP, concerning the priorities identified by CAMP Malta. Short-term financial profits should not prevail over broader, long-term economic, social and environmental costs.
4. Promote the general use of existing comparable indicators i.e. for sustainable development, and if appropriate to develop *specific* indicators on a national *or local* basis to provide standardised descriptions of the status of the coast and possible impacts of human activities, as well as of international progress made towards ICZM.
5. Make advances in the management and development of knowledge, specifically, in knowledge organisation, in the light of the opportunities provided by new technologies, and supported by common, systematic and standard formats, capable of producing standardised data bases that facilitate the flow of information on a national (and international) scale with the use of standardised G.I.S. too.
6. Compile a Guide to Good Practices for ICAM in Malta, with particular reference to main impacting activities (i.e. tourism, fishery, aquaculture, harbours management, urban planning in coastal zone, water management and biodiversity conservation) so as to integrate horizontal decision making processes, and also provide a foundation for communicating the benefits brought by ICAM implementation.
7. Promote ICAM on a local scale[11], in the conviction that local councils *(representing the local viewpoint or interest)* and stake-holders play an essential role in the success of ICAM. Furthermore emphasising the possibility to use spatial planning integrated with sea-use planning and marine resources management, at national, regional and local level as a way to apply a holistic and dynamic perspective in ICAM in order to create a common vision of the sustainable development in the coastal zone and to ensure dialogue and participation of local and national stakeholders.
8. Take advantage of, and encourage the creation of synergies arising in the application of numerous national and international instruments or initiatives affecting the coastal zones. such as the work of the National Commission for Sustainable Development, large-scale and micro-scale financing/

11 At local council level.

investment instruments and national/regional/local co-ordination of initiatives and subsequent strategies on ICZM.

Camp identified a number of key issues and processes both natural as well as human and societal. Not all of them can be addressed by a coastal strategy within a customary planning process. The Structure Plan is essential but it is only a spatial planning tool focusing mainly on spatial demands, and any coastal strategy it adopts is but one tool towards the goal of Integrated Coastal Areas Management.

There are many suitable tools and mechanisms to cater for the requirements of sustainable and integrated coastal areas management.. Taking as a bases the general and popular endorsement of the coastal vision as described in the "Coastal Declaration"[12], and its support by the stakeholders during the final presentation conference, we may propose the following measures designed primarily to bring into effect the ideals and principles set out in the 'vision'

In the first instance we believe that the bases for the sustainability (in time) of such new initiatives and proposals need to be grounded and strengthened by legal backing and appropriate institutional provisions, including financial security.

8.1 LEGAL PROVISIONS

In order to ensure continuity, the process of ICAM needs to be formalised and institutionalised.

It is therefore proposed that in the first instance and as a matter of some priority, the Coastal Zone of Malta should be defined through a legal notice issued jointly under the Environment Protection Act and the Development Planning Act.

This new legal instrument should also be used to launch a Coastal Resources Advisory Board, as an advisory board within the general consultative structures of the Malta Environment and Planning Authority. Its general conception would be closely modeled and related to, but in many ways improved, the currently existing Heritage Advisory Committee.

This new committee will be called the "COASTAL RESOURCES ADVISORY BOARD". It will have no executive powers, its main being to advise the MEPA regarding any and all forms of development and any activity which is proposed to take place in the defined coastal zone of Malta.

It will also have the means to conduct surveys, research, and monitoring activities, and to disseminate the outputs of such initiatives, to selected audiences and (in concurrence with the Arhus Convention) widely to the general public. It is also proposed that CRAB would be represented (by its chairperson) on Malta's National Commission for Sustainable Development, and would be a formal sub-committee of the Commission, entrusted with ensuring the sustainability of the coastal regions.

8.2 INSTITUTIONAL PROVISIONS

CRAB will be chaired by the Environment Protection Director (or his representative), and will have as member key persons who can give a contribution to the debate and to policy formulation (for submission to MEPA). Another key group of persons will be representatives elected or nominated by stakeholders, including representatives of Local Councils, NGOs, socio-economic actors, and the general public. It is also suggested that, to the fullest extent possible, those members who have actively participated in CAMP Malta, should be retained on CRAB.

A mistake that must be avoided at all costs is omitting the involvement of local stakeholders at the beginning of *plan development*. Two processes may be identified in which local stakeholders may interact between themselves.

The first one is the plan development process and second the *decision making* process.

Communication between stakeholders on these processes is seen as a main tool for participation. A new concept in policy and plan development is interactive policymaking. Making use of shared responsibility and finding common interests needs to be seen as inevitable and essential for further plan development and participation in such initiatives.

MEPA could also support the CRAB by making provisions for its secretariat (Secretary and an assistant) whose only function will be to service CRAB.

8.3 PROPOSED FUNCTIONS OF CRAB

This advisory group will thus in essence be a collaborative involvement of organisations and individuals in the planning and management of ICZM initiatives.

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Its main tasks could be to propose and suggest initiatives leading to:

- Coherent spatial planning
- Improved decision making
- Improved stakeholder understanding
- Agreement on prioritisation
- Fostering a strong community feeling and thus participation and concurrence
- Promote a better quality of life through "coastal" services and facilities
- Reduced pollution (from all sources)
- Recommend measures leading to sustainable fishing and aquaculture
- Recommend measures leading to sustainable tourism
- Promote habitat conservation and restoration
- Promote and suggest measures leading to reduced erosion, desertification and flooding
- Generally act to lower environmental risks
- Initiate and or support research programs
- Promote greater public awareness
- Conduct periodic people satisfaction surveys
- Disseminate information concerning all aspects of Coastal Zone Management
- Promote and implement formal and popular educational initiatives
- Suggest landscape improvement measures and the conservation and restoration of rubble walls and rural features
- Suggest sustainable measures to improved the economic returns from coastal resources
- Promote the creation and maintenance of Blue Flag status beaches

8.4 WORKING METHODOLOGY

CRAB would work in a CONTINIOUS but CYCLICAL manner

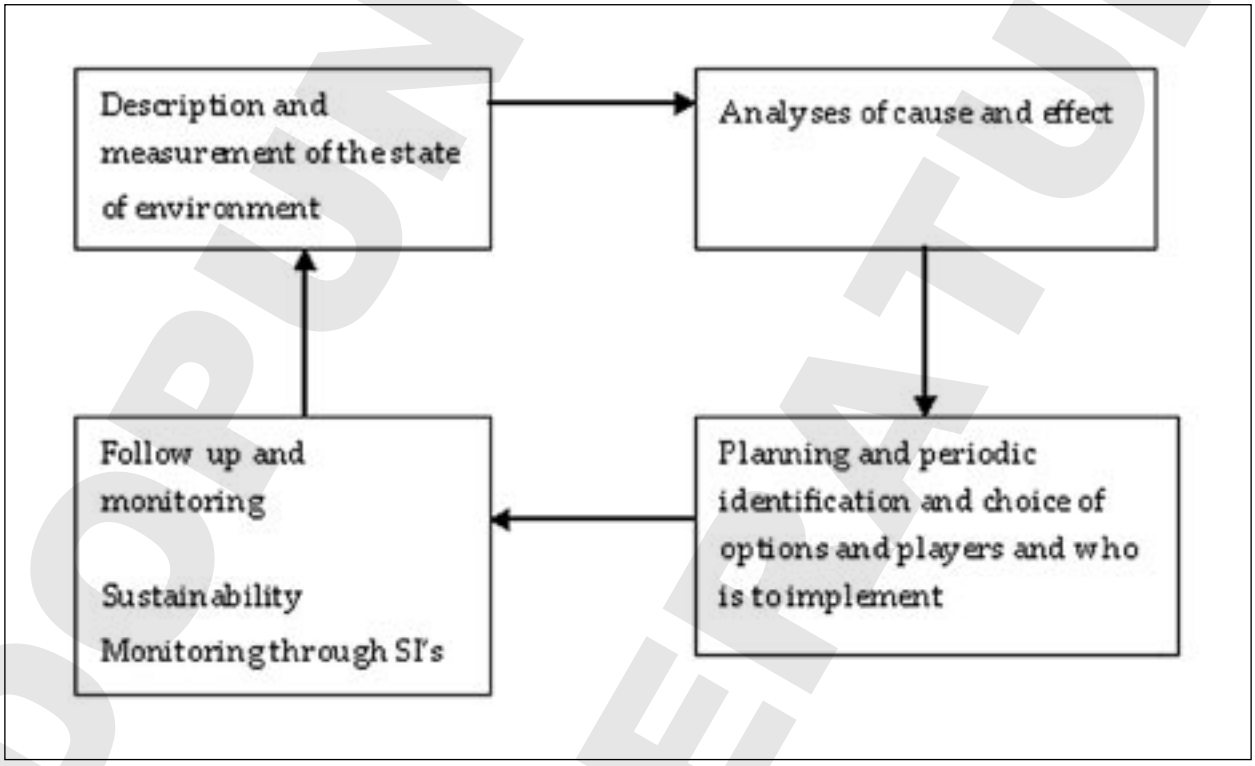

Plate 14
Operations of CRAB

CHAPTER IX

Examples of coastal management in practice

In order to give practical examples of what is being taking place in the field of integrated coastal area management, the following projects have been identified. They are however mainly stand alone activities, and many are following their own "life" with little formal input from the MAP-CAMP project, but they serve to illustrate the present state of play.

Such project eventually need to work in harmony and synergy, so that during their implementation, they will strengthen integration of the policies and actions set out in this document, and result in demonstrable and truly integrated coastal management from which sustainable development and benefits to the community as a whole can be derived.

9.1 MAP CAMP - THE MALTA PROJECT

MAP CAMP Malta was the first exercise in integrated coastal area management carried out in the Maltese Islands. It was the product of a series of five thematic activities (i.e. sustainable coastal management, tourism and health, erosion/ desertification control management, water resources management and marine protected areas) which addressed specific sectors regarding different problems and issues pertaining to the Maltese coastline. These thematic activities were complemented by three transversal activities, focusing on sustainability analysis and the development of sustainable indicators, data management and overall coordination of the Project. This structure was consistent with the Mediterranean Action Plan's Coastal Area Management Programme which has been applied in eight other locations around the Mediterranean Basin.

The broad objective of CAMP Malta was to increase national efforts towards sustainable management and environmental protection in Malta. This was carried out mainly by applying the methodologies and tools of ICAM and thereby identifying a strategy and action plan for ICAM in NW Malta.

CAMP Malta had a lengthy preparatory phase and a short implementation phase. This was very useful and successful since it was in line with the funding cycles of donor agencies. Furthermore, CAMP Malta incorporated and produced a number of important innovations. In a few cases the methodologies proposed were refined to better adapt them to the local scenarios which was necessitated by the smaller size of the country and thus the areas under study.

An important output of the CAMP Malta Project was the production of a set of thematic maps. The production of these maps involved the application of techniques which are innovative for Malta. A Final Project Database containing data compiled, collated and captured by the five thematic activities as well as for the horizontal activity, i.e. the Systemic and prospective sustainability analysis was produced on CD.

The identification and organisation of a series of key issues was another crucial output of the Project. These were largely elicited from the concerns of stakeholders and conditioned the orientation of the project towards a "bottom up" approach where problems and issues perceived by stakeholders and the public in general, were accorded the highest priority. In this respect, the role of the team leaders of most thematic activities was seen as more of facilitation rather than prescription.

The key issues were organised according to the three principles of sustainable development -environmental integrity, economic feasibility and social equity, thus facilitating integration and the identification of gaps. These functional and spatial gaps also included emerging issues. After identifying and analyzing sets of key issues and their interactions, CAMP Malta delivered a set of strategies and specific actions which are meant to address, correct or mitigate identified problems. This action plan was organised into another set of matrices outlining proposed strategy elements aimed at bringing about the required changes. In this respect, categories include governance; legal action; capacity building; knowledge and information; economic instruments; technological innovations and the protection of coastal resources.

9.2 GHAJN TUFFIEHA/RAMLA L-HAMRA

The Project of Ghajn Tuffieha (l/o Mgarr, Malta) and ir-Ramla (l/o Nadur, Gozo), implemented between 1999 and 2003, was coordinated by the Euro-Mediterranean Centre on Insular Coastal Dynamics (ICoD), in partnership with the Gaia Foundation and with the support of the Ministry for Rural Affairs and the Environment. Funds were secured through the European Union as part of the EU Life Third countries programme.

This Project focused on the integrated and holistic management of specially protected coastal areas in the Maltese Islands. The management of these two sites has been entrusted to a local NGO, i.e. the Gaia Foundation. This was achieved through the implementation of good management practices for the sustainable use of two coastal areas of conservation value in the Maltese Islands. Both sites are nationally recognized as sites of landscape value and are so far largely unspoilt by anthropogenic influence. The Project thus aimed to reconcile the simultaneous use of these sites for nature protection and for tourism.

The management plan aims to provide the means for:

- species and habitat protection;
- control of activities within the area;
- scientific research;
- education and public participation.

This Project commenced in 2001 and is expected to conclude in July 2004.

9.3 REGIONAL PROJECT FOR THE DEVELOPMENT OF MARINE AND COASTAL PROTECTED AREAS IN THE MEDITERRANEAN REGION (MEDMPA)

The MedMPA (Regional Project for the development of marine and coastal protected areas in the Mediterranean region) is a Project financially supported by the European Commission and is coordinated by MAP RAC/SPA. The Malta Environment and Planning Authority and ICRAM (Instituto Centrale per la Ricerca Scientifica e tecnologica applicata al mare - Italy) are Project partners, where ICRAM is providing technical assistance to MEPA in the Project.

Previous reports have identified candidate sites as a Marine Protected area in the Maltese Islands. One of these sites is a stretch of coast from Rdum Majjiesa to Ras ir-Raheb in the northwest of Malta. During the MAP CAMP Malta Project, an activity on a pilot study for the evaluation, designation and drawing up of a management plan for a Marine Protected Ras on the northwestern coastal of Malta was implemented. The outputs of this activity confirmed preliminary works carried out in this area and justified the proposal that the area is a suitable candidate for a Marine Protected Area. Therefore, the results and outputs of this activity are being used to elaborate a management plan for the site as a Marine Protected Areas within the framework of the MedMPA Project.

BIBLIOGRAPHY

Baldacchino, A. E. and C. M. Tanti (1999) *National Awareness Seminar on land degradation and desertification - Proceedings of Seminar 3rd - 4th June, 1998, Malta*. Environment Protection Department, Floriana, Malta.

Borg, J. (1998) *The importance of vegetation on the choice of nesting sites by Cory's shearwater Calonectris diomedea in Malta, preliminary results*. In: Monitoring and conservation of birds, mammals and sea turtles of the Mediterranean and Black Seas. Proceeding of the 5th Medmaravis Symposium, Gozo, Malta, 29 September – 3 October 1998 (Yesou and Sultana, Eds.).

Cachia Zammit, R. (2003) *Malta's Heritage – The Victoria Lines*. 2nd edition, R. Cachia Zammit (Editor), Progress Press Co. Ltd., Malta.

Camilleri, A. (1998) *Degradation of the terrestrial environment in the Maltese Islands*. In: Baldacchino, A. E. and C. M. Tanti (1999) National Awareness Seminar on land degradation and desertification - Proceedings of Seminar 3rd - 4th June, 1998, Malta. Environment Protection Department, Floriana, Malta.

Dimech M., Borg J. A. and Schembri P. J. (2000) *Structural changes in a Posidonia oceanica meadow exposed to a pollution gradient from a marine fish-farm in Malta (Central Mediterranean)*. Biologia Marina Mediterranea, 7(2): 361-364.

EEA (1997) *Sustainable Development for Local Authorities, Approaches, Experiences and Sources*. Prepared by Malini Mehra IMSA, Amsterdam.

EEA (2000) *State and pressures of the marine and coastal Mediterranean environment*. Environmental issues series No. 5.

Environment Protection Department (1999) *State of the Environment report 1998*. Environment Protection Department, Floriana, Malta.

Fondazzjoni Wirt Artna (2003) *Wirtna*. Newsletter of the Malta Heritage Trust. Issue No. 1. Printcare Ltd., Malta.

Department of Fisheries (2002) http://www.fao.org/fi/fcp/en/MLT/profile.htm. Accessed on 11th March, 2004.

Gauci, V. (1994) *Solid waste management: the Traditional versus sustainable approaches.* In: Marine Pollution in Malta - The Problem and its Management. Proceedings of a Conference on the Management of Marine Contamination Hazards (V. Axiak, Ed.).

MEPA (2002) *State of the Environment Report for Malta. Malta Environment and Planning Authority, Floriana, Malta*.

MEPA (2003) *Rural Strategy Topic Paper*. Volume 1. Malta Environment and Planning Authority, Floriana, Malta.

Mercadié, A. (1999) *Application of the Aarhus Convention in the Integrated Coastal Zone Management (ICZM) process*. Université du Littoral, Dunkerque, France.

NSO (2001) New Release No. 35/2001. Issued on 18 April 2001. Valletta: National Statistics Office, Malta.

NSO (2001) New Release No. 54/2001. Issued on 5 June 2001. Valletta: National Statistics Office, Malta.

NSO (2001) New Release No. 68/2001. Issued on 19 July 2001. Valletta: National Statistics Office, Malta.

Planning Authority (2000) *Coastal Profile I*. Report drawn up by Coastal Zone Management Team for MAP CAMP Malta Project, Floriana, Malta.

Planning Authority (2000) *Coastal Profile II*. Report drawn up by Coastal Zone Management Team for MAP CAMP Malta Project, Floriana, Malta.

Planning Authority (2001) *Policy & Design Guidance on Fishfarming - Search area policy (Amendment)*. Planning Authority, Floriana, Malta.

Planning Authority (2002) *Coastal Strategy Topic Paper*. Planning Authority, Floriana, Malta.

Role', A. (1998) *Land degradation and urbanization in an island state*. In: Baldacchino, A. E. and C. M. Tanti (Eds.) National Awareness Seminar on land degradation and desertification - Proceedings of Seminar 3rd - 4th June, 1998, Malta. Environment Protection Department, Floriana, Malta.

Schembri, P. J., Baldacchino, A. E., Mallia, A., Schembri, T., Sant, M. J., Stevens, D. T. and Vella, S. J. (2002) *Natural Resources, Fisheries and Agriculture*. In: State of the Environment Report for Malta, 2002. Ministry for Home Affairs and the Environment, Malta.

Stephen C. Spiteri (1994) *Fortresses of the Cross - Hospitaller Military Architecture (1136-1798)*. Heritage Interpretation Services, Malta.

Tanti, C. M., A. Role', A. Borg and I. Calleja (2001) *Socio-economic patterns and strategies*. MAP CAMP The Malta Project, Environment Protection Department, Floriana, Malta.

Tanti, C., A. Role', A. Borg and I. Calleja (2002) *Protection of Soil and rural landscapes in Northwest Malta*. Activity 5: Soil Erosion/Desertification Control Management, Final Activity Document, Environment Protection Department, Malta.

UNEP/MAP/PAP (2001) *Good Practices Guidelines for Integrated Coastal Area Management in the Mediterranean*. Priority Actions Programme Regional Activity Centre, Split.

Vella, L., C. M. Tanti, A. Role', M. Borg and B. Shipman (2003) *Integrated coastal area management in the island of Malta - a tool for sustainable use of coastal resources with particular reference to the northwest*. Final integrated project document for MAP CAMP the Malta project. MEPA, Malta.

Annex I

List of flora and fauna recorded from the Maltese Islands	
Algae	ca. 150
Myxomycota (slime moulds)	ca. 71
Large Fungi	ca. 150
Lichenes (lichens)	ca. 300
Bryophyta (mosses and relatives)	ca. 130
Pteridophyta (ferns and relatives)	11
Gymnospermae (conifers)	2 indigenous species
Angiospermae (flowering plants)	ca. 900 indigenous species

List of fauna recorded from the Maltese Islands (reproduced from Schembri *et al*., 1998).	
Hydrozoa (hydras)	1 species recorded
Turbellaria (flatworms)	at least 10 species
Nematoda (roundworms)	ca. 27 plant parasitic species; probably 1-2 hundred free-living and other species occur
Nematomorpha (horsehair worms)	1 species
Annelida (earthworms and leeches)	at least 15 species
Mollusca (snails and slugs)	69
Scorpiones (scorpions)	1
Pseudoscorpiones (false scorpions)	ca. 24
Opiliones (harvestmen)	ca. 6
Araneae (spiders)	ca. 83 recorded; at least 200+ species occur
Palpigradi (microwhipscorpions)	1
Acari (ticks and mites)	a few species recorded; many more occur
Branchiopoda (fairy shrimps, water-fleas and relatives)	at least 10 species
Ostracoda (seed shrimps)	at least 7 species
Amphipoda (sandhoppers and beach-hoppers)	ca. 9 recorded
Isopoda (woodlice)	ca. 49
Decapoda (crabs)	1 freshwater species
Apterygote orders	ca. 20 species recorded; many more occur
Odonata (dragonflies & damselflies)	ca. 10 recorded
Dictyoptera (mantises & cockroaches)	ca. 11
Orthoptera (grasshoppers)	ca. 48
Dermaptera (earwigs)	5
Isoptera (termites)	2
Coleoptera (beetles)	ca. 600 recorded; probably 2000+ occur
Homoptera (aphids, leafhoppers, scale insects and relatives)	a few species recorded; many more occur
Heteroptera (true bugs)	113 recorded; more occur
Lepidoptera (butterflies and moths)	ca. 590
Neuroptera (lacewings)	ca. 30 recorded
Diptera (flies)	ca. 200 recorded; probably 500+ occur
Hymenoptera (bees, wasps and ants)	ca. 150 recorded; probably 500+ occur
Diplopoda (millipedes)	ca. 14
Chilopoda (centipedes)	ca. 15
Amphibia (frogs)	1
Reptilia (reptiles)	9
Aves (birds)	ca. 13 resident
Mammalia (mammals)	c. 20

List of marine flora and fauna recorded from the Maltese Islands (reproduced from Schembri *et al*. 1998). In some cases the numbers given are only estimates, as the groups concerned have not been adequately studied.

Macroscopic algae (seaweeds)	ca. 220 recorded; more occur
Microscopic algae	ca. 160 recorded; more occur
Marine angiosperms (sea-grasses)	3 confirmed species
Porifera (sponges)	33 species recorded; more occur
Hydrozoa (hydroids),	ca. 34 recorded; many more occur
Scyphozoa (jellyfish)	ca. 5 recorded; more occur
Anthozoa (sea-anemones and corals)	ca. 20 recorded; many more occur
Ctenophora (comb-jellies)	2 species recorded; more occur
Platyhelminthes (marine flatworms)	occur not studied
Nemertina (ribbon worms)	ca. 4 species recorded; more occur
Nematoda (thread worms)	occur but not studied
Gastrotricha	occur but not studied
Rotifera (wheel animals)	occur but not studied
Kinorhyncha	occur but not studied
Bryozoa (moss animals)	ca. 20 species recorded; many more occur
Brachiopoda (lamp shells)	6
Phoronida	occur but not studied
Caudofoveata	2; more may occur
Solenogastres	2; more may occur
Polyplacophora (chitons)	19
Scaphopoda (tusk shells)	10
Gastropoda (marine snails and slugs)	ca. 600 recorded; more occur
Bivalvia (marine bivalves)	ca. 230 recorded; more occur
Cephalopoda (squid, cuttlefish and octopuses)	20 recorded; more occur
Priapulida	probably occur
Sipuncula (peanut worms)	ca. 3 recorded; more occur
Echiura (spoon worms)	1 species recorded; more may occur
Polychaeta (ragworms and relatives)	ca. 83 recorded; more occur
Oligochaeta (marine oligochaetes)	occur but not studied
Hirudinea (marine leeches)	1 species recorded
Tardigrada (water bears)	occur but not studied
Pycnogonida (sea spiders)	occur but not studied
Branchiopoda	1 species recorded; more occur
Ostracoda (marine seed shrimps)	2 species recorded; more occur
Copepoda (oar shrimps)	ca. 54 recorded; more occur
Cirripedia (barnacles)	19 species recorded; more occur
Isopoda (sea slaters and fishlice)	ca. 12 species recorded; more occur
Amphipoda (beachhoppers)	ca. 21 recorded; many more occur
Mysidacea (mysid shrimps)	2 recorded; more probably occur
Euphausiacea (krill)	3 recorded; more probably occur
Stomatopoda (mantis shrimps)	3 recorded; more probably occur
Decapoda (shrimps, hermit crabs & crabs)	ca. 85 recorded; more occur
Crinoidea (sea lilies)	1 species recorded
Asteroidea (starfish)	ca. 14 recorded; more occur
Ophiuroidea (brittle stars)	ca. 5 recorded; more occur
Echinoidea (sea urchins)	ca. 17 recorded; more occur
Holothuroidea (sea cucumbers)	3 recorded; more occur
Chaetognatha (arrow worms)	4 recorded; more probably occur
Hemichordata (hemichordates)	may occur
Urochordata (tunicates)	ca. 16 recorded; many more occur
Cephalochordata (lancelets)	1
Agnatha (jawless fishes)	1
Chondrichthyes (cartilaginous fishes)	51; more may occur
Osteichthyes (bony fish)	234; more may occur
Reptilia (marine turtles)	3
Mammalia (seals, dolphins and whales)	1 seal and ca. 9 cetaceans

Annex II

Coastal Zone Management (Structure Plan Policies CZM 1- 3; TOU 15)

Coastal planning incorporates a holistic approach to address all the demands and impacts arising from development on coastal resources and uses, within the identified geographical space. The three distinct policies within the Structure Plan, CZM 1-3, attempt to introduce the concept of coastal management within the planning process. Policies CZM 1 and 2 address the administrative measures to adopt coastal management rather than giving a strategic direction of how development can occur in coastal areas. As they stand, these policies do not assist the development control process at all. Policy CZM 3 calls for public coastal access all along the coast.

The absence of an identified geographical space directing where this policy applies has led to loopholes in development control, whereby access has been interpreted as a pathway, thus displacing informal recreational public space by development. Furthermore the lack of information on land ownership has hindered measures towards expropriation of coastal areas to bring them back into public ownership as directed in the policy. Public use of the coast is still an issue that needs to be addressed at a strategic level. Policy TOU 15 is also administrative as it calls for the formulation of a comprehensive coastal management plan.

Annex III

Structure Plan policies affecting the coastal zone

1 General Conservation: Policies RCO 10, RCO 11, RCO 19, RCO 20, RCO 21, RCO 24,

Policies RCO 10 and 11 have protected most of the coastal habitats and areas of scientific importance along the coast and proved effective for development control once these areas were protected. There are other areas that require protection and such policies would adequately assist this process within the formulation of the Local Plans. Once areas are scheduled and protected the next step would be to retain and if possible enhance their status. Policy RCO 20 could have been more strategic if the areas of degraded habitat and landscape were identified. Such areas are still present today and have been identified by the natural resource surveys, therefore giving a geographical location to this policy would make it more effective to implement. A similar statement can be made for policies RCO 21 and RCO 22, which deal with coastal erosion.
Policy RCO 19 is an administrative policy that does not affect the development control or planning process in terms of spatial use. With the existence of the Soil Preservation Act and the Sand Preservation Act, there was really no need for Policy RCO 24 since these legislative documents are still in force.

2 Beaches: Policies: RCO 16, RCO 17, RCO 18, RCO 23, RCO 22
Five policies addressing sandy beaches and in terms of development control have been very effective because they are very specific and allow suitable direction when processing development applications. These policies however address similar issues that are also found in other coastal areas, for example the issue of overnight camping and permanent structures are also covered in polices REC 9, REC 11, REC 12 and CZM 3. The issue of coastal engineering is partially covered by Policies RCO 16 and RCO 23 by addressing beach replenishment, creation and coastal defences, leaving a policy loophole for other types of coastal engineering works. Yet the issue of beach facilities is not addressed.

3 Specific Areas: Policies: RCO 34, RCO 36, RCO 37, RCO
These policies are site specific with Policy RCO 34 addressing minor islands and policies 36-38 directed towards the Dwejra/Qawra area in Gozo. The protection of minor islands can be linked with measures on Marine Conservation and is still applicable in terms of development control and planning purpose. The protection of Dwejra is still on the agenda as is the need to protect other important areas.

4 Marine Conservation Areas: Policies: MCO 1-13
No Marine Conservation Area has been designated to-date for two reasons. There were no financial resources allocated for data collection and subsequently no classification system was adopted to categorise the local habitats in a similar scheme that was adopted for terrestrial habitats. Policy MCO 1 proved to be the most useful with respect to development control, as it afforded some protection to the candidate sites from development projects through the conditions made. The strategic policies still count to date but require revisions to include additional measures for further protection particularly from land-based sources of pollution and the increasing quantities and diversity of sea-based uses.

Annex IV

Table 2 Indicators for coastal issues

Indicator	Note	Maximum	Minimum	2000
Scheduled/protected areas in NW	% of the total coastal area of the NW	80	65	66
Abandoned agricultural land	% of total agricultural land	25	7	15
Fish farms in the NW	Number of farms	5	2	5
Cars travelling through the NW	Number of cars during peak	3,000	1,000	4,500
Marine vessels in the NW	Number of marine craft during peak weekend	700	400	1,000
Enforcement actions by PA	Annual number of cases	60	25	68
Marine conservation/protected areas	% of coastal length	20	10	0
Diving in the NW	No. of dives	40,000	15,000	55,000
Bathing water quality	% of samples meeting acceptable levels of faecal coliforms (<1000mg/l)	95	85	98.3
Number of breaches in rubble walls	No. of breaches	10	5	11
Pollution in ground water	Level of nitrate (mg/l)	50	25	65.27
Unemployed as a % of working population	% of working population in NW	3	1	1.8
Full time farmers	% of total farmers	50	40	44
Tourist accommodation occupancy - winter	Occupancy % during winter	55	35	26
Employment in tourism	Full-time employees in NW % of total	25	15	14
No. of claims for storm damage	No. of annual claims	50	25	72
TSE recycled water	% of water consumed	80	50	4.6
leaked water	Cubic metres per hour	600	300	1,200
level of bunkering operations	% of total operations in Malta	20	5	19.3
Population growth in the NW	Annual rate of growth	5	2	1.4
population density in NW	Population per sq km	500	300	328
Beach closure	Number of days during summer	15	2	25
Tourist resident ratio -summer	Daily tourists as a % of residents	95	70	136
Gastroenteritis outbreaks in NW	No. of total outbreaks in a year	3	1	5
Quality of drinking water	Level of chloride (mg/l)	800	200	517
Quality of drinking water	Level of nitrate (mg/l)	50	15	56
Quality of bathing water	No. of points obtained on faecal coliform readings	50	35	40

Indicator	Note	Maximum	Minimum	1990	1995	1996	1997	1998	1999	2000
SUSTAINABLE COASTAL MANAGEMENT										
Applications granted - other	granted as a % of sq m submitted	70	30				1	63		
Applications granted - commercial	granted as a % of sq m submitted	75	40				23	64		
Applications granted - tou/ rec	granted as a % of sq m submitted	60	35				34	2		
Applications granted - domestic	granted as a % of sq m submitted	90	80				49	54		
Scheduled/ protected areas in NW	% of the total coastal area of the NW	80	65			7				66
Applications granted - agriculture	granted as a % of sq m submitted	95	75				0	24		
Applications granted - listed buildings	granted as a % of sq m submitted	90	70				0	0		
Abandoned agricultural land	% of total agricultural land	25	7			12	12	13	14	15
Fish farms in the NW	number of farms	5	2	3		4	4	4	4	5
Bunkering operations in NW	number of bunkering operations	NA	NA							
Hardstone quarries	size of quarries by surface area (000 sq m)	800	400							775
Production from hardstone quarries	% of national production	80	50			70				60
Cars travelling through the NW	number of cars during peak	3,000	1,000	1630				4109		
Marine vessels in the NW	number of marine craft during peak weekend	700	400			800				1,000
Enforcement actions by PA	annual number of cases	60	25			104	75	67	52	68
Reports to ALE (administrative law enforcement branch of police department)	Annual number of ALE reports	60	25					34	67	109
Unemployed as a % of working population	% of working population in NW	3	1							1.8
Applications granted - industrial	granted as a % of sq m submitted	65	30				0	0		

Indicator	Note	Maximum	Minimum	1990	1995	1996	1997	1998	1999	2000
SUSTAINABLE COASTAL MANAGEMENT										
Applications granted - services	granted as a % of sq m submitted	95	80				100	77		
Full time farmers	% of total farmers	50	40							44
Fish catch	% of total catch	30	15							
Fish farm production	yearly production	NA	NA							
Tourist accommodation occupancy - winter	occupancy % during winter	55	35					39	38	26
Tourist accommodation occupancy - shoulder	occupancy % during shoulder	75	55					65	63	48
Tourist accommodation occupancy - summer	occupancy % during summer	95	80					87	84	67
Employment in tourism	fulltime employees in NW % of total	35	30							14
Population growth in the NW	annual rate of growth	5	2			19	1.6	1.3	1.3	1.4
population density in NW	population per sq km	500	300			310	316	320	324	328
Full time fishermen	% of total fishermen	15	5							
Beach closure	number of days during summer	2	15			36	17	27	28	25
Tourist resident ratio - winter	daily tourists as a % of residents	50	45				48	51	52	51
Tourist resident ratio - shoulder	daily tourists as a % of residents	70	55				92	95	97	95
Tourist resident ratio -summer	daily tourists as a % of residents	95	70				122	129	129	136
Marine conservation/ protected areas	% of coastal length	20	10			0	0	0	0	0
Diving in the NW	No. of dives	40,000	15,000							55.000

Indicator	Note	Maximum	Minimum	1990	1995	1996	1997	1998	1999	2000
TOURISM & HEALTH										
Gastroenteritis Outbreaks in NW	No. of total outbreaks in a year	3	1				2	1	6	5
Gastroenteritis cases in NW	No. of total cases in a year	9	5				8	6	5	7
Rodent control - bait placed	No of takes from baits places	3	2							
Bathing water quality	% of samples meeting acceptable levels of faecal coliforms (< 1000 mg/l)	95	85			98.5	98.7	98.6	97.4	98.3
Risk Factor grading of hotels	% of inspections falling within Grade A - C	90	70					76	72	68
Risk Factor grading of catering establishments	% of inspections falling within Grade A - C	90	70							57
Rodent Control – residents' complaints	No. of complaints from residents	5	1		9	6	9	7	14	1
Beach quality as compared to Blue Flag	In % points attained	210	71							
Beach quality as compared to Health criteria	% of total beach sample observations falling within Grade A	100	80			75.4	80.6	81.6	65.7	71.7
Media interest in tourism health	% of positive/ negative media coverage	90	50							

Indicator	Note	Maximum	Minimum	1990	1995	1996	1997	1998	1999	2000
SOIL EROSION & DESERTIFICATION CONTROL										
Official flood warnings	No. of warnings given	10	4							
No. of claims for compensation	annual number of claims	50	25		217		50	72		72
No of breaches in rubble walls	No. of breaches	10	5							11
Length of breaches in rubble walls	Length in metres	100	50							69.8
Land tenure	% of agricultural land owned and farmed by owner	50	25							15

Indicator	Note	Maximum	Minimum	1990	1995	1996	1997	1998	1999	2000
INTEGRATED WATER RESOURCES MANAGEMENT										
Quality of drinking water	chloride level (mg/l)	800	200	457	771					517
Use index	% of total users	100	85	>99	>99					>99
Water consumption	litres per capita per day	150	90	77.9	88.2					72.9
Pollution in groundwater	Nitrate levels (mg/l)	50	25	67.4	70.1					65.27
water affordability	Lm/m3	1.1	0.12	0.105	0.327					0.516
TSE recycled water	% of water consumed	80	50	1.5	1.4					4.6
Quantity of produced water	million m3/ year	20	10	39.59	51.61					35.15
piezometric levels	metres	3.25	0.5	2.81	2.63					3.11
Quality of drinking water	nitrate level (mg/l)	50	15	75	54					56
Leaked water	m3/hour	600	300	2,421	2,800					1,200

Indicator	Note	Maximum	Minimum	1990	1995	1996	1997	1998	1999	2000
Marine Conservation Areas										
phc in effluent (bunkering)	ppm	10	0							
Level of bunkering operations	% of total operations in Malta	20	5				20	17.5	25	19.3
Marine vessels in MCA	no. of vessels	70	30							
Quality of bathing water	Number of points obtained on faecal coliform readings	50	35		40	45	50	45	50	40
Complaints by visitors	% of visitors	10	5							

Note: Some data is not available or has not been collected.

Annex V

Coastal declaration for Malta

On the bases of the general deliberations resulting from the CAMP Malta project, the following declaration is endorsed as the national vision for the sustainable use and management of Malta's coastal areas:

Coastal Zone Declaration

Reaffirming our commitment made in RIO , and in Chapter 17 of Agenda 21 entitled 'Protection of the Oceans, all kinds of seas, including enclosed and semi-enclosed seas and coastal areas, and protection, rational use and development of their living resources'.

Recognising that for Maltese citizens, the coastal zone is the main and last remaining "open space" and that it has considerable sociological, cultural and psychological importance, its accessibility for recreational and leisure activities thus needs to be ensured and conserved, and where possible and practical, enhanced.

Recognising also that the coastal zone is an invaluable natural resource which is under great pressure resulting from demographic and lifestyle pressures, and that accessibility and use need to be managed in order to ensure a sustainable utilisation of the many material and living resources to be found therein.

A balance between material prosperity, social development, spiritual and cultural fulfilment, and ecological integrity, should be sought in the interests of all Maltese.

Efforts to ensure that Maltese citizens enjoy the coast in a spirit of community and shared responsibility will be initiated.

Efforts should be made to ensure that all Maltese will accept that the coastal zone is to be enjoyed in a spirit of community and shared responsibility, and thus they need to take responsibility for the health and sustainability of the environment, particularly for the coast, in a spirit of stewardship and caring.

We emphasise the need to agree upon a common understanding of the "coastal zone" in functional terms, and of a sense of vision of how we wish the coast to meet the needs of current and future generations, as well as the need for broad endorsement and acceptance of ICZM as a pro-active tool to facilitate appropriate and sustainable development of coastal areas and resources.

Guidance for the proper management of the Maltese coast shall be provided to allow the correct and appropriate management of coastal areas, in a way that current and future generations will benefit.

We therefor commit ourselves to the management of our coast in a way that benefits present and future generations, and that international, national and local obligations are honoured.

We support the following set of principles which should guide our actions and set the goals and objectives for our Coastal Policy.

Principles for an Integrated Coastal Area Management Plan

To achieve the ideal of a truly sustainable coastal development, the following principles for integrated coastal management are proposed:

1. National heritage. The coast should be formally and legally recognised as an outstanding national and global heritage.
2. Economic development. Economic development opportunities in the coastal zone should be exploited in a sustainable manner to meet human needs and to promote human well-being.
3. Social equity. Coastal management efforts should ensure that all people, including future generations, are treated with dignity, fairness and justice.
4. Inclusivity. Coastal management shall be carried out in a socially inclusive manner, having sought the views and opinions of all parties, including stakeholder, non-governmental organisations and the general public.
5. Ecological integrity. The diversity, health and productivity of coastal ecosystems should be maintained and enhanced.
6. Holism. The coast should be treated as an indivisible system, recognising the inter-relationships between coastal users and ecosystems and between the land and sea.
7. Risk-minimisation and precautionary principle. Coastal management efforts should adopt a risk-minimisation and a precautionary approach under conditions of scientific and economic uncertainty.
8. Duty of care. Coastal management is a shared responsibility. All people should be responsible for the consequences of their actions, and have the duty to act with care to avoid damage to others and to the coastal environment.
9. Co-ordination and integration. Coastal management efforts should be co-ordinated and integrated, and conducted in an open, inclusive and transparent manner.