

Sustainable development of a former U.S. Base in Greece

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Abstract

The Former U.S. Base of Gournes (FUSBG) is located on the northeastern coast of the island of Crete under the regional authority of Hersonissos, a municipality with a coastline of 38 km and a population of more than 27,000 inhabitants. Hersonissos is one of the most important tourist destinations in Greece, representing 15% of the country's tourism resources. During the summer season, there is a substantial flow of touristic visitors, who are accommodated in a large number of hotels. The total surface of the FUSBG is 2.98 km² with only 38% in use and providing a range of facilities. In some cases, FUSBG facilities either malfunction or do not function at all, partly because of the financial and economic crisis Greece has been facing since 2007. In 2011, the Greek Parliament passed a law (Gazette: 3986/152/1-7-2011), which allows the so-called “fast track” procedure for purchasing or leasing of public enterprises and property, in order to meet national financial obligations towards the European Union, the European Central Bank and the International Monetary Fund. FUSBG is included in the list of properties suitable for this procedure. To combat the very real risk of uncontrolled future growth of this coastal area, fuelled by the private sector and disregarding the common good and environmental protection, we put forward a proposal that depends on a strategy of rapid actions, based on an analysis of the existing legislative and institutional framework, together with an exploration of the most important environmental components focusing on the development of the FUSBG. Tools applied in the analysis, such as Geographical Information Systems (GIS) and a Beach Vulnerability Index (BVI) to anticipated sea-level rise, are proposed as important means for setting up the overall framework for a successful Integrated Coastal Zone Management (ICZM) implementation in the study area. Additionally, the establishment of a management board consisting of a wide range of local stakeholders from the public and private sectors is strongly recommended, ensuring local interests and enhancing public awareness on issues relevant to the FUSBG's sustainable development. Loss of faith in institutions may result in a need to draw up new cycles of consultations and agreements between different parties that will be built up on trust and transparent procedures, to ensure benefits for the civil society, respect of cultural heritage and co-management of the area.

Introduction

International experience has shown that converting former military bases to alternative uses is a time-consuming, costly, bureaucratic and arduous process (Bagaeeen, 2006; Abrahams, 2008). Though there is available literature on the redevelopment and rehabilitation of closed military facilities, there is a lack of information concerning similar facilities along the coastal zone and their environmental risks. Integrated Coastal Zone Management (ICZM) is an established management framework and process for the sustainable development of coastal areas (World Bank, 1996). The reference document within the European Union (EU) is Recommendation 2002/413/EC, under which EU Member States should elaborate national strategies for coastal management. This process was followed by the elaboration of the ICZM Protocol for the Mediterranean, adopted in 2008 and entered into force in 2011, which reflects the regional sea-based approach and includes the basic ICZM principles and objectives for the support of sustainable development of Mediterranean coastal zones

(Koutrakis et al., 2011). To date, eight countries bordering the Mediterranean have ratified this Regional Seas Convention's Protocol, among them Greece.

The Former U.S. Base of Gournes (FUSBG), located on the northeastern coast of the island of Crete (Fig. 1) is included in the list of public properties suitable for “fast track” purchasing or leasing in order to meet national financial obligations towards European Union (EU), European Central Bank (ECB) and International Monetary Fund (IMF). The present study puts forward a proposal for a rapid action strategy for the sustainable development of the FUSBG, based on the analysis of the existing legislative and institutional framework, together with an exploration of the most important environmental components (e.g. coastal erosion processes) in the area under study.

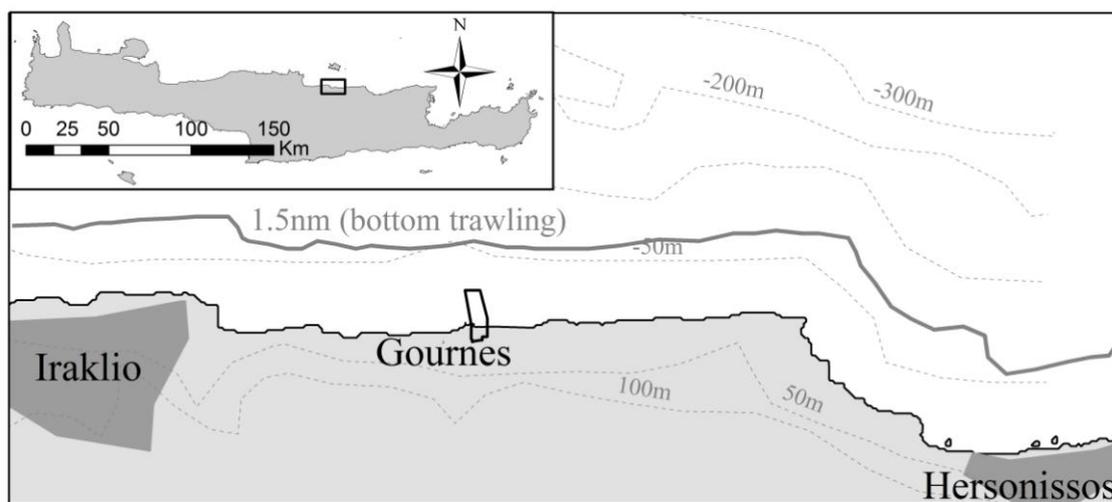


Fig. 1: Location of the FUSBG (highlighted with a black outline), Crete Island (inset).

Geographical and social context of the study area

The FUSBG, located in Gournes village, has good road links to the major touristic town of Hersonissos (13 km west) as well as to Iraklio city (17 km east), the largest urban centre of the island of Crete (Fig. 1). The distance from Iraklio port is about 15 km, and that from the airport 10 km. Since 2010, the FUSBG has been the seat of the Hersonissos Municipality, which has a total surface of 271,580 km² with a coastline of 38 km and a population of more than 27,000 inhabitants (Hersonissos Municipality, 2011). This multi-cultural area has residents coming from the United Kingdom, the Netherlands, Germany, Austria, etc as well as economic migrants from countries such as Albania, Romania, Bulgaria and Serbia. In addition to its permanent residents, the population significantly increases due to more than 25,000 summer residents and approximately 700,000 tourists arriving mainly via the airport of Iraklio (Hersonissos Municipality, 2011). The majority of local residents are working in the tourism sector during summer. However, many of them also work on agriculture during winter, especially in the hinterland.

Methodology

The base layer for the area under study was created, based on a satellite image (GeoEye) freely available through Google Earth (2012). The various features of the area were digitised within a Geographical Information System (GIS; Environmental System Resource Institute (ESRI) ArcGIS 9.3): they included coastline, road/path network, existing buildings, etc. This base layer formed the template for the spatial elaboration of the development plan. Ground-truthing was carried out (via snorkeling) in order to validate the presence of seagrass and other seabed structures, as dark patches are indicated in the satellite image (Fig. 2), and digitised on that basis.

The Beach Vulnerability Index (BVI) was used (Alexandrakis et al., 2011) in order to estimate the vulnerability of the study area along the coastal zone, in relation to the development plan. For the morphological mapping of the study area, topographic diagrams and "orthophoto" maps (1:5000) were used. The morphodynamic measurements included 10 representative shore-normal profiles along the beach with 100 m spacing, extending from the seawards limit of the beach to a depth of 15 m. Beach elevations and slopes were measured by using Differential GPS, whilst depth soundings were taken by a portable echo-sounder. Furthermore, 60 surficial sediment samples were collected along the profiles and analyzed according to Folk's (1974) procedure. The wave regime was calculated with the equations of Coastal Engineering Research Centre (CERC, 1984) by utilising local wind data during the period 1960-2007 (Athanasoulis and Skarsoulis, 1992; Soukisian et al., 2007). For the relative Sea Level Rise the estimate provided by the Intergovernmental Panel on Climate Change (IPCC, 2007) was adopted, i.e. an average rise of 0.38 m is expected for the year 2100.

Grey literature, local newspaper archives and published government reports as well as legislative documents (in Greek) were also used in order to gather relevant information on the study area.

Historical background

From 1954, the study area has been used as an U.S. military base for telecommunications. The base was officially closed in 1994 and, since then, the area has been recorded as property of the Greek Ministry of Defense. At that time, a surface of 0.49 km² of the FUSBG (2.98 km²) was assigned to the Greek Air Force for the accommodation of its personnel and their families, which is still being used. During the same year, the Hellenic Public Real Estate Corporation (HPREC), under the supervision of the Greek Ministry of Economy and Finance, took over the management in order to ensure the sustainable development of the area. For this purpose, the HPREC awarded part of the land to local/regional bodies and research institutions (Memorandum of Cooperation, 2004). This part of the land with a total surface of 0.65 km² (on top of the 0.49 km² used for military accommodation) currently includes: Thalassocosmos complex (Hellenic Centre for Marine Research main building, Cretaquarium, Aqualabs), an International Exhibition Centre, Hersonissos Municipality, state-run schools, tennis and volley ball courts, a gymnasium and an environmental education centre (closed in 2012 due to the financial crisis). There is also a marina with basic facilities for small boats, a waste-water treatment plant for the needs of the FUSBG and an outfall for Cretaquarium and Aqualabs seawater discharges (400 m offshore). The HPREC also commissioned a study for the rest of the area (1.84 km²) proposing the

creation of an operational and a recreational park. In addition, the HPREC proposed to put this area under international public tender for either purchasing or leasing, with particular emphasis on a public-private partnership (Gazette: 3389/232/22-09-05). In fact, this part of the FUSBG is currently abandoned, including infrastructure such as former U.S. base buildings and an outdoor swimming pool with facilities, due to the absence of surveillance and state subsidy for the maintenance of the area and still undeveloped.

Institutional and legal framework

At present, the FUSBG is considered to be developed as a residential district that will include a large cultural-educational centre not only for the visitors and tourists, but also for the benefit of local/regional residents. This proposal is formally described in a recent Decision of the General Secretary of Region of Crete referring to the spatial planning and urban organization of an open city in the FUSBG (Gazette: 787/60/26-2-2010). Under this 2010 Decision, a list of authorized uses is provided, such as buildings for accommodation as well as restaurants, cafeterias and shops of certain capacity. Overall, no more than 40% of the area can be used for infrastructure, while the rest is designated for free space. The same Decision also defines the coastal zone which should not be included in the urban development planning (a zone of either 50 m width from the shoreline, or 100 m width from the highest winter waterline). Even though touristic facilities cannot be constructed within 50 m of the shoreline in general, there are some exceptions regulated by local/regional authorities (e.g. installation of non-permanent structures for swimmers, converting coastal roads into cycle/pedestrian paths, establishment of prefabricated settlements). Reconstruction and further development of the port facilities could also be allowed, so that small yachts and boats can dock. In conclusion, this Decision is consistent with the ICZM Protocol, and includes the basic principles and objectives of the EU's ICZM Recommendation regarding the protection of the environment and the sustainable development of this coastal area. However, one year later the Greek Parliament voted a law (Gazette: 3986/152/1-7-2011), which partially conflicts with the Decision voted in 2010 by allowing the "fast track" process for leasing or purchasing of public enterprises and property, in order to meet national financial obligations towards the country's creditors. The FUSBG is included in this list of properties suitable for undertaking this procedure. Therefore, the local/regional perception is of concern for there is a very real risk of uncontrolled future growth of this coastal area, fuelled by the private sector, and without regard for the common good and environmental protection.

Political will and public participation

Until now a number of proposals have been submitted for the reuse and co-use possibilities of the FUSBG by the local/regional bodies and associations, as well as research institutions (e.g. local union of municipalities and communities of Iraklio Prefecture, the Chambers of Commerce, hoteliers' association, associations of school teachers, HCMR, Foundation for Research and Technology, different associations of the local society). In addition, numerous meetings and consultations of local/regional

stakeholders have taken place during these years as an engagement initiative of the local community to reach a level of participation in decisions and co-management in the area. Yet, no progress has been made for further development of the area. The majority of local/regional actors appear to support the implementation of the 2010 Decision referring to the spatial planning and urban organization of an open city in the FUSBG (Gazette: 787/60/26-2-2010), but under specific terms. According to these terms, any private investments should be accompanied by guarantees for the protection of the environment and for job/enterprise and wealth creation opportunities for local/regional residents and entrepreneurs. Unfortunately, the rapid change of legislation by the Greek Parliament in 2011 (Gazette: 3986/152/1-7-2011) allowing for the “fast track” process of leasing or purchasing of the public property destroyed any opportunity for the implementation of spatial planning and urban organization, and therefore the sustainable development and environmental protection of the study area. Moreover and despite the fact that there is great reluctance at the local and regional levels to abide by this “fast track” law, the financial crisis in the country has brought about general societal instability and inability of the local communities to react.

Environmental risks

Ground-truthing (via snorkeling) confirmed that the dark patches on the satellite image (Fig. 2) were a mix of hard substrate (rocks) and patches of seagrass beds. Seagrass beds are identified as a priority habitat type for conservation under European law (Habitats Directive 92/43/CEE; Council Regulation EC No 1967/2006 Management measures for the sustainable exploitation of fishery resources in the Mediterranean Sea). Even though the seagrass bed was patchy and mixed with hard substrate, the precautionary principle requires that proper measures should be taken for the protection and conservation of these important habitats, whose benefits to the marine ecosystem are widely accepted (Díaz-Almela & Duarte, 2008).

The values of the BVI variables for each section of the beach zone of the study area are presented in Fig. 3. Maximum and minimum values of the different variables present in different beach sections indicate the variability of the processes along these different sections. The sediment transport along the coastline does not seem to be significant with regard to erosion processes (low and moderate values of the long- and cross- shore variables, respectively). The extremely high values of wave run up, especially in the western part of the beach, indicate that the wave energy affects the whole sub-aerial part of the beach and makes it more vulnerable to processes of erosion. Furthermore, the high values of the Aeolian transport in the central and eastern part of the beach indicate sediment transport from the beach to the sea. Sea level rise also seems to have a high impact on the erosional processes, especially in the central part of the beach (also visually verified). The riverine sediment transport and the land erosion indices show the maximum values, due to the fact that there is no sediment availability from land sources in the beach. There is no dune field in the study area and the beach has been cut off from the river system as a result of man-made structures. The overall BVI values show relatively high vulnerability of the beach in front of the FUSBG, and especially within the zone of 50 m from the shoreline. Therefore, the construction proposed in the development plan of the study area should not be allowed within a zone

of 100 m from the highest winter waterline according also to the ICZM Protocol (PART II, Article 8).

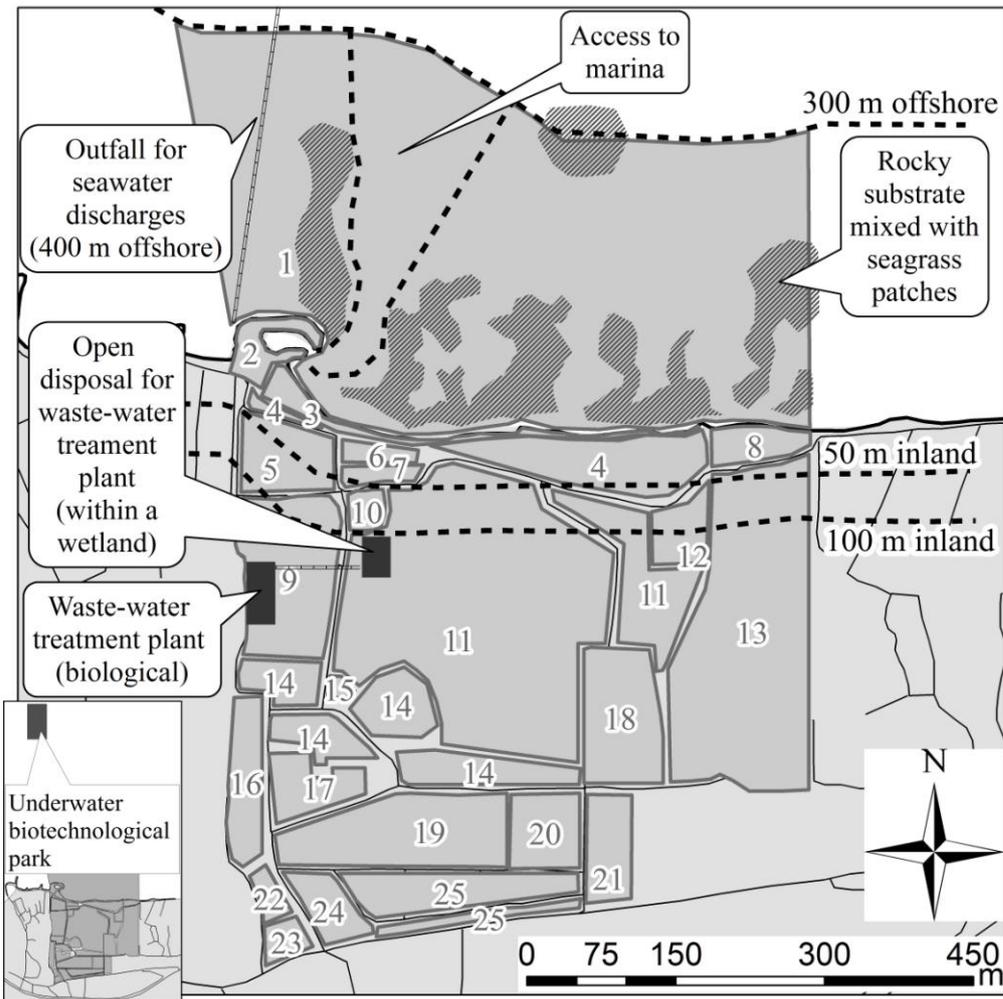


Fig. 2: Current and planned uses of the FUSBG, as per the spatial development plan (the numbers refer to Table 1, Inset: the underwater biotechnological park).

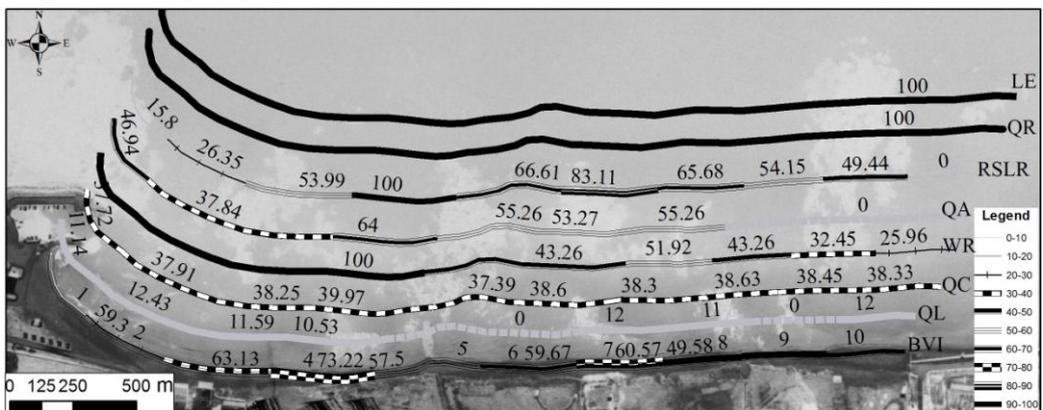


Fig. 3: The processes, incorporated in the BVI index, that control the evolution of the beach zone in front of the FUSBG are: (i) long-shore sediment transport (QL), (ii) cross-shore transport (QC), (iii) riverine inputs (QR), (iv) Relative Sea Level Rise (RSLR), (v) wave run-up (WR), (vi) aeolian sediment transport (QA), and (vii) land erosion.

Table 1: Current and planned uses, as per the proposed development plan of the FUSBG.

Code number	Current uses	Planned uses	Development level
1	Swimming and vehicle (boats) zone	Swimming zone, including passage for boats to access the marina	-
2	Marina with basic facilities for marina users & paved car park	Marina with modern facilities for beach and marina users & vehicle park	Medium
3	Sandy beach	Sandy beach, using facilities of the marina	-
4	Free land	Natural land	Minor
5	Thalassocosmos complex (free land)	Natural land	Minor
6	Abandoned buildings constructed for relevant beach facilities	Natural land	Medium
7	Thalassocosmos complex (car park paved of Cretaquarium & free land)	Natural land	Minor
8	Sandy beach (municipal facilities for swimming & unpaved car park)	Sandy beach (municipal facilities for swimming & vehicle park)	Minor
9	Thalassocosmos complex (HCMR, Aqualabs, Cretaquarium & waste treatment plant of 2nd stage)	Thalassocosmos complex (new facilities)	Medium/Major
10	Thalassocosmos complex (unpaved car park of Cretaquarium)	Natural land	Minor
11	Free land	North: natural land. West: Thalassocosmos (new facilities). East: centre for leisure activities. South: accommodation, cafeterias, restaurants etc	Major
12	Abandoned outdoor swimming pool (associated buildings & free land)	Outdoor skate/roller/bike park & outdoor sports courts (part of the centre for leisure activities)	Medium
13	Military housing (families of military personnel)	Military housing (families of military personnel)	-
14	Abandoned US base buildings	Accommodation, restaurants, cafeterias etc	Major
15	Animal rescue centre	Animal rescue centre contributed by municipality	Minor
16	US base buildings used by municipality	US base buildings used by municipality	Medium
17	Municipality of Hersonisos, tennis/volley ball courts & gymnasium	Municipality of Hersonissos, tennis/volley ball courts & gymnasium	-
18	International exhibition centre (incl. car park, restaurant, children playground)	International exhibition centre (incl. car park, restaurant, children playground)	-
19	Public education centre: high school, artistic/music schools	Public education centre: high school, artistic/music schools	-
20	Abandoned US base buildings	Rental shop (pedal bikes, pedal cars, roller-blades, etc), health centre.	Major
21	Abandoned US base buildings (part of the international exhibition centre)	US base buildings used by the international exhibition centre	Medium/Major
22	Environmental education centre (closed)	Environmental education centre (re-open)	-
23	Public kindergarten (ages of 1-4)	Public kindergarten (ages of 1-4)	-
24	Public kindergarten (ages of 5-6)	Public kindergarten (ages of 5-6)	-
25	Abandoned US base buildings & free land	Welcome and information desk, post office and fire preventing facilities	Medium/Major
26	Underwater Biotechnological Park (part of Thalassocosmos complex)	Underwater Biotechnological Park (part of Thalassocosmos complex)	Medium/Major

Development plan

During the last decades, Crete has experienced significant levels of tourism growth, which represents its largest economic activity (Hersonissos Municipality, 2011). Therefore, tourism and the hospitality industry were considered to be key economic drivers for the development plan of the study area. The FUSBG is a large and open area close to the urban centre of Iraklio city, which has an international airport and a port, as well as being very near to the major tourist destination of Hersonissos town. Consequently, sustainable development of the FUSBG can be achieved by converting it to an attractive year-round (warm summers and mild winters) pole for visitors (e.g. day trips, summer residents) and tourists (e.g. summer and year-round tourism). Furthermore, the proximity of the FUSBG to important cultural and educational/environmental attractions of Crete (e.g. archaeological sites, museums, aquarium) supports the creation of a large cultural-educational centre, also described in the 2010 Decision referring to the spatial planning and urban organization of an open city in the FUSBG. In addition, this plan is compatible with the existing infrastructure on the FUSBG that is already in place and/or functional considering the financial and economic crisis. The development plan proposed in the present study includes a mix of uses in coherence with the existing management plans that may provide the most overall benefits for the civil society. The proposed uses of the development plan are shown in Fig. 2 and described in Table 1.

Thalassocosmos complex with the existing infrastructure and activities could represent the core of the cultural-educational centre, with emphasis on the eastern Mediterranean sea world. HCMR, linked with universities/research centres/institutes worldwide, has facilities to host students/researchers for training courses, summer schools, seminars and conferences. *Cretaquarium* further contributes to educational opportunities and supports actions aiming at public awareness regarding human activities and the protection of the environment. The underwater biotechnological park with a wide spectrum of activities for marine research and technology includes the development and promotion of innovative aspects of marine tourism (e.g. sport diving). HCMR has already proposed to expand their activities for research, technology, education and recreation and to further develop: (1) a research centre of excellence for Mediterranean marine biodiversity and genomics (new research laboratories, outreach activities for the public), (2) an educational centre in collaboration with other universities/research centres/institutes (laboratories, seminar and conference rooms), (3) an exhibition centre for discovery and exploration of the “eastern Mediterranean sea world” and relevant activities (e.g. "touch pools" to interact with living sea creatures, museum halls, documentary films, exhibitions, interactive games/experiments, events). EU and national projects could be coordinated by HCMR in cooperation with the Hersonissos Municipality and the Region of Crete in order to fund this concept.

The cultural-educational centre and relevant activities can be supplemented and supported by the hospitality industry including activities strongly related to Cretan tradition and culture (e.g. music/dancing/cooking/pottery-making/wine and craft production). Traditional-style accommodation suitable for year-round use (e.g. proper insulation for heat and cold, water-saving devices, central heating by using renewable resources such as solar and wind energy), restaurants and cafeterias serving Cretan-

inspired cuisine and using local products as well as relevant private shops and enterprises should be considered as good investments, counteracting at the same time the unemployment in the area. The FUSBG could also become an important “long stop” for tourists visiting various attractions in the hinterland (e.g. farms, eco-trails, Byzantine churches, archaeological sites), several of which are included in alternative kinds of tourism (e.g. agro-, eco- and religious tourism). The role of the local municipality is crucial for investigating the potential of the private sector, giving priority to the local actors who should be involved from the beginning in the implementation of the development plan of the FUSBG. Hersonissos Municipality could financially support the development of the centre for year-round leisure facilities in co-operation with the private and public sectors: (1) paths for engine-free modes of transportation and pedestrians, (2) skate/roller/bike park, (3) basket-, volley- ball and tennis courts, (4) picnic areas and benches shaded by trees, (5) children’s playground, (6) equipment for sports (e.g. jogging), (7) indoor multipurpose/polymorphic space to host various activities (e.g. yoga retreats, training courses for adults, events). Some additional public amenities could be: (1) information points, (2) a rental shop for engine-free vehicles, (3) a health centre and (4) post office facilities.

Similar funding sources as the ones proposed for Thalassocosmos complex could be used for tackling environmental issues such as: (1) monitoring the waste treatment plant and the seawater discharge outfall from *Cretaquarium* and *Aq ualabs*, (2) extending the breakwater wall of the existing marina in order to minimize the need to remove the sand that gradually accumulates above the cement "floor" of the marina, (3) using soft-engineering (beach replenishment or nourishment) to mitigate the effects of coastal erosion and sea level rise, (4) taking measures for the protection of seagrass beds (e.g. implementation of the existing legislation, conservation and environmental awareness). Furthermore, existing infrastructure (two abandoned buildings constructed for relevant beach facilities) within 100 m from the highest winter waterline should be demolished and pedestrian access to/from the beach could be provided. All the open spaces could be improved with newly created natural space to use endemic Mediterranean flora adapted to life in the coastal zone.

Conclusions

Even under “fast track” procedures, the local municipality retains a crucial role regarding the sustainability of this development process in terms of leading and engaging with the local/regional community and the private sector. But the “need for a fast track” purchasing or leasing of the FUSBG could lead to an uncontrolled future growth of this coastal area, fuelled by private investors, with little regard for the common good and environmental protection. There is a general mistrust of Greek civil society towards private investments, especially the large-scale ones, as there have been several examples of non-implementation of legislation in the past. Loss of faith in institutions that have failed to provide to the public the economic and social umbrella against the financial crisis is strongly expressed nowadays. Despite the fact that there is public awareness regarding the development of the FUSBG, active public participation has been negligible in providing actual alternatives and feasible solutions. Most reactions are limited to protesting and therefore discourage private investors highlighting the complexity of the current situation.

The local municipality, through a series of meetings and workshops, should ensure that the civil society, through ward committees and various civic organisations, remains committed and active during the entire process. The involvement of the private sector is also essential from the outset. However, considering the current circumstances, their commitment should be compatible with environmental protection, and accompanied by guarantees for offering work to local/regional communities. Furthermore, new cycles of consultations engaging all interested sides are needed in order to gain a holistic view of the issues to be faced in the FUSBG, as well as the cumulative effects from the different uses. Therefore, the establishment of a management board consisting of representatives from a wide range of stakeholders with well defined targets is urgently required in order to promote adaptive management depending on the different contexts.

Finally, there is an emerging need for institutional and legislative frameworks, including further arrangements to ensure environmental protection and to regulate the development of the FUSBG towards a sustainable process. Loss of faith in institutions may be faced with drawing up agreements between local and other agencies that will be built on trust and transparency to ensure benefits for the civil society, respect for cultural heritage and co-management of the area. The document to be prepared for the bidding process should ensure that preference is given to those bids that encourage the use of local labour, consider equitable conditions of employment, skills development programmes, and local residents' involvement in the construction and operational phases. The public will support the plan if the citizens sense that they have been heard and that their concerns have been addressed. Moreover, the business community will support the plan if the decisions are predictable, well-grounded in law, and economically viable.

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