Designing a Bathing Area Management Plan - a template for Ramla Bay, Gozo

Ramla Bay, Gozo, reflecting a high recreational potential within a very natural and largely undisturbed setting.

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January 2003

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1.0 Executive summary

This document represents a recommended design for a bathing area management plan for Ramla Bay, Gozo. The work was commissioned by the GAIA Foundation as a component of an overall management strategy being developed for Ramla Bay within the context of the EU-LIFE funded project ''Integrated Management of Specially Protected Coastal Areas in Malta'' (EU – LIFE TCY 99/M/095).

Since this report considers Ramla Bay from the management perspective concerning its use as a bathing area, readers should, for a broader management viewpoint, also refer to the ''Management Plan for Ramla Bay, Gozo'' document, also developed within the same EU-LIFE TCY/99/M/095 project.

In this document, management of the Ramla Bay bathing area is addressed through:

- Development of a bathing area management strategy.
- Application of a number of novel management tools for data gathering, environmental and problem scope evaluation and bathing area quality assessment.
- Recommendation of a management plan model.
- Identification of bathing area management guidelines and recommendations.

It should be noted that while some of the bathing area management recommendations presented in section 4.0 of this report may be in part or to a larger degree already implemented within existing on-site management efforts at Ramla Bay, they have been retained in this document in order to preserve the integrated nature of such management proposals.

2.0 Bathing area management strategy

In the absence of a national Bathing Area Management Strategy for the Maltese Islands, Micallef (2002) has recommended an approach refering to four main phases namely: **I.** Identification of areas suitable for bathing and related recreational activities; **II.** Data collection; **III.** Establishment of a management plan & committee; **IV.** Application of specific management guidelines.

Phase I: Identification of areas suitable for bathing and related recreational activities.

Due to the very limited number of local beaches, the Structure Plan for the Maltese Islands identifies the need to maximise the recreational potential of all bathing areas in keeping with current environmental protection strategy (Planning Services Division, 1990). While the identification of suitable bathing areas is in part influenced by current government policy regarding nourishment of existing small or degraded sandy beaches and creation of new artificial ones, available data concerning sandy beaches reflects their limited extent and carrying capacity. Conversely, very little information concerning the potential use of rocky shores as bathing platforms is available. Policy decisions must yet be taken to identify low-lying rocky shore suitable for development as bathing platforms, where recreational related facilities may be improved. Their extent will be determined by existing data related to sandy beach carrying capacity and by studies carried out by the Ministry for Tourism regarding sustainable national tourism carrying capacity (Ministry for Tourism, 2001). Using survey questionnaires aimed at local and overseas tourists, the more popular rocky sites may be identified together with user preferences and priorities.

Phase II : Data collection.

Prior to the generation of a management plan, a wide variety of information regarding the beach/rocky shore and its immediate environment should be collected from the field as well as existing records and research projects.

Phase III : Establishment of a Beach / Shoreline Management Plan and Committee.

The Management Committee should be composed of representatives from the Planning Authority, Department for Environment Protection, Ministry of Tourism, Local Council, an NGO and preferably a person with a background/expertise in coastal management unless already possessed by other members. The main function of such a committee is to identify and resolve issues and design, implement and review a management plan.

Phase IV : Application of Management Guidelines for bathing areas in the Maltese Islands.

In the long-term, application of the comprehensive guidelines set out by the European Blue Flag criteria (addressing water quality, environmental education and information, environmental management, safety and services)

is recommended as this reflects participation in what appears to be, particularly at administrative levels (e.g. Local Council) a widely recognised, successful and increasingly popular award scheme (European Commission, 1998). In addition, it is suggested that the practice of annual renewal of such an award encourages local compliance with set criteria as it is considered to encourage tourism (Ministry for Tourism, 2001). While participation in this scheme is a long-term goal of the National Tourism Organisation of Malta, European Blue Flag awards are yet to be realised in Malta due to local infrastructure limitations. In this context, a number of essential but less comprehensive guidelines have been identified (Micallef, 2002)

It is suggested that application of these '*easier to realise'* guidelines to the management of bathing areas in the Maltese Islands will assist in the development of the necessary local infrastructure and regulations which will allow subsequent application of more stringent criteria. This strategy is based on a similar initiative by UNEP (1990) who promoted, within Mediterranean less-developed countries, the application of *essential elements* of Environmental Impact Statement (EIS) requirements in an effort to encourage compliance with this practice and to facilitate subsequent realisation of the capability to carry out full-scale and comprehensive EIS studies.

3.0 Environmental evaluation techniques

Optimum bathing area management may be best achieved through the generation of specific data indicated by effective management strategy (Micallef, 2002). In this context, generation of essential base-line information on physical and environmental bathing area quality parameters may be greatly facilitated through employment of a number of novel management techniques. Such methodologies are considered to present improved opportunities for addressing conflicting land-use problems at the coast. To this end, a number of environmental evaluation techniques recommended for facilitating development of effective batthing area management plans (Micallef, 2002) were applied to the bathing environment at Ramla Bay.

3.1 Beach Registration

Beach registration is an effective means for compiling bathing area-related resource inventories, identification of land-use best-suited to individual beaches and for the provision of data on which bathing area quality may be determined (Micallef & Williams, *in press*). Few authors have addressed the use of beach registration. Of these, Pond *et al.* (2000) and Figueras *et al*. (2000) proposed this technique as a methodology to enable collection of

comprehensive data for development of practical and cost-effective beach management. Short (1993) employed data collection through beach registration in the development of a manual for beach surf life-saving services in Australia, identifying improvement of service through increased efficiency as an objective of such a technique.

Beach registration - local aspects and adaptations

A Beach Register was adapted to local characteristics prevalent on Maltese beaches based on guidelines suggested by Pond *et al*. (2000), Figueras *et al.* (2000) and Williams (*pers comm*., 1999). The Beach Registration System was designed to address management needs through provision of data relating to the bathing area's surrounding environment, accessibility, facilities, safety parameters, shore type & beach material, litter, occupancy rates, bathing zone characteristics, presence of sensitive areas and water quality (see Appendix I).

The beach register was developed to provide a bathing area related database which could aid coastal managers in their decision-making process through for example, highlighting the suitability of beaches for particular uses (Micallef, 2002). In this context, the data contained in a beach register could indicate that a particular bathing area should not be promoted for conservation purposes if the area was one where the natural ecological resources have been largely degraded and/or, the area indicated high recreational and development potential. The information held in the proposed beach register was also intended to be used for the evaluation of beach quality which would in turn, allow the generation of a novel beach classification system.

Information relevant for the beach register was collected via a desk survey of the existing/available information and during subsequent field surveys on the beach and its surrounding environment. Using the Beach Registration Form described, the bathing area at Ramla Bay was registered (Appendix I). The data thus collected for Ramla Bay was subsequently used for site classification.

3.2 Beach classification

A novel system for the Classification of Bathing Area Quality was developed for the Maltese Islands, (Micallef & Williams *in press*). The development of a Bathing Area Classification System was based on data collected through a Beach Register (Appendix I) and referred to (in order of priority):

- Safety Parameters (Appendix II, Table 1)
- Water Quality Criteria (Appendix II, Table 2)
- Presence of Facilities (Appendix II, Table 3).
- Beach surroundings (Appendix II, Table 4).

- Litter Assessment (Appendix II, Table 5).

From a management perspective, the proposed Bathing Area Classification System was considered to present a powerful tool to identify, through the five sub-rating schemes, those areas where priority management action should be focused. In the development of a bathing area classification system, the main objective considered concerned the elaboration of a system having enhanced scope for management intervention. This was achieved through the development of a scheme able to:

- Contribute to overall beach user safety.
- Assist local management in selecting issues requiring priority intervention not only in terms of improvement but also through monitoring.
- Provide beach users with an opportunity to make a better-informed choice of bathing areas.
- Provide decision makers with a tool to better gauge the quality of their bathing areas and the necessary improvements for their upgrading.
- Provide local authorities (e.g. Local Councils) with a system reflecting criteria that may be used for more effective promotion of the bathing areas under their jurisdiction.

Methodology

The bathing areas are conveniently classified as resort and non-resort. The former represent areas where recreational use-value far exceeds that of conservation. These areas invariable have hotels, restaurants, and related recreational amenities, etc. Tabulated results for Ramla Bay in Gozo, a non-resort bathing area are presented in Appendix II, Tables 1 - 5.

The novel classification system developed, considered five bathing area '*rating schemes'* based (in order of priority) on safety, water quality, facilities, beach surroundings and litter-related parameters. The choice of these five parameters was determined on the basis of their high rating by beach user preferences and priorities and frequent consideration in beach management guidelines, beach rating and beach award systems as well as the information gleamed by the beach user questionnaire surveys (Morgan *et al*., 1996; Micallef *et al*., 1999; Micallef & Cassar, 2001). Assessment of a bathing area is carried out via checking safety, water quality, facilities, hinterland and litter parameters against tabulated items shown in Appendix II, tables 1 - 5. By incorporating the results of each of the above-mentioned rating schemes, the proposed system provided a technique for **bathing area classification** according to criteria awarding *1* to *5 Star* ratings (Appendix II, Table 6).

The choice of parameters considered for the proposed beach classification system was ascertained on the results of a literature trawl and cognisance of view-points expressed by several research papers concerning beach management guidelines and beach-user questionnaire / beach rating surveys including: Chaverri, 1989; Morgan *et al*., 1993; Williams & Morgan,

1995; Micallef, 1996; Williams & Davies, 1999; Micallef *et al*. 1999. Cognisance was also taken of the importance allocated to such parameters in established beach quality award systems such as that applied to European Blue Flag Resort Beaches (FEE, 2001). Based on the wealth of information gathered through the Beach Register completed for Ramla Bay (Appendix I) it was possible to complete a site rating based on the five parameters adopted by the Bathing Area Classification scheme.

Results

A ***Class B safety rating*** for Ramla Bay described in Appendix II, Table 1 may be attributed to the absence of adequate and well-sited emergency telephone facilities. From a management perspective, improvement of such facilities at this beach should allow upgrading in safety rating to Class A.

Based on the ***water quality*** related criteria listed in (Appendix II, Table 2), the rating for the Ramla Bay bathing environment was ***Class A***. This is the consequence of a bathing water classification of 'Blue Quality' standard (based on the E.U. Bathing Water Directive – 76/160/EEC) awarded to this site by the year 2000 annual report on bathing water quality in the Maltese Islands (Dept. for Pub. Health, 2000).

As identified through Dimensional Analysis (see section 3.3) , both litter bin and parking facilities require upgrading at Ramla Bay. In this context, what were described as *non-adequate* litter bin and parking facilities resulted in a site rating for ***bathing area-related facilities***) of ***Class B*** (Appendix II, Table 3).

The Ramla Bay bathing environment is situated in a rural area strongly influenced by natural vegetation, historic features and an undulating (hilly) landscape. No negative parameters in the surrounding environment were identified at this site. As a consequence, the bathing area rating based on the quality of the surrounding hinterland at Ramla Bay (Appendix II, Table 4) indicates an award of ***Class A.*** This rating is equivalent to the presence of 5 positive and no negative parameters.

As a consequence of the presence of broken glass, accumulations of litter besides overflowing litter bins and trace quantities of oil identified during beach registration, the EA/NALG (2000) litter assessment scheme adopted for use in the Beach Register awarded a site rating for Ramla Bay of ***Class B*** (Appendix II**,** Table 5).

Based on the five quality associated bathing area ratings (related to safety, water quality, facilities, hinterland and litter) Table 6 (Appendix II) describes an overall bathing area classification for Ramla Bay. As a consequence of having at least four bathing area related parameters rated *Class A or B*, with three of these ratings being either Safety, Water Quality

and either Facilities or Hinterland, an overall ***Four Star*** classification was awarded to this site.

3.3 Dimension Analysis

Methodology
Dimension analysis is an evaluation technique that has not been specifically developed for beach or coastal management. However, Micallef & Williams (2002) have recommended it as an effective evaluation tool that may be used during the problem definition phase of the proposed bathing area management model. It is a problem solving strategy that approaches an issue by characterizing it into five dimensions (Jensen 1978). These dimensions are of social and psychological concern and in considering them for beach management, they take the form of an advanced structured checklist. The five dimensions addressed in a dimensional analysis routine are the substantive, spatial, temporal, quantitative, and qualitative dimensions. Each dimension consists of several aspects that are used to approach the problem from the respective angle of that dimension. In the present study, descriptions of these dimensions and their aspects were considered strictly in terms of beach management.

Dimension Analysis is therefore recommended as a structured step-by-step approach supporting intuitive judgment and able to contribute to the determination of the scale and scope of beach problems, assess the relevant beach characteristics influenced and therefore facilitate the formulation of effective management strategy.

Results and interpretation
Consideration of the ***Spatial dimension*** for Ramla Bay considered the availability of beach registration and bathing area quality classification data (Appendix III, Table 1, row 3). Beach related system boundaries were identified as having been defined at Ramla bathing area (Appendix III, Table 1, row 1). However, available data reflected a general absence of accurate data on sediment budgets and sediment cell characteristics and a generally poor understanding of external influences on beach quality (Appendix III, Table 1, row 2). In this context, consideration of the spatial dimension recommended use of novel environmental evaluation tools (Beach Registration and Quality Evaluation) for effective site management together with the establishment of sediment cell related studies. Site-specific recommendations concerned the need to evaluate the impact of fumes from a municipal waste disposal site and of agriculture related nutrient loading at Ramla Bay in Gozo (Appendix III, Table 1, row 2).

Evaluation of the ***temporal dimension*** identified beach related issues concerned with the generation of annual bathing-water quality reports by the national health authorities in Malta (Dept. of Public Health, 2000) and the availability of general data on Maltese and other Euro-Mediterranean beach user preferences & priorities (Appendix III, Tables 2, rows 2 & 3

respectively). From a negative aspect, the absence at Ramla of a long-term beach profile monitoring programme and beach-user health related studies were identified (Appendix III, Tables 2, rows 3 & 4). Recommendations emanating from evaluation of the temporal dimension included the need for:

- long-term monitoring programmes on beach sediment dynamics and clay slope stability studies.
- better identification of site-specific trends in beach user preferences and priorities.
- establishment of base-line studies in conjunction with the use of historical records to determine any evidence of beach change over time.

Evaluation of the ***substantive dimension*** (Appendix III, Table 3) reflected that the issues considered for Ramla Bay were highly specific to the beach in question. This was attributed to the opportunity of evaluating an on-going pilot project on integrated management of this site. In this context, analysis of the substantive dimension for Ramla bay reflected the important management role played by the Gaia Foundation at this site. The *site-specific nature* of the substantive dimension analysed for Ramla Bay was reflected by the specific consideration of the extremely degraded but nonetheless locally important sand dune remnants at this site (Plate 1). In this context, it was recommended that the problem of encroaching farming on the dune remnants should be addressed.

Plate 1: Highly degraded dune system at Ramla Bay, Gozo.

It is particularly interesting to note that the multi-dimensional approach of this (Dimension Analysis) technique is indeed effective since recommendations address not only important conservation issues related to the dune remnants but also socio-economic issues related to the popular use of this area for bathing and related recreational activities. In this context, it is recommended that a management plan for this area should also address recreational related issues (e.g. bathing, coastal footpaths and provision of a first-aid centre) as well as health issues of as yet un-quantified pollution from extensive use of pesticides in the agriculture dominated hinterland and the impact of an upwind domestic refuse landfill site. A further recommendation made concerned the need to identify sediment exchange mechanisms between the beach and sediment cell active in the bay.

At Ramla Bay, issues that were highlighted through consideration of the ***Quantitative Dimension*** of the Dimension Analysis technique included the bathing related thresholds of water quality and bathing platform carrying capacity (Appendix III, Table 4, row 2). In this context, the European (76/160/EEC) standards were identified as being applied to all bathing areas monitored by the national health authorities in Malta (Dept. of Pub. Health, 2000).

From a negative aspect, evaluation of the quantitative dimension reflected that the beach carrying capacity threshold identified by the Structure Plan for the Maltese Islands as $3m^2$ per person (Planning Services Division, 1990) has unfortunately yet to be implemented on any local beach (Appendix III, Table 4, row 2). Similarly, an absence of extensive site and user group-specific information on beach user preferences & priorities was also indicated (Appendix III, Table 4, row 3). The recommendations arising from the quantitative dimension of this analytical technique stressed the need for the development of holistic beach management plans and to determine sediment budgets and flux rates this site. Updating and implementation of beach related thresholds and identification of site and user group-specific beach user preferences & priorities were also recommended.

The final aspect considered by the Dimension Analysis problem-scoping system was the ***qualitative*** dimension of bathing areas. It is interesting to note that while this dimension is normally noted for its difficult nature to interpret (Jensen, 1978; Williams & Davies, 1999) this study identified that the data provided by other environmental evaluation techniques simultaneously considered in this study (beach user questionnaire surveys, Dimension Analysis, Function Analysis, Beach Registration and Bathing Area Classification) greatly facilitated site evaluation (Appendix III, Table 5). Consequently, it is recommended that these evaluation techniques form part of any beach management plan adopted.

With regards to bathing area water quality issues, the qualitative dimension of the proposed evaluation system highlighted the need to keep abreast of the on-going political / scientific debate regarding acceptable sampling

procedure (WHO, 2000). On the basis of arguments presented by Pike (1997), Rees (1997) and WHO (1999) regarding the validity of current water sampling strategy, the shifting of emphasis from in-situ bathing water quality control to control at source (i.e. prior to entry into a bathing area) was strongly recommended. It was also observed that for a representative evaluation of trends in beach sediment fluctuations, methodology used to date to collect available (unpublished) data (where measurements were limited to the sub-aerial beach sediment component) may need revision to include underwater profiling up to depth of closure. With regards to the management policy at Ramla Bay, it was recommended that this should have a conservation bias.

3.4 Function Analysis

Background

The characterisation of a coastal environment by its *conservation value* and *use/development potential*, allows assessment of the degree of sustainability of a given/envisaged management regime for that area. However, such characterisation requires an expression (normally in monetary units) of the area's economic and ecological values. Unfortunately, it is still very difficult to reach agreement on an acceptable expression of ecological value in monetary terms and a number of alternative approaches to assessing conservation value and use/development potential have been considered.

De Groot (1992) approached the assessment of ecological and economic values of an environment by considering goods & services (*Functions*) provided by various processes & components (*environmental characteristics*) within that environment. This approach is referred to as Environmental Function Analysis. It considers the natural characteristics of an environment and their ability to provide environmental goods & services (*i.e. environmental functions*) and may be employed as a planning and decision making tool. Function Analysis is an innovative technique able to provide a means for assessing changes in environmental quality of an area and evaluating the sustainability of applied management regimes. Analysis showed that Ramla Bay had high conservation value and low use/development potential.

In a *theoretical* consideration of the Functional Analysis approach, Cendrero & Fischer (1997) proposed a technique for assessing environmental quality of coastal areas through characterization of conservation value and use/development potential. This and the technique's ability to effectively integrate scientific evaluation into the decision making process provide a direct contribution to coastal planning and management.

Method

Based on the underlying principle of the methodology proposed by Cendrero & Fischer (1997) that only those parameters that are considered applicable to the specific environment being evaluated should be valued by

the environmental evaluation technique (in this case, the bathing area), the authors' exhaustive list of ecological and socio-economic aspects developed for evaluating coastal areas, has been adapted to better describe the natural and human use components of the local (Maltese) bathing area environment (Micallef, 2002; Table 1, Appendix IV) through:

i. The omission of parameters requiring detailed studies and data not readily available e.g. detailed knowledge on the impact of atmospheric and water pollution on vegetation/humans or general public health and opportunities for employment.
ii. A simplified scoring system which omitted complex weighting techniques. This approach has been previously successfully tested by van der Weide *et al*, (1999) and Micallef & Williams (*in press*).

Using extensive site visits and desk studies of site relevant reports where available, the analysis of each beach was carried out in a four-step process:

i. The environmental functions considered to be available at the beach in question were identified using the revised list of indicators of environmental and human components adapted to better reflect the local coastal environment and having direct relevance to the use of bathing areas (Table 1, Appendix IV).

ii. Using a Delphi interview method, u*se-values* were attributed to the environmental functions identified, addressing socio-economic and ecological characteristics separately. The value allocated (ranging from 1 (the lowest value) to 3 (the highest) were considered to represent human demand for such environmental functions (i.e. human and ecological use-potential). It should be noted that value allocation may be subjective, depending for example, on one's well-being or personal preferences. In addition, only parameters which are considered applicable to the specific environment being evaluated, should be valued.

iii. The scores for individual beach aspects were normalised to represent the conservation and use/development potential value as a non-dimensional parameter ranging from 0 (no value) to 1 (max. value). In order to normalise the value for each component e.g. air, coastal waters, marine biota, etc., the sum of the values attributed to the characteristics of that component was divided by the maximum possible score which could be allocated to that environmental component (i.e. 3 x number of characteristics considered for that component).

iv. Similarly, the total of the values allocated to all parameters was normalised (separately) for the sub-total of the ecological characteristics and the socio-economic characteristics. The normalised values attributed to individual environmental and social components were plotted as a bar chart so as to better identify individual problem areas. The total scores for the ecological and socio-economic characteristics

were also plotted to better define a comparison of the areas' conservation value and land use-potential.

A Conservation/Development diagram was also drawn and used to interpret for site assessment and management guidance by providing:

- The base-line environmental quality of an area.
- A comparison of two (contrasting) areas for the identification of different planning and management strategies required.
- Identification of future development strategies.
- Options for increasing environmental quality and improving sustainable development of an area.
- An opportunity to implement subsequent monitoring of the impact of applied management.

In this study, field observations were supported by desk studies and data generated by various management techniques (Questionnaire Surveys on beach user preferences and priorities (Micallef, 2002), Dimensional Analysis, Beach Registration & Classification). In a separate study based solely on visual observations carried out in the field, van der Weide *et al*. (1999) used the same approach to carry out a semi-quantitative evaluation of two coastal wetlands in Turkey. The authors concluded that the technique was able to represent base-line information on each site as well as reflect differences in coastal planning and management objectives for each site, thereby providing a basis for discussion on wetland value.

Results & Discussion

Based on the data provided by Table 1(Appendix IV), normalized scores allocated to bathing area-related parameters were compared (Figures 1 – 2). For ease of presentation, the human (socio-economic) parameters are grouped under one heading.

Figure 1 describes the Function Analysis results for Ramla Bay, reflecting generally high scores allocated to environmental parameters and low values to human aspects. Some site-specific characteristics are evident, for example the low value allocated to the air quality parameter at Ramla Bay (Figure 1) may be linked to the impact of an upwind municipal waste disposal site. Similarly, the high value allocation to the freshwater parameter may be attributed to the large water catchment area influencing this site.

Figure 2 describes the overall conservation value versus the use/development potential of the bathing area at Ramla Bay, reflecting high conservation value and low use/development potential.

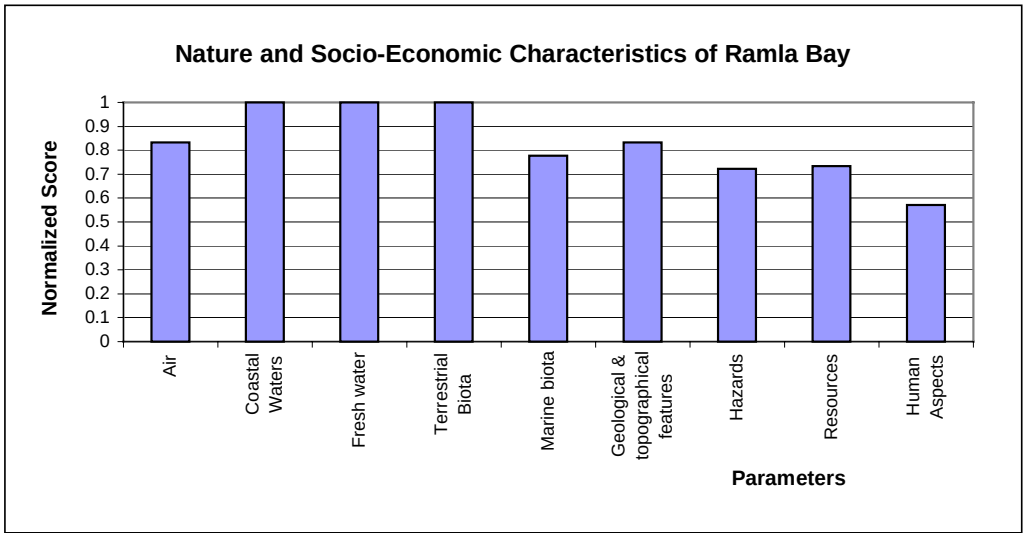

Figure 1: Graphical representation of normalized scores allocated for bathing area-related parameters at Ramla Bay, Gozo.

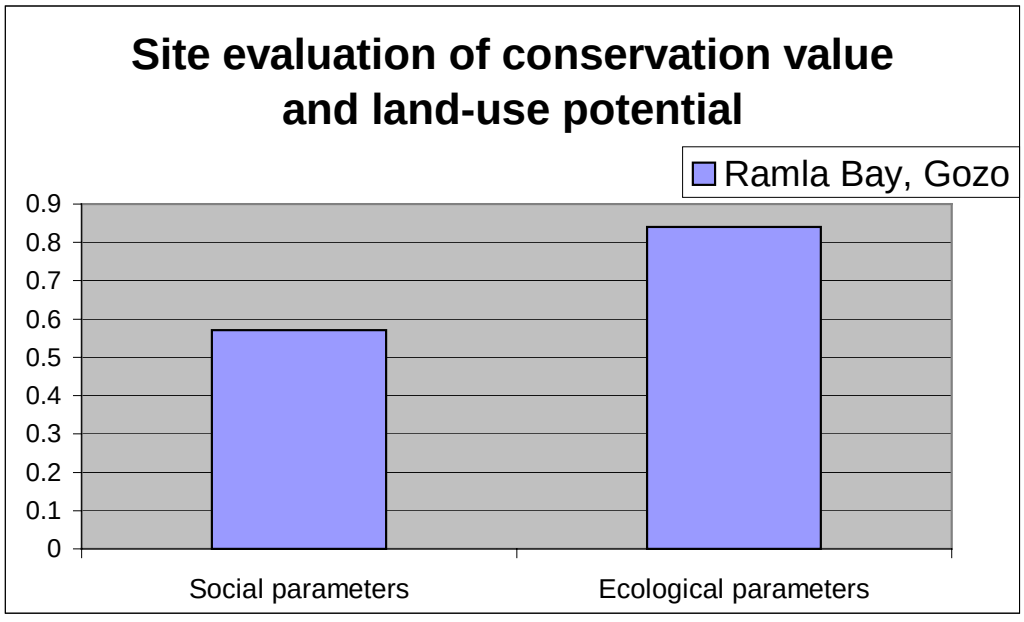

Figure 2: Comparison of conservation and use/development values at Ramla bay, Gozo

Figure 3 shows the total normalized scores for conservation value and use/development potential for the Ramla bathing area plotted as a matrix that allows site evaluation and development of Integrated Coastal Area Management (ICAM) strategies as well as a potential for subsequent site comparison with other bathing areas (Micallef & Williams, *in press*). The latter would be particularly useful when considering a national bathing area management framework.

Points located in the bottom part of the matrix have low conservation values while those placed in the upper section have high conservation values. Similarly, values located in the left section of the matrix have low economic potential while those placed to the right side of the matrix reflect areas with a high potential for development. In considering the most appropriate strategies to apply to an area, development priority should be allocated to areas placed at the bottom right of the matrix (i.e. high development potential and low conservation value). Van der Weide *et al*. (1999) suggested that in such circumstances, Environmental Impact Assessment procedures should be applied to confirm that any negative impacts on the conservation value of an area is within acceptable limits. Conversely, strict conservation measures should be applied to areas located in the upper left section of this matrix. The authors recommended that where areas fall in the conflicting sections of the matrix, in-depth studies should be carried out to better define the conflicts and appropriate management strategy. In this context, a first glance at the matrix reveals that while Ramla Bay falls within the matrix area reflecting a strong potential for conservation, it none-the-less holds a significant potential for land-use development. This is signified by the site's position (within the matrix) close to the high conflict zone, thereby stressing the need of careful management if the conservation value is to be retained.

The high conservation value rating allocated to Ramla Bay may be attributed to the ecologically important though albeit highly degraded sand dune remnants identified at this site (Plate 1). The high conservation value awarded is well supported by its status as an Area of Ecological Importance (AEI) and nomination as a potential marine conservation area. A Conservation Order currently being sought for Ramla Bay Ramla Bay will also offer further protection to this site through stipulation of site-specific regulations. The position of Ramla Bay within the conservation value / use-development potential matrix indicates that an improvement in conservation value may be achieved at this site. In this respect, a management plan having high conservation bias is advocated. These results are complementary with the findings of the bathing area classification where the Ramla Bay bathing area was awarded a high rating (*4* out of a possible *5 Stars).*

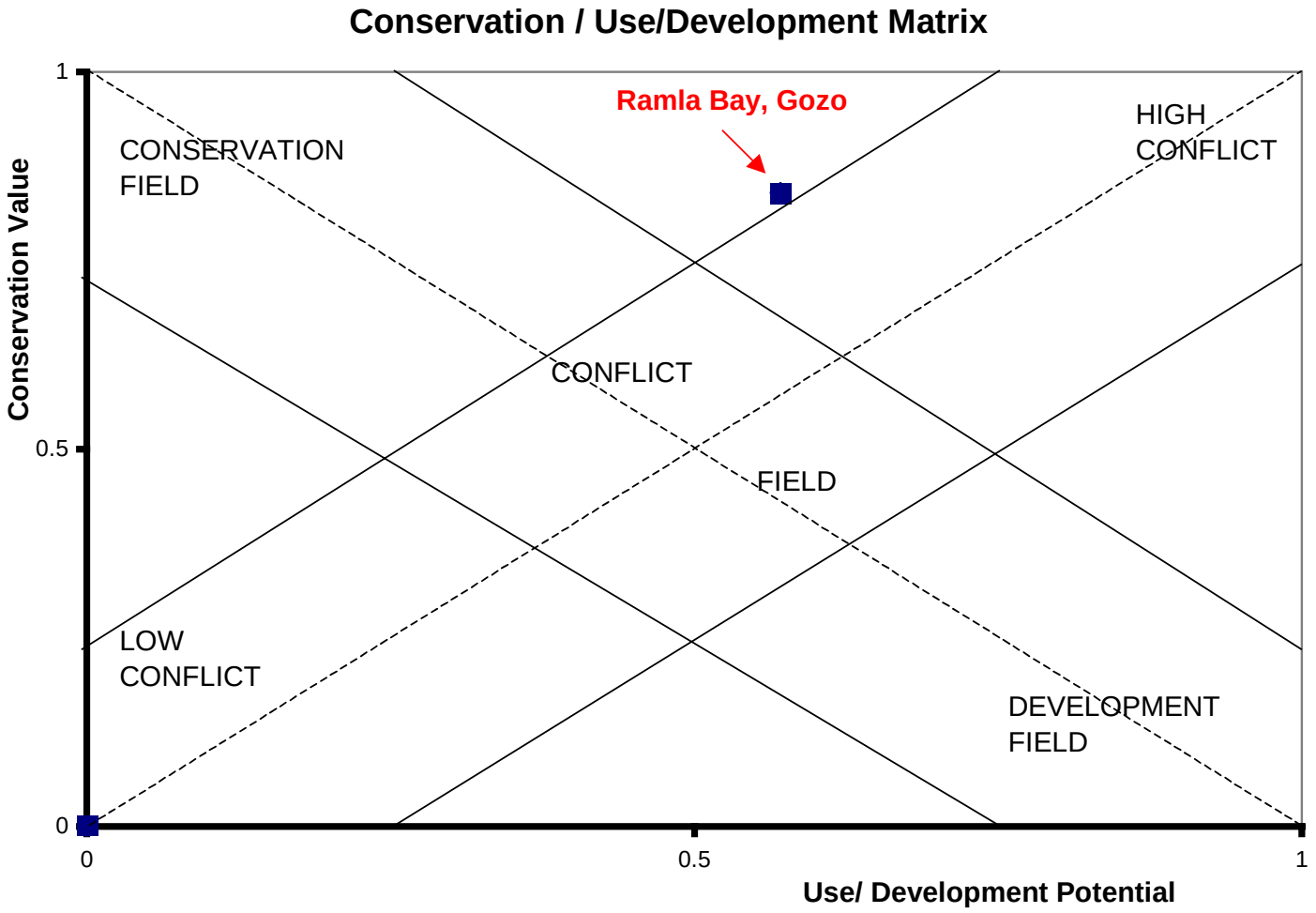
Conservation / Use/Development Matrix
Ramla Bay, Gozo
CONSERVATION FIELD
HIGH CONFLICT
CONFLICT FIELD
LOW CONFLICT
DEVELOPMENT FIELD
Conservation Value
Use/ Development Potential
1
0.5
0
0
0.5
1

Figure 3: Position of Ramla Bay bathing environment within the Conservation / Development Matrix

Conclusion

Through Function Analysis, the bathing area examined was evaluated in terms of its potential for development and its conservation value, through consideration of predefined bathing area-related ecological and socio-economic parameters. It was demonstrated that a graphical representation of the value allocated to each parameter considered of importance to the provision of natural and socio-economic functions facilitated identification of those parameters that need to be addressed (in this case, low scoring parameters) in order to improve the overall ecological or socio-economic quality of that bathing area through appropriate management. Ramla, was identified as a site having a high conservation value in need of careful management to avoid high conflict with a significant use/development potential.

Functional Analysis identified the Ramla Bay bathing environment as one having a high conservation value and generally low use-development potential. The potential conflict with a strong recreational potential was noted and the evaluation technique recommends a management strategy that exploits recreational potential while retaining an environmental bias.

4.0 Bathing area management plan model

On the basis of the evaluation of a number of management techniques considered applicable to bathing area management for Ramla Bay, Gozo, a management model (Malta (M) Model) developed by Micallef (2002) was applied to this site. Although developed as a bathing area management tool the model is also applicable to coastal area management plans in general. The model (Figure 1) has its origins in the KJ – method described by Anon (1994). The method, which was originally used in 1967 for structuring data from anthropological fieldwork and is popular mainly in Japan, has since been applied to a number of other fields, mainly as a management tool in governmental administration but also for dune management by Davies *et al.* (1995). The KJ – method is a tool for data sorting and problem solving by repeatedly applying the method using a cyclical 'W – shaped' model. The latter consists of successive phases of problem exploration, field observation, hypothesis making, evaluation, experimental design, laboratory observation and verification, operating at two main levels, namely, the field and conceptual levels. This concept was adapted and applied to local bathing environments. The Malta (M) Model consists of seven main phases namely data gathering, policy definition, planning, implementation, analysis, evaluation & review and monitoring/ control.

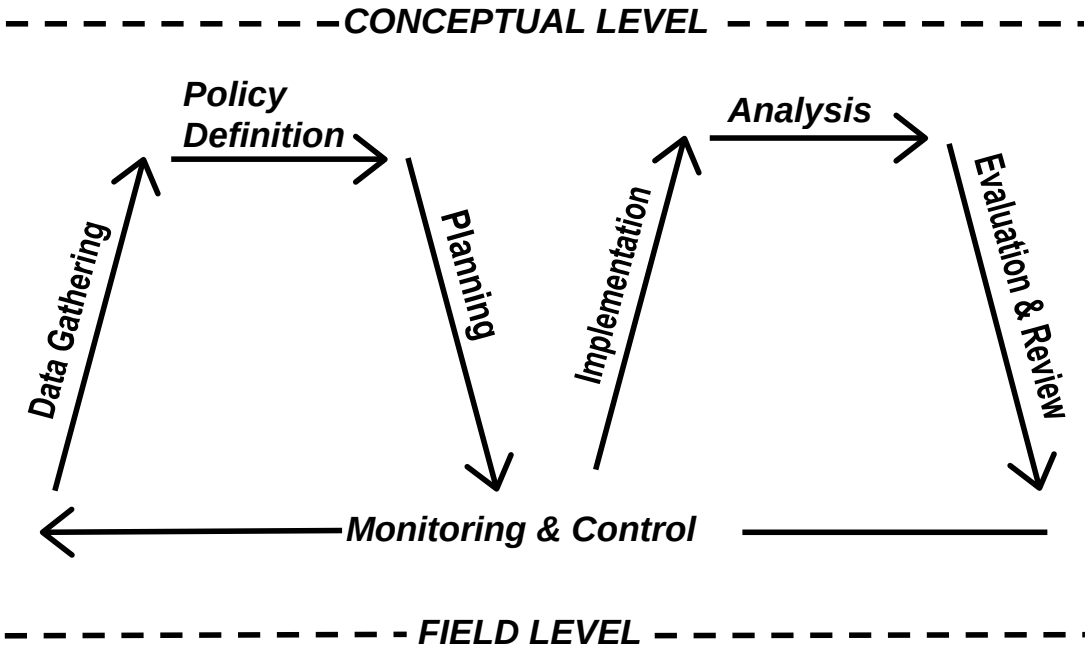

Figure 1: The Malta (M) Model for bathing area management.

Figure 1 describes how the model envisages policy definition and analysis phases at the conceptual level and the monitoring and control phase at the field level. The remaining phases naturally involve both conceptual and field

application. For example, the data-gathering phase involves both fieldwork as well as desk studies and consideration of innovative data gathering strategies, such as the design of beach registration schemes and application of Dimension Analysis for problem/issue definition.

In this context, the proposed ***data gathering*** phase involves data collection and exploration of problems relevant to the bathing area and surrounding environment. Further to the work carried out in this study, it is recommended that this phase include:

- A site survey to identify boundaries, distinct components (such as sand dunes and shore platforms) and their physical attributes such as location, dimensions, sediment characteristics and likely source, geomorphologic description and any facilities on or linked to the locality.
- Morpho-dynamic analysis of beaches (which would involve profiling and analysis of the beach forcing factors such as wave and inshore current regime and erosion related studies of rocky shores.
- Identification of the need for zonation and protection needs of any special (rare, threatened) components.
- Identification and assessment of natural processes active on the coast and their interaction with local human activities. Due to the small size and limited nature of local coastal resources, it is particularly important to identify quick acting processes that could lead to a rapid deterioration of the system (e.g. nearby sewage and industrial out-falls prone to faults/accidental discharge). In addition identify any temporal and geographic variations, including historical written or memory records of such phenomena and possible user interactions and potential conflicts to achieve best allocation of site zonation and management priority.
- Evaluation of the importance of the three main use categories [i.e. socio (recreational), economic (commercial activities) and environmental (nature and landscape) at the national, regional and local level.
- Determination of the level and type of activities to be allowed in different zones identified; these should be based on conservation value of the area, beach-user preferences and priorities and over-riding shore-use function (i.e. whether used mainly for bathing or conservation).
- Identification of official and non-binding regulations and bye-laws that may be applicable to the bathing and surrounding areas which may be used to further strengthen the management strategy.
- Utilisation of Dimension Analysis for problem/issue identification and Questionnaire Surveys for identification of beach user preferences and priorities.

The ***Policy Definition*** phase of the proposed model (Figure 1 above) involves the setting-up of a management committee whose main tasks should include:

- Identification through desk studies of current national policy related to bathing area and coastal management.
- Identification of funds necessary for appropriate management and subsequent monitoring.
- Design and implementation of an appropriate education campaign for the public, bathing area users and local council members through appropriate information signs, public lectures, exhibitions, seminars and publications.
- Identification of specific criteria and indicators of coastal environmental quality in line with national policy, development of recommendations for revision where necessary and definition of new policy where non-existent. These should reflect not only environmental concerns (e.g. water quality, rare species and habitats) but also socio-economic interests (e.g. cultural heritage, user preferences & priorities and tourist related needs). While the quality criteria chosen should be based on those applied to European resort beaches, careful consideration of the ongoing scientific debate regarding the acceptability or otherwise of current sampling strategy and target organisms and revision to the European Bathing Water Directive 76/160/EC, should be made (Rees, 1997; Pike, 1997; WHO, 1999, 2000). The Management Committee should seek expert advice on the latest developments in this field.
- Identification of qualified NGOs who may be able to contribute to and preferably take over the responsibility of implementing the management plan/s.
- Employment of a site/s manager or warden to ensure that regulations set down by the management plan are enforced.
- Consideration of suitable bathing area management guidelines.

Application of Function Analysis is strongly recommended at this stage as it presents a holistic understanding of the main conservation value/development potential of the natural system, thereby allowing the setting of policy on management bias.

In the ***Planning Phase*** described by Figure 1 (above), the management committee should identify a working hypothesis through evaluation of possible options/solutions as presented by appropriate bathing area management guidelines (see recommendations in section 4.1) and adopt an action plan that defines a pilot management programme based on this proposed management model. In this context, recommendations emanating from the Dimension Analysis carried out in the Data gathering phase and decisions taken at the policy definition phase should be integrated within the planning process. It is also recommended that bathing area classification is carried out in this phase as an aide to the development of the pilot plan of action.

The ***Implementation Phase*** of the proposed model involves setting into motion a pilot-scale project of the action plan designed in the planning phase, particular through application of pre-determined beach management

guidelines (see recommendations in Table 1, section 4.1) under the direction of a site warden or where appropriate, a qualified non-governmental organisation (NGO). In Malta, the use of such NGOs has already been successfully implemented at Ghajn Tuffieha. The Gaia Foundation (local NGO) was designated as a site manager to this environmentally important bay scheduled as an Area of Ecological Importance and Site of Scientific Interest in 1996. During the *Implementation Phase*, particular emphasis should be given to implementation of the educational campaign adopted in the planning phase. This should be aimed at improving the general public's awareness not only of the natural beach attributes and relevant bye-laws but also of the management plan implemented. It is considered beneficial to encourage social activities at the coast since increased use under careful surveillance by wardens will not only optimise use of limited resources but also increase public appreciation and knowledge of local recreational facilities. The implementation process is enhanced by information generated by the questionnaire surveys related to user perceptions and priorities that ensure consideration of user needs and therefore increase the chances of acceptance and co-operation by the general public.

In Figure 1, the ***Analysis Phase*** involves processing of preliminary results obtained from the pilot-scale project. It is recommended that suitable data processing techniques and software are identified or developed in advance so as to facilitate this phase of the model. In this connection, the development of novel survey questionnaires and use of specific software packages (such as the Social Sciences Statistical Package - Norusis, 1993) were found particularly well-adapted for gathering and processing data related to beach and rocky shore user preferences and priorities.

The ***Evaluation & Review Phase*** of the proposed model allows the evaluation and verification of preliminary results and development of the pilot-scale management plan into a full-scale plan (applying modifications where necessary through the processes of innovation, and incrementalisation. In this phase, re-application of Beach Classification and Functional Analysis is recommended to confirm whether desired beach use functions and/or improvements are being attained through ongoing management. In the ***Monitoring and Control Phase,*** the adopted/revised management plan is applied accompanied by active monitoring (Figure 1 above). The latter serves as a control mechanism to check implementation of the management plan and to identify at an early stage any changes in environmental behaviour outside set limits of normal fluctuation through for example, the use of beach profile sweep zones and comparison with base-line data and historical records.

While this novel Malta (M) Model has a pre-determined start and finish point, it has been developed in such a manner so as to allow maximum flexibility. In this context, initiation of the model can take place at a number of points, depending on the degree of management already implemented in a particular bathing area. As an example, in the case where current management practice is not yielding the desired objectives, entry into the

model could take place at the *Policy definition phase.* Alternatively, when a problem is obvious (where environmental dynamics appear outside known normal limits of behaviour) and needs better definition and solving, the model is initiated at the data-gathering phase where Dimension Analysis may be applied.

Data analysis and recommendations made through Dimension Analysis (section 3.3) may be considered as direct inputs to the seven phases of the proposed Bathing Area Management Model. In this context the ***data gathering phase*** of the proposed beach management model at Ramla Bay should also consider:

- Establishment of sediment surveys to identify sediment sources, the sediment cell influencing this beach and sediment flux patterns.
- Execution of site specific surveys on quantification of impacts from municipal waste disposal site, effects of nutrient loading from agricultural inputs.
- Carrying out site/user group-specific studies on beach-use patterns and evaluation of beach-user preferences and priorities.
- Identification of the carrying capacity of this bathing area.
- Execution of studies by health authorities on local and overseas bather health prior to and post bathing activity/related vacation.

Similarly, the ***policy definition phase*** of the proposed management plan should include:

- Development of a wider-scoped management plan which, while having a conservation bias, should also address beach sediment dynamics and social aspects of beach user preferences and priorities.
- Establishment of Ramla Bay as a Conservation Area.
- Integration of novel evaluation/management tools such as Beach Registration & Bathing Area Quality Evaluation, Dimension and Functional Analysis.
- Integration of current bathing water quality testing procedure with the proposed bathing area quality assessment technique.
- Adoption of applicable bathing area management guidelines (see recommendations in Table 1, section 4.1).

The ***planning phase*** should include:

- Evaluation of a catchment-wide influence on bathing area quality.
- Cater for appropriate parking facilities based on the bathing area carrying capacity evaluation.
- Consider findings of beach user preferences and priorities.
- Integrate novel environmental evaluation tools in the planning process.
- Consider multiple-source problems (e.g. leading to beach sediment loss).

- Identify threshold values (e.g. concerning air quality, water quality, carrying capacity etc).
- Consider impact of farming practices on sand dune remnants.
- Apply adequate consideration to rural nature and environmental importance of this site.
- Consider action to shift emphasis of controlling water quality prior to entry/discharge into the marine environment.

Dimension Analysis also considered several aspects relevant to the ***implementation phase*** of a management plan that should include:

- Establishment of a First-Aid and Information Centre.
- Provide warden and life-guard facilities throughout the summer months and at least during week-ends during the winter months to protect the conservation value of the area and provide safety facilities for bathers.
- Provide additional signs/ facilities to cater for potential footpaths in this and adjacent areas.
- Apply threshold values identified in the planning phase.
- Provide beach users with better public notification of water quality assessments, health/sanitary facilities and bathing area classification achievements.
- Apply adopted bathing area management guidelines (see recommendations in Table 1, section 4.1).

The ***analysis phase*** of the proposed management model should include:

- Evaluation of information collected in the data gathering and monitoring phases. In particular, the information provided by the proposed Beach Registration and subsequent Bathing Area Classification will have a high contributory value to this management phase.

The ***evaluation & review phase*** should be used to (re)-evaluate the progress accomplished through site management through:

- Evaluation of Function Analysis results (describing shifts of the site's development/conservation status within a matrix of these two parameters).
- Evaluation of bathing area classification results (identifying specific issues which require improvement to upgrade the bathing area quality rating.
- Evaluate applicability of adopted bathing area management guidelines (see recommendations in Table 1, section 4.1).

In the ***monitoring and control phase*** of the management plan for Ramla Bay, Dimension Analysis recommended establishment of:

- Identification of short-term sediment exchange rates and processes between beach and sediment cell active within the embayment.

- Long-term monitoring of beach sediment fluctuation trends and clay slope stability.
- Identification of site-specific beach user preferences & priorities and emergent trends in beach use patterns.
- Beach-user health-related studies.
- Monitoring of ongoing debate on acceptable bathing water sampling strategies.

4.1 Specific guidelines for consideration within bathing area management plan adopted for Ramla Bay

Issues	Recommended Strategy
Bathing area carrying capacity	A minimum of approximately $3m^2$ of beach space per user, $2.5m^2$ water surface per bather in shallow areas and $7m^2$ for deeper (>1.2m) waters.
Beach / rocky shore slope	For water depths of up to 1.2m, a slope not exceeding 1:10 is considered as safe while for greater depth, the slope should not exceed 1:3.
Zone allocation	Mainly separating bathing and boating/ski jetting related activities using lines with marker buoys but also to specify land-use sub-zones such as dog-free zones and conservation areas. Other recreational activities such as picnicking and camping should also be controlled.
Access	Adequate parking facilities should be provided off the bathing area but preferably not further than 500 m. Vehicular access to the beach should be restricted to emergency cases. While public access should be facilitated by sign-posted footpaths, access to the highly degraded and thereby sensitive sand-dune areas at Ramla should be prohibited.
Drinking water	To counter the potential problems of dehydration, drinking water should be supplied from municipal supplies according to national standards.
Toilet and shower/ changing room facilities	Adequate facilities to be provided to cater for the large number of summer visitors to Ramla. All facilities should be sited away from sensitive areas to encourage better zonation. Such facilities should be well maintained and in a clean/hygienic state.

Beach cleaning	Adequate and appropriate beach cleaning services should be provided. Considering the environmentally sensitive nature of Ramla, mechanised beach cleaning should be prohibited.
Litter bins	A minimum of one per 150 beach users is recommended, having covers to minimise insect nuisance and health hazards. It is essential that litter bins are regularly emptied since full or overflowing litter bins may discourage use.
Hazardous items	Glass and other potentially hazardous material should be ideally prohibited from the beach and service facilities encouraged through incentives, to use alternatives.
Information boards	These should be constructed and sited to facilitate visibility and understanding, addressing hazards (such as storms and dangerous currents), regulations and bye-laws, environmental concerns and information on the bathing area management plan where being implemented. In particular, they should be erected at beach and water entry sites so as to maximise visibility.
Wardens	The engagement of suitable trained wardens is considered essential for application of guidelines for effective management of bathing areas. In particular, wardens should have the necessary legal status for enforcement of regulations and local bye-laws.
Bye-laws	Should address all issues of concern to shore use including generation of noise, unpleasant behaviour, fires, dog fouling and litter.
Lifeguards	These should have specialist training and access to further training and updating courses. They should be aware of both natural and man-made features/hazards of the area as well as access to further medical assistance. Volunteer lifeguard services, when utilised, should have a clear contract delineating their responsibilities. While a minimum of two lifeguards per beach is recommended, Blue Flag guidelines imply the possibility of having only 1 (FEE, 2001).
Patrol towers	These should be ideally placed either at the centre of the bathing area or in that area where bathers tend to concentrate.
Public rescue facilities and emergency /	Ring buoys and /or similar devices should be available particularly on non-supervised bathing areas, having at least 30m of throw-line. Emergency telephones should be

public telephones	available with easy access and having visible contact numbers for emergency services.
Monitoring	A long-term monitoring programme related to base-line studies should be implemented to detect early signs of environmental change.
Beach Concessions	The granting of beach concessions to private operators offering facilities on or near to bathing areas should consider the need to protect unencumbered public use of this space.
Management	A system should be established to monitor the implementation of the management plan. The latter should also be regularly reviewed with a view to modification as a consequence of changing local circumstances.

Table 14: Proposed bathing area management guidelines for Ramla Bay, Gozo (*source: Health Education Service, 1990; Micallef, 1995, 1996; Williams & Davies, 1999; Micallef & Williams, 2002*).

4.2 General Recommendations for Ramla Bay, Gozo

i. Ecological qualities of Ramla Bay should be carefully considered in the adoption of beach cleaning guidelines and techniques (Schembri & Lanfranco, 1994; Micallef, 1996; Llewellyn & Shackley, 1996; Williams & Davies, 1999). In this respect, the study reported by Breton and Esteban (1995) on a Spanish pilot programme of information and conservation for beaches on the Llobregat Delta in Catalonia, has provided useful guidelines that may be applied to the beach cleaning strategy to be adopted at Ramla. In the Spanish case study, mechanical cleaning of the more sensitive (and therefore protected) part of the beaches concerned was replaced by a manual approach. The positive impacts recorded refer to a dramatic increase in establishment of native flora representing a natural (rather than opportunistic dominated) distribution of species and a consequential regeneration of otherwise eroded dune systems due in part, to the increase in vegetation cover. Breton & Esteban (1995) also identified selective beach cleaning as a particularly useful opportunity to include community participation as part of beach management strategy.

ii. Having an environmentally sensitive and semi-protected nature, management of the Ramla Bay bathing environment should be preferably carried out by specialised agencies. If this is not possible, then it may be appropriate that such management is carried out under supervision or guidance of specialists. Edwards (1994) questioned the sufficiency of the voluntary approach for the management of

environmentally sensitive areas and strongly argues for the need of appropriate legislative, financial and expert human resource support to assist such management needs.

iii. This management of Ramla Bay should include programmes for educating not only bathers and recreational users but also managers and authorities responsible for coastal management. Morgan & Williams (1995) and Morgan *et al.* (1996) have described the process of educating bathers and recreational users as a difficult and complex issue as a consequence of different socio-demographic variables that result in varying user perceptions. On the same subject, Williams *et al.* (1992) have described how inappropriate setting of information/notice boards may result in an almost total disregard by the public.

iv. The management strategy adopted for Ramla Bay should be evaluated (e.g. using Environmental Impact Statements and Risk Assessment techniques and Function Analysis) to evaluate the likely long-term impact on that shore. Unlike construction development, the adoption of management strategy is often not bound by legislation and many examples of misinformed or misdirected unwise management practice leading to considerable environmental degradation exists.

v. The management strategy for Ramla Bay should cater for its inherent physical and natural characteristics and the beach user perceptions & priorities specific to that environment rather than taking a blanket management approach for the entire island (Micallef & Williams, 2002). For example, it would follow that bathing areas frequented mainly by those seeking solitude and a desire to experience a natural environment should have conservation oriented priorities as an integral part of their management strategy. Such an approach should also include identification of management *priorities* in the case where financial or human and technical resource limitations impose such decision-making. In line with the proposed application of different management strategies to different beaches, Vogt (1979) recommended that a country's resource base should be partitioned into different 'use zones'. The author suggested that this would be particularly applicable where establishing a balance of conflicting interests (such as those often presented by mass tourism and conservation) is found to be practically unfeasible on individual beaches.

vi. At Ramla, the highest priority should be given to maintenance or restoration of dunes as these without fail, form an integral part of beach systems (Bird, 1996; Cassar, 1996). In proposing a semi-quantitative assessment of the inter-relationships between coastal dune vulnerability and protection measures, Davies *et al.* (1995) included 'beach condition' as one of four groups of indicators to be included in a checklist technique developed for rapid assessment of dune vulnerability. While the other parameters included site and dune morphology, surface characteristics of the frontal 200m of the dune and pressure of use, the latter and beach

condition were considered by the authors to be particularly significant in controlling the dune vulnerability index.

vii. As is the case at Ramla, where vegetation or other natural habitats are associated with bathing areas, the entry of heavy or other vehicles should be limited to emergency and rescue services as the potential damage to such vegetation can be extensive. Doody (1989) considered that protecting dunes from those activities that destroy their surface should be one of the highest priorities in related management strategy. In this connection, Davies *et al.* (1995) noted that many instances on the French coast have been recorded of dune degradation arising from uncontrolled visitor pressure including that of camping activities.

viii. Where management policy leans towards environmental conservation (as proposed at Ramla Bay) beach accumulated seagrass *banquettes* should not be cleared until the beginning of the summer season as these provide a medium for beach fauna (Schembri & Lanfranco, 1994) and potentially, a form of physical protection from erosive impact of storm waves and water run-off following intense wind and precipitation storm events and reduce unintentional removal of beach sediment trapped within the sea-grass *banquettes* (Micallef & Williams, 2002).

References

Anon, 1994. *Creative management techniques*, Open business school, B882. Group 4: Mapping and structure: the KJ – Method, Open University, UK. Pp 112 – 115.

Bird, E.C.F., 1996. *Beach Management*. John Wiley & Sons, 1996. Pp 281.

Breton, F and P. Esteban, 1995. The Management and Recuperation of Beaches in Catalonia. (In): *Directions in European Coastal Management*. (eds), M.G.Healy and P.Doody, Samara Publishing Ltd., Cardigan. Pp. 511 – 517.

Cassar, L.F., 1996. Coastal Dunes: form and process. *Unpublished M.Sc. dissertation (Environmental Planning and Management)*. University of Malta, Tal Qroqq, Malta.

Cendrero, A. and D.W. Fischer, 1997. A Procedure for Assessing the Environmental Quality of Coastal Areas for Planning and Management. (In): *Journal of Coastal Research*, 13 (3) Pp. 732 – 744.

Chaverri, R., 1989. Coastal Management: the Costa Rica Experience (In) *Proceedings Coastal Zone'89: 5th. Symposium on Coastal and Ocean Management*. (ed.), O. T. Magoon,.*Jr. Amer.Soc. Civ. Eng*.,5: 1112 – 1124.

Davies, P., Williams, A.T. and R.H. Curr, 1995. Decision Making in Dune Management: theory and practice. (In): *Journal of Coastal Conservation*, Vol. 1, Pp 87 – 96.

De Groot, R.S., 1992. *Functions of Nature. Evaluation of nature in environmental planning, management and decision making*. Wolters-Noordhoff, Groningen, Holland. Pp. 315.

Department of Public Health, 2000. *Bathing Water Quality, Reports 1997 - 2000*. Ministry of Health, Government of Malta, Valletta, Malta. Pp. 24.

Doody, P., 1989. Conservation and development of dunes in Great Britain. (In): *Perspectives in Coastal Dune Management – Proceedings of the European Symposium,* (eds.), F.van der Meulen, P.D. Junerius and J.H. Visser. Academic Publishers. Pp 53 -67

EA/NALG, 2000. *Assessment of Aesthetic Quality of Coastal and Bathing Beaches*. *Monitoring Protocol and Classification Scheme*. Environment Agency and the National Aquatic Litter Group, U.K. May, 2000. Pp 15.

Edwards, S., 1994. Managing Coastal Recreation in Environmentally Sensitive Areas. (In): *Littoral'94*, Lisbon, Portugal. (eds.), G. Soares de Carralho and F. Velos Gomes, Instituto de Hidraulica e Recursos Hidricos, Universidade do Porto, Portugal. Pp. 953 – 964

FEE, 2001. Blue Flag Campaign. (In): Official web page for the Foundation for Environmental Education, *www.blue flag.org*. Pp. 40.

Figueras, M.J., Borrego, J.J., Pike, E.B., Robertson, W. and N. Ashbolt, 2000. Sanitary Inspection and Microbiological Water Quality. (In): *Monitoring Bathing Waters: A Practical Guide to the Design and Implementation of Assessments and Monitoring Programmes; World Health Organisation, 2000.* (Eds) Jamie Bartram and Gareth Rees. E & FN Spon; London and New York. Pp 113 – 167.

Health Education Service, 1990. Recommended Standards for Bathing Beaches. (In): *A Committee Report on Policies for the Review and Approval of Plans and Specifications for Public Bathing Beaches*, Board of State Public Health and Environmental Managers Albany, USA. Pp.16.

Jensen, J.V., 1978. A Heuristic for the Analysis of the nature and Extent of a Problem. *Journal of Creative Behaviour*, (12), 168 - 180.

Llewellyn, P.J. and S.E. Shackley, 1996. The Effects of Mechanical Beach Cleaning on Invertebrate Populations. (In): *British Wildlife*, 7 (3):147 – 155.

Micallef, A., 1995. Maltese Beaches and Management Needs. Unpublished Lecture Notes. *(*In): *MedCoast Beach Management Training Workshop*, Erice, Sicily. MedCoast Secretariat, Middle East Technical University, Ankara, Turkey.

Micallef, A., 1996. Socio-Economic Aspects of Beach Management – a pilot study of the Maltese Islands. (In)*: Proceedings of the International Workshop on ICZM in the Mediterranean and Black Seas: Immediate Needs for Research, Education, Training and Implementation*, Sarigerme, Turkey, 1996. (ed.), E.Ozhan, MedCoast Secreteriat, Middle East Technical University, Ankara, Turkey. Pp. 111 - 124.

Micallef, A., 2002. Bathing Area Management in the Maltese Islands. (In): Published Ph.D doctorate dissertation, University of Wales, U.K. Pp. 544.

Micallef, A. and M. Cassar, (Eds.) 2001. An Environmental Impact Statement on the proposed Beach Nourishment Project at Bajja ta' San Gorg, San Giljan, Malta. *A Technical Report & Non-Technical Summary*, Malta Ministry for Tourism, St. Julians, Malta.

Micallef, A. and A.T. Williams, 2002. Theoretical Strategy Considerations for Beach Management. (In): *Journal of Ocean & Coastal Management*, 45 (2002) 261 - 275.

Micallef, A. and A.T. Williams, (*in press*). Application of Function Analysis to Bathing Areas in the Maltese Islands. (In):*Journal of Coastal Conservation*.

Micallef, A., Morgan, R. and A.T. Williams, 1999. User Preferences and Priorities on Maltese Beaches –Findings and Potential Importance for Tourism. (In - CD-ROM): Coastal Environment Management, EUCC - ITALY/EUCC. (ed.), G. Randazzo, 1999.

Ministry for Tourism, 2001. Tourism Carrying Capacity Assessment of the Maltese Islands. Technical Report & Executive Brief. Malta Tourism Authority, Valletta, Malta. Pp. 38.

Morgan, R. and A.T. Williams, 1995. Socio-demographic parameters and user priorities at Gower beaches, Wales, UK. (In): *Directions in European Coastal Management*. (eds), M.G. Healy and P. Doody, Samara Publishing Ltd., Cardigan. Pp 83 - 90,

Morgan, R., Jones, T.C. and A.T. Williams, 1993. Opinions and perceptions of England and Wales Heritage Coast beach users: Some management implications for the Glamorgan Heritage Coast, Wales.(In): *J. Coastal Research*, 9(4), 1083 - 1093.

Morgan, R. Gatell. E. Junyente, R. Micallef, A. Ozhan,E. and A.T. Williams, 1996. Pilot studies of Mediterranean beach user perceptions. (In): *ICZM in the Medirerranean and Black Sea: Immediate Needs for research, Sarigerme, Turkey.* (ed.), E. Ozhan, MedCoast Secreteriat, Middle East Technical University, Ankara, Turkey. Pp. 99 – 110.

Norusis, M.J., 1993. Software Package for Social Sciences for Windows: Base system users guide: Release 6.0 SPSS INC., Pp.768

Pike, E., 1997. Quality at the Beach-Head. (In): *Current Quality – a Newsletter on Recreational Water Issues*, Robens Institute, Robens Centre for Public and Environmental Health, Surrey, U.K. (1), 1997. Pp. 6.

Planning Services Division, 1990. *Malta Structure Plan*, Report of Survey (1), Ministry for the Development of Infrastructure, Malta. Pp. 375

Pond, K., Robertson, W., Rees, G. and H. Salas, 2000. Design of Monitoring Programmes. (In): *Monitoring Bathing Waters: A Practical Guide to the Design and Implementation of Assessments and Monitoring Programmes; World Health Organisation, 2000.* (Eds) Jamie Bartram and Gareth Rees. E & FN Spon; London and New York. Pp 15 – 26.

Rees, G., 1997. Lies, Damned Lies and Beach Awards. Editorial (In): *Current Quality – a Newsletter on Recreational Water Issues*, Robens Institute, Robens Centre for Public and Environmental Health, Surrey, U.K. (1), 1997. Pp. 6.

Schembri,P.J. and E.Lanfranco, 1994*. A survey of the sandy beaches of the Maltese Islands*. Management Systems Unit Ltd., Malta University Services Ltd., Msida, Malta. Pp. 20 + 36 maps.

Short, A., 1993. Beaches of the New South Wales Coast. Andrew D Short (Pub.), Australian Beach Safety and Management programme, 1993, Pp. 358.

UNEP, 1990. An Approach to Environmental Impact Assessment for projects Affecting Coastal and Marine Environments. (In): *UNEP Regional Seas Reports & Studies* No. 122, UNEP, 1990.

Vogt, G., 1979. Adverse Effects of Recreation on Sand Dunes: a problem for coastal zone management. (In): *Coastal Zone Management*. (6). Pp 37 – 68.

Van der Meulen, F. and J. van der Weide, 1999. Unpublished lecture notes on: Functions of Nature and Environmental Function Evaluation. (In): *MedCoast Institute'99*. (International Training Course on Coastal Zone Management, 1999). MedCoast Secretariat, Middle East Technical University, Ankara, Turkey.

Van der Weide, J., Van der Meulen, F., Sarf, F., Gengic, S. and Mzia Gabunia, 1999. Assessing the Value of two Coastal Wetlands in Turkey. (In) *MedCoast '99 – EMECS'99 Joint Conference on Land – Ocean Interactions: Managing Coastal Ecosystems,* Antalya, Turkey*.* (ed.), E. Ozhan, MedCoast Secreteriat, Middle East Technical University, Ankara, Turkey. Pp. 1009 - 1020.

Williams, A.T., 1999. Personal Communication on the '*Application of Rule of Negligence to (beach) management responsibilities: the Donnahue vs Stevenson 1936 court case, U.K*'; on '*the utility of beach award schemes'* and on '*Design and content of beach registration techniques*'. University College of Bath Spa, U.K.

Williams, A.T. and R. Morgan, 1995. Beach Awards and Rating Systems. (In): *Shore and Beach*, 63(4). Pp 29 – 33.

Williams, A.T. and P. Davies, 1999. Beach Management Guidelines: Dimensional Analysis. (In, CD-ROM): (In): *Coastal Environment Management,* EUCC - ITALY/EUCC. (ed.), G. Randazzo, 1999.

Williams, A.T., Winarski-Jones, T.C., Davies, P. and R. Curr, 1992. Psychological Profile of the Beach /Dune User in South Wales, U.K. (In): *Shore & Beach*, 60: (2). Pp 26 - 30.

World Health Organisation, 1999. Health Based Monitoring of Recreational Waters: The Feasibility of a New Approach (The Annapolis Protocol). (In): *Protection of the Human Environment. Water, Sanitation and Health Series*, WHO, Geneva, 1999. Pp 50.

World Health Organisation, 2000. *Monitoring Bathing Waters: A Practical Guide to the Design and Implementation of Assessments and Monitoring Programmes;* (Eds) Jamie Bartram and Gareth Rees. E & FN Spon; London and New York. Pp 337.

Appendix I: Beach Registration

1. **Beach name** ***RAMLA BAY*** **Beach N^{o}** *4.*

2. **Length** *412(m)* **Average width** *25 - 50(m*).

3. **Responsible authority** *Gaia Foundation (NGO)/ Xaghra Local Council, Gozo.*

4. **Municipality** *Xaghra*

5. **Date of initial registration** *21st May, 2001*

6. **Date of field survey** *21st May, 2001*
7. **Hinterland** (within walking distance and generally visible from the beach)

Positive parameters

River mouth ***(Dry)***	***Yes***
Rural area	***Yes***
Natural vegetation	**Yes**
Historic features	**Yes**
Hills	**Yes**

Negative parameters

Industry/Military area	***No***
Yacht/fishing harbour	***No***
Insensitive tourism/Urban development	***No***
Commercial Harbour	***No***
Traffic/constant noise/litter **(*smell from Gozo refuse site depending on wind)***	***No***

8: Accessibility:

Road: ***Yes***; Track: ***Yes***; Public transport: ***Yes***; no access: ***No***;

9: **Beach facilities**:

Hotels	***No***	*Restaurants*	***Yes***	*Showers*	**Yes**
Snack bars	**Yes**	*Camping grounds*	***No***	*Parking lot*	***Yes***
Litter bins	**Yes**	*Information sources*	**Yes**	*Secondary housing*	***No***
Toilets	**Yes**	*Freshwater tap*	**Yes**		

10. Safety parameters

Lifeguards ***(Not permanently)***	***Yes***
Fixed safety equipment	***Yes***
First aid posts	***No***
Swimming safety warning notices	***Yes***
Emergency phone facilities	***No***
Safe bathing environment ***(bathing environment slope < 1:10 and sandy beach environment)***	***Yes***

11a. Shore type (%)

Sandy Beach	***95***	**%**
Rocky shore	***5***	**%**
Cliff	*0*	%

11b: Beach material (% cover):

Sand	***99.5***	**%**	*Gravel*	%
Stones	***0.5***	**%**	*Rocks*	%
		%	*Other kind*	%

12: Litter survey (based on *NALG* protocol)

Category	**Type**	**A**	**B**	**C**	**D**
Sewage Related Debris	General	**X** 0	1-5	6-14	15+
	Cotton buds	**X** 0-9	10-49	50-99	100+
Gross Litter		**X** 0	1-5	6-14	15+
General Litter		**X** 0-49	50-499	500-999	1000+
Harmful Litter	Broken glass	0	**X** 1-5	6-24	25+
	Other	**X** 0	1-4	5-9	10+
Accumulations	N^{o}.	0	**X** 1-4	5-9	10+
Oil		Absent	**X** Trace	Nuisance	Objection-able
Faeces		**X** 0	1-5	6-24	25+

13: Bathing zone

Slope: steep Gentle	***Gently sloping sandy beach***
Sea current (m/sec) Typical (bathing conditions Extreme (storm conditions)	***Rip currents***
Sea Waves (m) Typical (bathing conditions) Extreme (storm conditions)	*(estimated)* ***10 – 50 cm*** ***2 – 2.5m***
Bottom material*:* Sand: **100%;** stones…….%; gravel …….%; rock…….%	

14: Usage:

Jetskiing	***No****	Sailing:	***No****	Motor boating:	***No****
Fishing (shore/boat):	***Yes#***	Surfing	***No***	Swimming:	***Yes***

***** Marker bouys delineate the offshore limit for boat/jetski operation and inshore swimming zone.
# limited to the rocky side of the bay.

15. Designated sensitive area

Resting place for water fowls	**No**
Breeding place for rare birds	**No**
Sanctuary	**No**
Conservation area (***Scheduled)***	**Yes**
Potential conservation area	***Yes***
Other kind of protected area	**No**

16: Water Quality:

Results from national bathing season monitoring programme: (*Year 2000 report*)	**Based on Bathing Water Directive (76/160/EEC**) *see Appendix V*	
	Blue Quality	**X**
	Green Quality	
	Orange/Red Quality	
	Black Quality	
Potential influences of poor water quality	1. sewage outlet	**No**
	2. sewage pipes	***No***
	3. river mouth ***(Dry)***	***Yes***
	4. harbour areas	***No***
	5. other outlets:	***No***

Appendix II : Bathing Area Classification

Beach rating based on the availability of safety related parameters	
***Resort* bathing areas**	
Presence of all six safety related parameters	Class A
Presence of fixed life-guards and any other two parameters	**Class B**
Absence of life-guards	Class C
Absence of life-guards, fixed safety equipment & swimming safety notices	Class D
(*) Lifeguards, fixed safety equipment, swimming safety warning notices first-aid post, safe bathing environment and emergency telephone facilities.	
***Non-resort* bathing areas**	
Presence of all four safety parameters (#)	Class A
Presence of fixed safety equipment any one parameter	**Class B**
Absence of fixed safety equipment	Class C
Limited to emergency phone services or no facilities.	Class D
# Fixed safety equipment, swimming safety warning notices, emergency telephone services and safe bathing environment.	

Table 1: Ramla bathing area rating based on the availability of safety related parameters in non-resort bathing areas as indicated by record 10 of the Beach Register (Appendix I).

Beach rating based on Water Quality criteria (76/160/EEC)	
Rating	***Criteria***
Class A	*Blue Quality* (*) bathing water quality
Class B	*Green Quality* (**) bathing water quality
Class C	*Red/Orange Quality* (***) bathing water quality
Class D	*Black Quality* (****) bathing water quality
(*), (**), (***), (*****): see explanation in Appendix V	

Table 2: Beach rating based on Water Quality data as indicated by proposed Beach Register *(*Appendix I) reflecting European Commission Directive (76/160/EEC) water quality criteria.

Beach rating based on availability of facilities			
Resort Beaches			
Class A	Class B	Class C	Class D
Shower facilities	Shower facilities	-	< 2 facilities
Restaurant	Snack bar	Potable water supply	
Litter bins	-	-	
Toilet facilities	-	-	
Hotel accommodation	2^{o} summer homes	Camping grounds	
Parking lot & good access	Parking & poor access	-	
Non-Resort Beaches			
Class A	**Class B**	Class C	Class D
Adequate litter bins	Litter bins	Litter bins	Litter bins or total absence of facilities.
Toilet facilities	-	-	
Bar	Bar	-	
Adequate parking lot & good access	Good access	Poor access	
Information signs	Information signs		

Table 3. Beach rating based on availability of facilities as reflected by record 9 of the Beach Register (Appendix I).

Beach rating based on hinterland features		
Rating	***Positive Parameters***	**Negative Parameters**
Class A	5	0
Class B	3 – 4	1 – 2
Class C	1 – 2	3 – 4
Class D	0	5
In each case, default to the lower score is made.		

Table 4: Beach rating based on hinterland features as reflected by record 7 of the Beach Register (Appendix I).

	Beach Rating based on EA/NALG (2000) litter assessment scheme					
	Category	***Type***	**Classification**			
			Class A	***Class B***	Class C	Class D
1	Sewage Related Debris	General	0 **X**	1-5	6-14	15+
		Cotton buds	0-9 **X**	10-49	50-99	100+
2	Gross Litter		0 **X**	1-5	6-14	15+
3	General Litter		0-49 **X**	50-499	500-999	1000+
4	Harmful Litter	Broken glass	0	1-5 **X**	6-24	25+
		Other	0 **X**	1-4	5-9	10+
5	Accumulations	No.	0	1-4 **X**	5-9	10+
6	Oil		Absent	Trace **X**	Nuisance	Objection-able
7	Faeces		0 **X**	1-5	6-24	25+

Table 5: Beach rating based on EA/NALG (2000) litter assessment as indicated in record 12 of the Beach register (Appendix I).

	Bathing area rating parameter (in order of priority)				
	Safety	*Water quality*	*Facilities*	*Hinterland*	*Litter*
Rating awarded	**B**	**A**	**B**	**B**	**B**
Classification of bathing environment					
Five star	At least four parameter ratings awarded 'A' class rating for safety, water quality, facilities and either hinterland or litter.				
Four star	At least four parameter ratings awarded A / B class with three being either: *Safety, Water Quality* and either *Facilities* or *Hinterland*.				
Three star	*Where Safety, Water Quality & Facilities* parameter ratings awarded A , B or C class.				
Two star	*Where Safety, Water Quality, Facilities and either hinterland or litter* parameter ratings awarded not less than C class.				
One star	*Where Safety, Water Quality and Facilities* parameter ratings awarded less than C class.				

Table 6: Overall bathing area classification for Ramla Bay based on the five rating schemes determined by safety, water quality, facilities, hinterland and litter parameters.

Appendix III: Dimension Analysis

Spatial Dimension	Current Evaluation	Measures/Recommendations
1. Have bathing area and related system boundaries been identified? Has interaction of beach system with sediment cells and adjacent areas been evaluated?	System boundaries have been identified but not their sediment cells and interactions.	A broad based study of the impact of the catchment area influencing this beach and of the bathing area including characterisation of local sediment cell (including dune remnant resources) and depth of closure influencing beach.
2. Have the cause and effect of internal and external influences been considered holistically?	• Beach bars & restaurants previously sited on the beach have been moved outside of the immediate beach/dune system. • Potential nutrient loading and eutrophication from upstream agriculture is of concern but un-quantified. • Noxious fumes from the nearby municipal waste disposal site are evident but as yet un-quantified.	Quantification & evaluation of • The social impacts of fumes from the nearby municipal waste disposal site (e.g. on human health, discomfort). • The effects of nutrient loading from upstream field systems. • Novel environmental evaluation tools presented by this study.
3. Have facilities associated with bathing and related recreational activities, been evaluated?	The impact on bathing area quality by available facilities, surrounding environment, litter, water quality and safety issues was determined.	The inclusion of bathing area registration and classification as part of the overall site management plan is recommended.

Table 1: Dimensional Analysis of Ramla Bay considering spatial management aspects

Temporal Aspect	Current Evaluation	Measures/Recommendations
1. Are past records available? Is it possible to identify past problems or activities that may have given rise to current problems/ concerns?	Parking on clay slopes in the past due to insufficient facilities has resulted in their degradation. Although more parking space has been made available, its management remains unsatisfactory. Nearby domestic refuse landfill and agricultural sewage runoff have been identified as sources of atmospheric/aesthetic and marine pollution but their impact remains un-quantified.	• Parking requirements should be evaluated and adequately catered for. • The impact from agricultural sewage runoff and a domestic refuse landfill must be quantified and appropriately addressed. • Use of past aerial photographs should be investigated.
2. Have present beach use patterns been identified? What are they? What are predictions for the future?	Questionnaire surveys on beach user preferences & priorities have been collected for Maltese beaches.	Detailed site/user group-specific studies on beach use patterns and site carrying capacity are required. Beach management at Ramla should ensure adequate consideration of beach user preferences and priorities.
3. Have short and long term health analysis been considered?	While short-term water quality reports indicate there are no serious problems, no long-term bather related health studies are available.	• Better public notification of water quality assessments, health/sanitary facilities. • Beach user health related studies should be undertaken. • Monitor ongoing scientific debate on acceptable sampling strategies.
4. Is there evidence of change of the beach over time?	Some erosion of clay slopes is suspected but not quantified. Short-term beach sediment fluctuation studies do not indicate serious erosion problems.	Long-term beach profiling and clay slope stability studies should be implemented. Application of old maps & aerial photographs to determine any temporal changes should be investigated.

Table 2: Dimensional Analysis of Ramla Bay considering temporal management aspects.

Substantive Dimension	Current Evaluation	Measures/Recommendations
1. Do any active management practices exist? If yes, should they be continued, stopped or amended?	Existing management plan reflects conservation bias without reference to user preferences/priorities.	A more specific beach management plan addressing bathing aspects is proposed as part of this study.
2. Is there any information provided to the beach users? What type?	Signs prohibiting nude bathing, warning of dangerous currents, providing information on conservation value of sand dunes and management objectives are present.	Additional signs could be placed to describe potential footpaths within this and in adjacent embayments.
3. Have any studies been carried out to determine what level suitable measures should be taken? (facilities, structures, etc.)	Dune remnants have been extensively studied, beach user preferences & priorities identified through questionnaire surveys and a management plan proposed.	A first aid centre should be set-up. Wardens and lifeguards should be on duty particularly during week-ends to protect conservation value of the area and provide safety facilities for bathers. Sediment exchange mechanisms between beach & sediment cell should be identified.
4. Have any studies been conducted concerning the extent of beach problems ?	Catchment area ecology survey being updated. Wardens are being commissioned to oversee the area on weekends (limited to summer months). Short-term studies on sub-aerial beach sediment dynamics have been carried out reflecting minor trends of beach sediment loss.	Establishment of Ramla as a conservation area is desirable. Encroachment of farming practices on dune remnants should be mitigated. Potential impact of unchecked use of pesticides and fertilizer on extensively farmed beach hinterland and impact of mal-odours from an upwind landfill should be investigated. Trends of beach sediment fluctuation should be determined.

Table 3: Dimensional Analysis of Ramla Bay considering substantive management aspects.

Quantitative Dimension	Current Evaluation	Measures/Recommendations
1. Have problems having single / multiple sources been identified? If so, what are they?	Deterioration of dune remnants may be attributed to multiple sources e.g human trampling, limited sediment supply, poor management and sand removal for construction purposes.	Wide-scoped management plan recommended to enhance evaluation of multiple source problems during the evaluation phase of the plan. Determination of sediment budget and rates of sediment flux are also recommended.
2. Are there threshold levels (e.g. beach loss, water quality, beach population, air quality, dune erosion)? If threshold levels have been defined, have they been applied?	While levels for water quality and beach capacity have been identified, only the former are currently applied. In the case of Ramla air quality and beach sediment fluctuation thresholds are of particular concern.	The management plan should identify and apply existing threshold levels and determine value for those unknown.
3. Is data on beach user preferences & priorities for different user groups available?	General beach user questionnaire surveys have been carried out for several beaches in Malta and abroad.	More site/user group-specific questionnaire surveys should be undertaken to ensure a correct evaluation of user preferences & priorities.

Table 4: Dimensional Analysis of Ramla Bay considering quantitative management aspects.

Qualitative Aspect	Current Evaluation	Measures/Recommendations
1. Have beach related social, economic and environmental attributes been evaluated?	**Environmental evaluation identified this site with the highest conservation value of the beaches studied (this chapter, section 5.2.5).** • Socio-economic questionnaire surveys at several local beaches indicate particular importance of safety, facilities, water quality, surrounding landscape & litter.	• Management plan objective should reflect a strong conservation bias • Environmental evaluation techniques evaluated should be integrated in the beach management plan adopted. In particular, Function Analysis is indicated for assessment of whether current management is appropriately oriented.
2. Has bathing area quality rating been evaluated for this site?	A ***4 Star*** rating was awarded. A '***C*** 'rating for facilities (due to absence of accommodation facilities) prevented a higher class award at this site.	As a rural beach with high conservation value, accommodation facilities are not desirable. Bathing area quality rating is recommended as part of the management plan.
3. Are sampling and analysis strategies scientifically sound?	• Though widely used, the ethos of adopted bathing water quality testing is in question. • Short-term beach profiling may be viewed as potentially inaccurate due to limitation to sub-aerial sediment component.	• Retain current procedure for water quality testing but integrate with proposed bathing quality assessment technique. Also keep abreast of ongoing scientific debate. • Long-term beach profiling should be initiated. Review accuracy of current methodology. If inaccurate, profiling up to depth of closure is recommended.
4. Does the beach meet acceptable bathing water criteria?	For the bathing period year 2000, the highest possible rating of *Blue Quality* (based on European 76/160/EEC standards) was attained by this site.	More management emphasis needs to be placed on control of water quality prior to entry/discharge into the marine environment.

Table 5: Dimensional Analysis of Ramla Bay considering qualitative management aspect.

Appendix IV: Function Analysis

Environmental Component	Characteristic	Indicators	Characteristic evaluation Ramla Bay
Ecologic Values			
Air	Pollution	*Gravity*	2
		Visibility	3
		Effect on humans	2
	Noise	*Intensity*	3
		Normalized Score	*0.833*
Coastal Waters	Quality	*Microbiological pollution*	3
	Aesthetic condition	*Turbidity*	3
		Floating debris	3
		Normalized Score	*1.000*
Fresh water	Supply	*Rainfall*	3
		Normalized Score	*1.000*
Terrestrial Biota		*Natural veg. cover*	3
	Quantity	*Biological productivity*	3
		Biological diversity	3
		Species of special interest	3
		Normalized Score	*1.000*
Marine biota	Quantity	*Biomass*	2
		Biological productivity	2
	Diversity	*Biological diversity*	3
		Species of special interest	No Data
		Normalized Score	0.778
Geological & topographical features		*Lithological*	3
		Size of bathing area	2
		Normalized score	*0.833*
Hazards		*Coastal erosion*	2
		Coastal flooding	3
		Storms	2
		Cliff/slope instability	2
		Soil erosion	2
		Torrential rains	2
		Normalized Score	*0.722*
Resources	Non-renewable	*Minerals, rocks, construction materials, fuels*	1
		Soil	3
	Renewable	*Fish*	1
		Visual quality	3
	Landscape	*Uniqueness*	3
		Normalized Score	*0.733*
		Total	68.000
Normalized Score of Ecologic Value			0.840

Social Component	Characteristic	Indicators	Characteristic evaluation Ramla Bay
Human Values	Potential for use		
		Historic, artistic, archaeological sites	3
		Public recreation facilities	2
		Hotels, restaurants	1
		Utilities	1
		Parking	2
		Accessibility	3
		Land-use	1
		Extent of development	1
		Population density	1
		Intensity of use	2
		Extent of reclamation(with nourishment)	1
		Public health	2
		Opportunity for employment	1
		Perception of the quality of the environment	3
		Total	24
Normalized Score Human Value			0.571

Table 1: Value allocation and calculation of normalized scores for bathing area-relevant coastal parameters. *Scale used for total score allocation for ecological and social values used scale 1: minimum – 3 maximum.*

Appendix V: Water Oualitv Evaluation Standards

(*) Blue water quality is awarded to bathing waters in compliance with the *Imperative Values* and also conforming with the stricter *Guide Values* at a level of 80% for the *total & faecal coliforms* parameters and at 90% for other parameters as stipulated in Annex 1 of Directive 76/160/EEC (see Appendix V).

(**) Green water quality is given to bathing waters where 95% of samples taken are in conformity with the Imperative Values stipulated in Annex 1 of Directive 76/160/EEC (see Appendix V).

(***) Red water quality is awarded to bathing waters where the samples taken are not in conformity with the parametric values of Directive (76/160/EEC).

(***) Orange water quality is awarded to bathing waters in conformity with Directive (76/160/EEC) but where insufficient sampling has taken place.

(****) Black water quality is awarded to bathing waters where bathing is temporarily prohibited because of a danger for the health of bathers but where water quality is still monitored and the necessary action to remedy the situation is taken.