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# Environmental Management and Monitoring for Sustainable Development in Marinas

*Environmental management and monitoring for sustainable development in marinas are common challenges at marina, where the proposed concept is considered to be appropriate for marina sustainability. According to this concept, it is possible to involve new activities for the strategic planning process, logistic system analysis and capacity assessment of the marina, definition of the sustainable scenario, the strategy for sustainable marina, the strategic action plan and its implementation, monitoring and review and so on. In addition, a practical monitoring approach is considered to be appropriate for promotion of the sustainable development in marinas with regards to monitoring of water quality and noise level.*

**Keywords:** *Environmental management, sustainable development, marina performance, a practical monitoring approach.*

## 1. INTRODUCTION

Actually, the sustainable development goals are related to implementing some directions to confirm that marina has all the capacities and conditions to become environmentally familiar. For applying and promoting these goals, some marinas adopt a sustainable development to manage the environmental issue. This paper addresses sustainable development implementations in marina with regards to monitoring of water quality and noise level (a practical approach) and assesses the potential concept strategies which will be implemented in the Marina Bar (Montenegro) through scientific international project entitled “Applying and promoting the concept of sustainable development to AD Marina Bar” (SUST-MARINA project) [1]. During the first year of the project, the project team defined the list of objectives to be realized and achieved. It includes the following [1] and [2]:

- first time promotion of marina sustainable development to achieve higher standards in water quality and environmental management;
- the recognition of level of noise in marina;
- define the policy and management for the sustainable use and protection of the marina and coastal environment.

This study represents integrated approaches and is based on environmental management and monitoring for sustainable development in marinas. The study is a continuation of previous activities that each researcher exercised in order to solve problems of a practical monitoring approach in marinas can be used to generate quantitative information useful for the promotion of

sustainable development concept to marinas.

The proposed methodology is considered to be appropriate for environmental management and monitoring for sustainable development in marinas and the accomplishment of study objectives. As such, results of this study provide an added value to the study impact and, if followed chronologically, introduce an innovative approach for implementation of obtained results of environmental management and monitoring for sustainable development in marinas.

The overall strategy of the work plan is carried out to understand the likely applying and promoting the concept of sustainable development to the Marina Bar, as well as environmental impacts of the plan. This is achieved by comparing the current environmental baseline of the Marina Bar and likely trends under the marina development plan against sustainability objectives. This allows an assessment to be made of whether or not the marina development plan is sustainable.

The paper is structured as follows. Section 2 provides a background of study regarding related literature. Section 3 presents a brief insight of study area (Marina Bar), while sustainable marina development performance concept is presented in Section 4. A practical monitoring approach is given in Section 5. The numerical and graphical results with discussions for the considered approach are explained in Section 6. The conclusions of research presented in this paper are drawn in Section 7.

## 2. RELATED LITERATURE

This study of environmental management and monitoring for sustainable development in marinas is based on an innovative approach. To illustrate, this approach is applied to the Marina Bar, Montenegro [3]. The approach determines the relevant marina facilities (see more in [4-7]) that are reflected at a regime of

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environmental management and monitoring for sustainable development in marinas. The contribution of the key marina facilities is expressed to determined appropriate several georeferenced positions around the marina.

In case study of the Marina Bar a key objective will be to determine reliable scientific elements that can be collected in an appropriate environmental study as mentioned in [8] and [9]. It includes the prevention of pollution that emanates from the activities in a marina, and differences arising from how environmentally friendly the marina activities are [8].

The environmental management and monitoring for sustainable development in marinas has been used extensively in valuing environmental amenities in [10], [11-13]. It was used to confirm that environmental attributes have value in [10] and [11], or to estimate the demand for the environmental attribute in question in [12-14]. To demonstrate, a practical monitoring approach in marina is applied to sustainable development in the main Greek marinas in [15] and in the Marina Bar in [16-21]. The objective is to generate information that will be useful from an appraiser's viewpoint, that is, the relative contribution of each potential attribute of a proposed the environmental management and monitoring for sustainable development in marinas.

In [12] addressed challenges facing the Marina Sustainable Development Concept (MSDC) implementation and assesses the potential of this concept based strategies being implemented in the Marina Bar, through a scientific international SUST-MARINA project originating in 2014. It is very important to note that project team has started scientific measurements of water quality from the quayside (measurements of water temperature, salinity, conductivity, total dissolved solids, dissolved oxygen, pH,) at several georeferenced positions around the marina [20]. This activity promotes good environmental planning according to national strategy of sustainable development plans in Montenegro. Also, a practical monitoring approach in marinas is considered to be appropriate for promotion of the MSDC with regards to monitoring of water quality in [21]. This approach provides some concept and strategies for the better planning and management of MSDC. A practical monitoring approach in marinas can be used to generate quantitative information useful for the promotion of sustainable development concept to marinas [21].

The authors in [22] set the context of the evolution of the environmental management of port authority operations to the point where credible functional organization of their liabilities and responsibilities requires cognizance of the role of the logistics. Having established the role and status of the port in this integrated approach, the paper [22] focuses on the environmental performance indicators that may be monitored and reported as evidence of compliance and sustainable development.

The basic requirements of an Environmental Management System (EMS) for marinas, based on well-established systems such as ISO 14001, EMAS and the PERS methodology (Port Environmental Review System) developed by the ECOPORTS Foundation have

been considered in [15] and [21]. This system that can assess the performance of environmental management has been created in [15], appropriate to the marina environment, tailor made to the needs and requirements of each marina manager, aimed at supporting marinas to attain international accreditation (i.e. Blue Flag [23] and Gold Anchor Award Scheme [24] and so on (see more in [7], [14] and [25])). The social dimension of marina sustainability is discussed in [26], while public preference for the attributes of the Marina Port in Korea is elaborated in [27]. The EMS, including environmental assessment and monitoring, was tested in Marina Bar and some discussions and conclusions are presented in [21].

Although each marina has its own expectations, rights and responsibilities with regard to sustainable marina development, marina needs to follow the same sustainability pattern and address social, economic and environmental issues in respect to regulatory, economic and planning tools, [26] and [27].

### 3. STUDY AREA

This study recognizes the Marina Bar as a very attractive place for yachting and represents the recreational port that was in the process of development since 1980s. Considering in mind that marina disposes with large area its capacity during the year is basically at the maximum level providing services not only for new customers but also for community service's boats and fishing boats. The aim is not to make marina Bar a popular marina, but to satisfy the needs of local population and new customers. The total land area of marina is approximately 4,5 ha while the water area including each basin and marina entrance is around 9,5 ha, [10-13], [15-21].

In Figure 1 are shown the current conditions of Marina Bar with the closeness connection to the city of Bar. Marina layout map is presented in Figure 2, considers marina area and part of the main promenade as well as the passenger terminal for Ferry ship transport. This area includes a small number of buildings and objects and the offices of marina as well as the restaurant and catering services. Although the area is directly superimposed on the promenade and therefore connected to the city center, it does not function as a part of the urban core but is cut off from it, from the content and ambient point of view ([10]-[13], [15]-[21]).



Figure 1. Current conditions and Marina Bar layout [3]

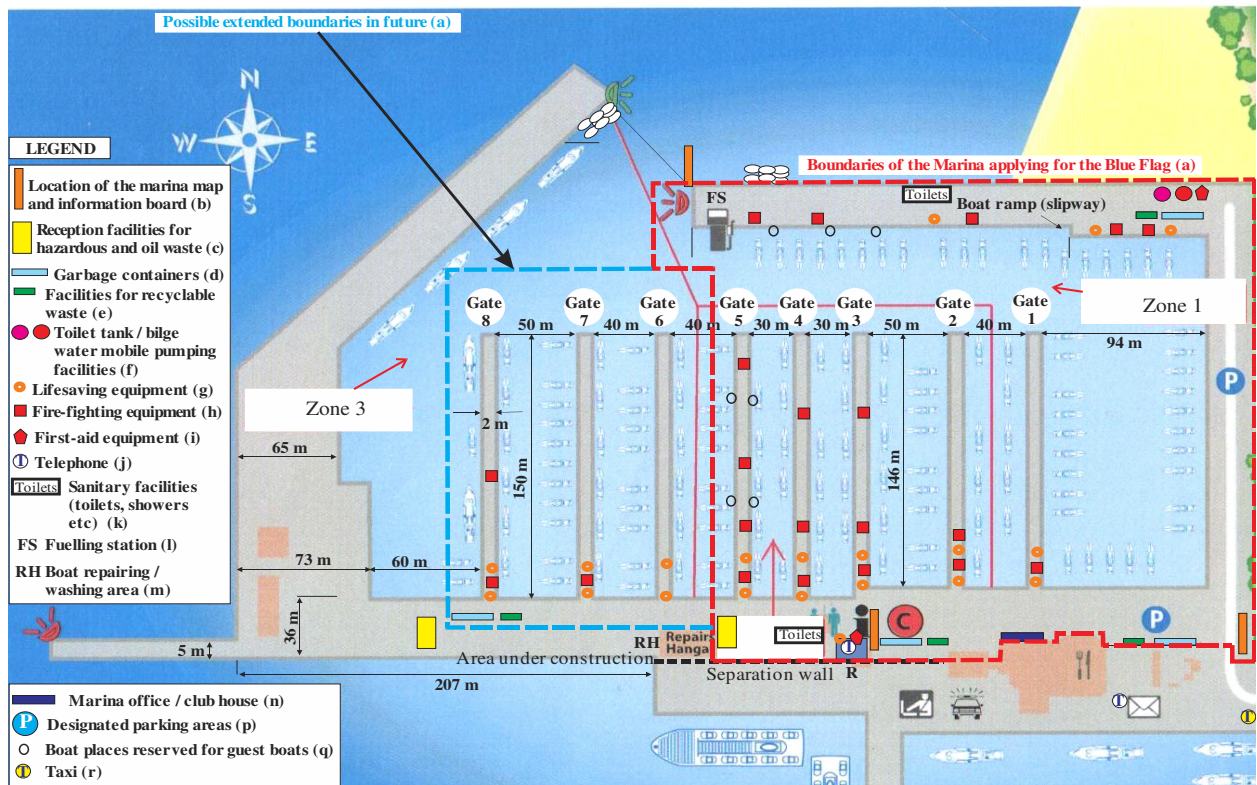


Figure 2. Layout of Marina Bar

More precisely, the overall strategy for the sustainability enables the determination of standards for water quality and noise level, standards for environmental management, analysis of energy consumption alongside docks and berths, promoting health and safety issues in regards to environmental-friendly strategy etc. Adaptation of an official policy for implementing standards for water quality and noise level in Marina Bar is of prime interest. The results of monitoring programme regarding water quality and noise level are related to the integration of environmental management system and directly affect the developed plan for sustainable marina management action. The determination of all level impacts in relation to the environmental loads in marina (in the form of monitoring programme) is a major impact for the sustainable development concept results.

#### 4. SUSTAINABLE MARINA DEVELOPMENT PERFORMANCE

The European Union (EU) standards and initiatives are directed to the implementation of green concept and sustainable development is all aspects of marina areas. This indeed promotes a perceived enhancement of image of the company especially in the circumstances that the direct water and waste pollutions of coastal region can cause a lot of damage. By implementing mentioned idea, it may feel that marina achieved green status and may proudly boast of such an environment friendly approach. It is obvious that applying sustainable marina development concept represents a long-term process because of the high-standard requirements.

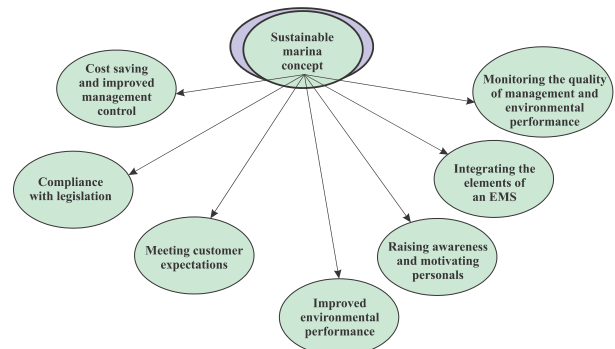


Figure 3. Sustainable marina development performance concept

This concept is presented in Figure 3 helps with [11] and [13]: cost saving and improved management control, compliance with legislation, fair competition, meeting customer expectations, improved environmental performance, raising awareness and motivating personnel, integrating the elements of an Environmental Management System (EMS) and monitoring the quality of management and environmental performance.

The effectiveness of the sustainable marina development concept includes the increasing the awareness of the aquatic environment by recreational users and inhabitants of the marina. It is not good only to concentrate on commercial benefits of marina. This is a reason because the local communities and other target groups have to permanently promote their activities in order to satisfy the needs of community service's boats and fishing boats. For instance, the available space for their location should be precisely defined because marina has to offer the space for purposes of friendly

relations with the city and its inhabitants. On the other hand, the activities of target groups (stakeholders, visitors, boaters, workers, employees) and providing some practice methods are the key points for incorporating them in sustainable management and nautical tourism in the area. Therefore, to satisfy this item, the environmental education activities have to be done. The objective is to determine the current conditions in marina and focus on the action that needs to be taken, [10-21].

In relation to aforementioned, as a first step of implementation of EMS, it is necessary to recognize significant environmental aspects and implications in relation to marina activities as potential points for improvement from the management point of view. After recognizing of significant aspects and implications, it is necessary to define a goals and targets and to develop environmental policy of marina as main tools for improvement of existing performances of marina in relation to the environmental important issues and by that to improve overall management of organization ([1] and [13]).

Defining the general and specific objectives implies consultations with managers of sectors within the marina authority and to analyze the relevant legal requirements and significant environmental aspects. This means that it is necessary to consider: relevant legislation; significant aspects and implications of environmental organizations and operations; technological, financial, operational and other business requirements, reviews of employees and other stakeholders ([1] and [13]).

To define sustainable marina development concept, some main objectives have to be evaluated, and are related already in the case of marina to seeking the Blue Flag programme, ISO 14001, ISO 9001 and Gold Anchor Scheme. The main point is to reduce the costs and to have environmentally protected area. The linkage between the Blue Flag, ISO standards and Gold Anchor Scheme to provide all environmental aspects of the marina's activities, using a logical, objective (rather

than subjective) methodology to rank such aspects into order significantly impact upon the environment.

For marinas that have introduced Quality Management System (QMS), it is considered as a good base to facilitate the development and implementation of EMS. Since, activities of marinas are very connected with impact on the environment issue of good management practices of activities in regard to the environmental standards are more then important aspects in overall management of marinas.

Therefore, the introduction of EMS for marinas that have QMS already in place would represent an upgrade of the existing management system, which would significantly contribute to the further improvement of the management of the organization through the application of standards ISO 14000 ([1] and [13]).

The main activities of the MSDC along with the implementation of SUST-MARINA project activities are divided into 12 work packages [12]: WP 1-Elaboration of project tasks through international cooperation; WP 2-Marina Bar planning framework; WP 3-Development of the environmental policy and environmental management system for Marina Bar; WP 4-Applying the Blue Flag programme to Marina Bar; WP 5-Strategic development plan for ISO standards to Marina Bar; WP 6-Establishment of marina environmental management system; WP 7-Application of novel techniques in Marina Bar services; WP 8-Marina Bar sustainability: A life cycle assessment of Zero emission marina equipment; WP 9-Improvement of safety and services in Marina Bar; WP 10-Certification of Marina Bar with regard to ISO standards; WP 11-Award to Marina Bar with regard to Blue Flag and Gold Anchor Scheme; WP 12-Final proposal for Marina Bar facility solutions [12]. In Table 1 are presented expected impacts – results and outputs from aforementioned work packages regarding sustainable marina development performance, [1] and [13].

**Table 1. Expected impacts – results and outputs from work packages regarding sustainable marina development performance ([1] and [13])**

Work Packages	Expected impact - Outputs	Expected impact - Results
WP1	Initial reports. Brief presentation of the comparative experience of sustainable marina development. Analysis of current situation in the marina. Data collection analysis. Work pan of sustainable marina activities.	Accepted strategic approach and cooperation between stakeholders. Discussed and agreed main issues related to planned activities of sustainable marina development. Researchers will give strategic directions for sustainable development of the marina.
WP 2	The review of marina capacities. Organizing a marina user's promotion campaign. Decision to begin the strategic planning process. Consensus on the vision statement. Initial analysis and capacity assessment of the marina. Well defined priority challenges and problems in the field of sustainable marina development. Created teams for monitoring. Reports on monitoring results (port capacities and legal framework). Strengthening of human resources and institutional capacities amongst all sectors involved in this action.	Logistic System Analysis. Integrated marina planning framework. Ecological standard as measure for sustainable development. Environmental Assessment as main part of development strategy. Preliminary data collection for ISO 9001 and ISO 14001 including all data. Promoted good environmental planning according to national strategy of sustainable development plans in selected country.

WP 3	<p>Environmental policy proposal. The use of environmentally-friendly products wherever possible. List of environmental standards. Planning and performing improvement of the environmental conditions. Environmental management system implementation. Determining the actions that need to be taken to provide the environmental sustainability in the marina. Proposal for efficiency energy consumption. Predicting potential impact during operation phase. Detail plan for water management, waste, energy consumption and health and safety issues.</p>	<p>Implementation of environmental policy and environmental management system. Determined standards for water quality. Achieved standards for environmental management. Determined environmental education and safety. Development of water management concept in the marina. Proposed waste management concept in the marina. The analysis of energy consumption alongside docks and berths. Promoting health and safety issues in regards to environmental-friendly strategy.</p>
..	<p>Review report focussed on achieved results. The analysis of the discrepancies in the investigated phases of project. Give the background of any unforeseen effects. Concentrate on getting Gold Anchor Scheme. The explanation of the obtained marina ratings with regard to marina design and construction, dock side facilities, fuel dock, customer enquire practices (booking procedure, marketing, advertising and so on).</p>	<p>Promotion of Gold Anchor Scheme. Promotion of getting accreditation to provide sustainable development concept in marina. Integrated promotion of Blue Flag award and marina sustainable development. The effective implementation of the recommended actions in the working plan. Clear explanation, private sector involvement.</p>
WP 12	<p>Proposal for facility solutions. Proposal for new boatyard equipment. Proposal for new berth equipment. Organizing trainings of professional handling in marina. Developed strategy to improve storage equipment. Developed strategy to improve storage services in marina. Developed strategy to improve some others services in marina.</p>	<p>Development of new spatial planning and feasibility study of the marina. Final report of applying and promoting the concept of sustainable development to the marina. Theoretical and practical knowledge of researchers to provide an effective support in other marinas for their sustainable development.</p>

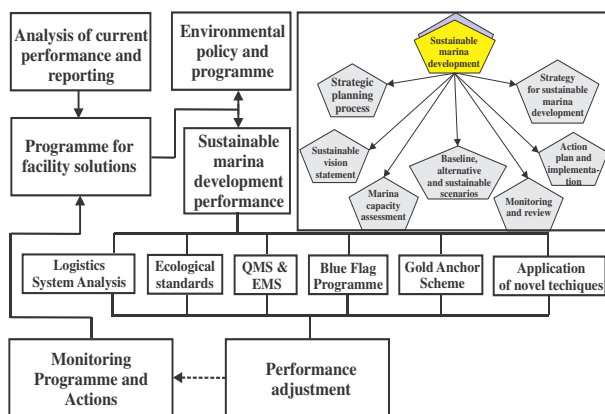
**Table 2. Measurements of the physicochemical parameters, 19<sup>th</sup> June 2014 ([2], [20] and [21])**

Weather fine and sunny after 11:00. South winds 1-2 Beauford, High humidity (>80%)										
Location	Position	Time	Temp. (°C)	Conduct. (mSi/cm <sup>2</sup> )	Salinity (‰)	Dissolved Oxygen mg/l	Dissolved Oxygen (%)	Total Dissolved Solids TDS (g/l)	pH	Water clarity
1	N 420 05.948', E 190 05.251'	12:50	21.8	53	35	4.64	65.4	22.9	7.84	goodS
2	N 420 05.947', E 190 05.381'	12:37	22	52.9	34,9	4.8	66.8	23.6	7.8	average
...	...	...	...	...	...	...	...	...	...	...
15	N 420 05.970', E 190 05.184'	11:03	21.6	53	35	5.3	74.2	24.2	7.9	good

**Table 3. Measurements of the physicochemical parameters, 17<sup>th</sup> October 2014 ([2], [20] and [21])**

Weather fine, Wind weak from variable directions. Temperature 20°C. 4 days earlier, much rain.										
Location	Position	Time	Temp. (°C)	Conduct. (mSi/cm <sup>2</sup> )	Salinity (‰)	Dissolved Oxygen mg/l	Dissolved Oxygen (%)	Total Dissolved Solids TDS (g/l)	pH	Water clarity
1	N 42 <sup>0</sup> 05.948', E 19 <sup>0</sup> 05.251'	12:30	22.3	53.4	35.3	5.4	76.1	23.2	7.9	good
2	N 42 <sup>0</sup> 05.947', E 19 <sup>0</sup> 05.381'	12:45	23.7	38.8	25	6.2	87.4	119.4	7.7	below average
...	...	...	...	...	...	...	...	...	...	...
15	N 42 <sup>0</sup> 05.970', E 19 <sup>0</sup> 05.184'	16:20	22.3	54.6	37.1	5.7	79.8	24.1	8	average

Finally, as shown in Figure 4, indicator and performance selection of sustainable marina development should proceed as follows. In the preparatory stage it is needed to include experts and decision support staff focusing on the following issues: preparation of expert report on project structure and strategies; assignment of project management responsibilities; preparation of project plan for marina; identification of indicator selection criteria and selection of issue areas and preliminary list of indicators for marina. Sustainable marina development indicators can be applied either as performance measurement or as planning tools ([13] and [28]).



**Figure 4. Indicators and performance selection process structure of sustainable marina development**

The performance measurement application is a component of using sustainable marina development indicators as planning tools. In their performance measurement capacity actually measured values of indicators have to be compared to either an applicable target value (progress determined in absolute terms) or to previously recorded values of the same indicator (progress determined in relative terms or differentials). For the purpose of marina performance measurement a monitoring, data analysis and reporting system must be in place ([13] and [28]).

## 5. A PRACTICAL MONITORING APPROACH

SUST-MARINA project has highlighted the importance of environmental monitoring as a major part of the Environmental Management certification process of AD Marina Bar. In this context, the project initiated a regime of environmental monitoring, within the limitations of the project and the lack of scientific apparatus at hand in Montenegro.

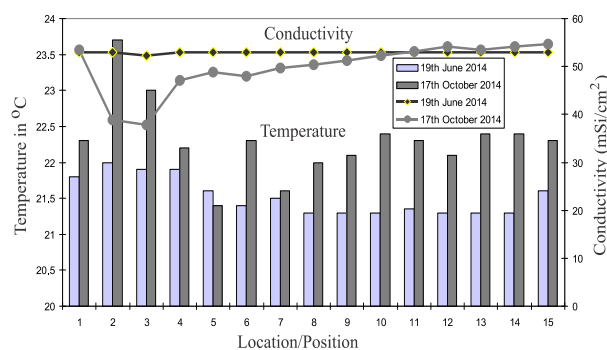
Measurements of the following physicochemical parameters were performed ([1], [2], [20] and [21]):

- Temperature (surface measurement);
- Salinity (surface measurement);
- Conductivity (surface measurement);
- Dissolved Oxygen (measurements at the a depth of 1m);
- pH (measured at the surface);
- Clarity of water (turbidity) (measurements at the surface and at depth depending on Secci disk);
- Total dissolved solids (TDS) (surface measurement).

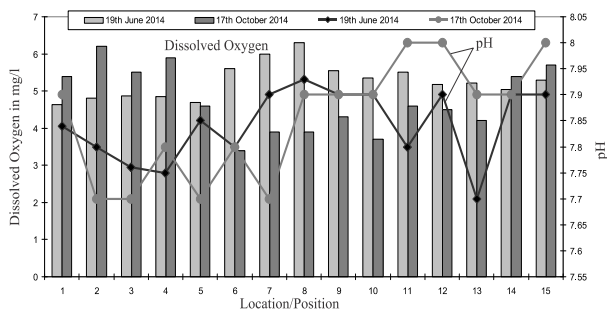
It must be noted that microbiological measurements (total coliforms, *E coli* and enterococci) considered very important in a monitoring strategy, were not performed due to lack of equipment.

Also, other measurements such as BOD, COD, nutrients (ammonia, nitrites, nitrates and phosphates), aromatic hydrocarbons, heavy metals in the water column and the sediments, as well as the assessment of biological quality of the major biological groups biological monitoring (as required by the EU water Framework Directive), as still to follow, according to the priorities and decisions of the Marina Bar Management Authority ([1], [2], [20] and [21]).

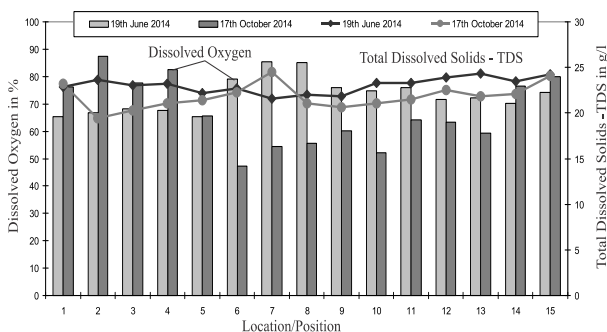
Already 6 monitoring attempts have been realized, as follows: June 2014, October 2014, March 2015, May 2015, September 2015 and December 2015. Some of the data of monitoring activities, realized on 19<sup>th</sup> June 2014 and on 17<sup>th</sup> October 2014 at 15 georeferenced positions around the marina (see in detail more results in Tables 2 and 3, as well as Figure 2) are presented in Figures 5, 6 and 7 ([1], [2], [20] and [21]).



**Figure 5. Measurements of water quality from the quayside (Temperature and Conductivity)**



**Figure 6. Measurements of water quality from the quayside (Dissolved Oxygen and pH)**



**Figure 7. Measurements of water quality from the quayside (Dissolved Oxygen in % and TDS)**

In addition, noise measurements have been performed with results presented in Figures 8 and 9.

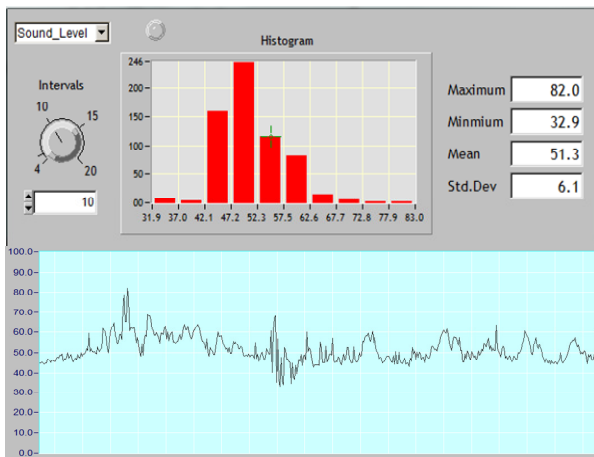


Figure 8. Noise sampling (17 October 2014 at 14:00)

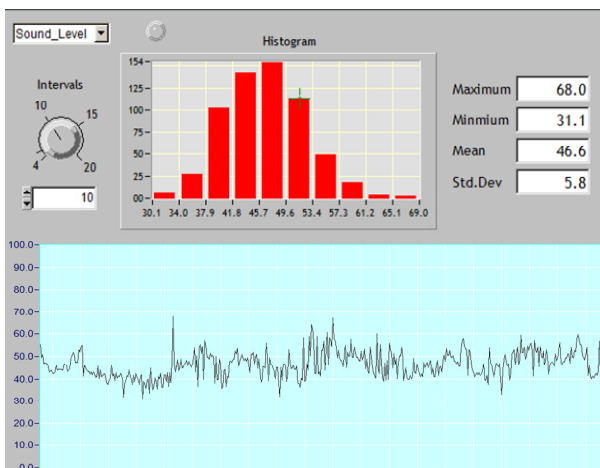


Figure 9. Noise sampling (17 October 2014 at 14:15)

## 6. RESULTS AND DISCUSSION

After collected data and analysis, which have been performed (see more in Tables 2 and 3, and in Figures 5 – 9), results obtained in this study with discussions are presented as follows ([2], [20] and [21]):

1. The physicochemical parameters [temperature, conductivity, dissolved oxygen, salinity, pH, total dissolved solids (TDS) and clarity], presented in Figures 4 – 6 and in Tables A2 and A3 (of the Appendix D), are within the range expected for the region and do not significantly vary in relation to the season and depth. The measurement of clarity (turbidity) was not performed by Secci disk, since the clarity was always more than what the Secci disk could measure. These measurements show that there
2. is an increase in turbidity in the inner port (communal, locations/positions 3, 4 and 5), as well as near the fishing vessels (locations/positions 14 and 15), this increase being more evident when sampling, takes place after rainfall.
3. Another important fact is that there are pipelines introducing fresh water from the land into the marina basin, which lie between locations/positions 3, 4 and 5, which deliver not necessarily fresh water (as indicated by the drop of temperature, conductivity, dissolved oxygen, salinity and pH observed at these points) but potentially can introduce microbial contamination and other waste

materials (petroleum products, plastics, nutrients, etc.).

4. It is difficult to observe some trend or seasonality in the data already obtained, since processes in the sea are complicated and easily influenced by factors that are still unknown to us (wind, underwater currents, sediment characteristics, previous pollution loads, etc.). It is obvious that this monitoring strategy must continue and expand, at least to microbial contamination measurements.
5. In almost all monitoring occasions, oil film has been observed on the surface of the marina waters. These are especially frequent and prominent in the communal area of the marina (locations/positions 3, 4, 5 and 6), indicating procedures that have to be monitored and managed, as soon as possible. It is important to note that they do not originate from the bunkering facility (location/position 1), which is operating professionally and with great care for the environment, adopting procedures that are excellent and highly proactive.
6. As stated before, communal activities have impacts on the environment and have to be dealt with. These include fishing practices- clearing unwanted species entangled in the nets, bunkering, motor repairs, maintenance, etc.
7. Fishing activities of larger vessels moored on the western pier (windward jetty) also impact on the marine environment of the marina (apart from the land area). It is indicative that on the 5<sup>th</sup> of May, the sea area between piers 8, 7 and 6, was covered by dead fish that have originated from clearing unwanted species entangled in the nets of these larger vessels. A closer look near point 14 indicated a significant amount of such fish lying on the sea bed.
8. The repair activities around locations/positions 9, 10 and 11 also have negative effects on the marine area of the marina. Dust from sanding down paints etc. finally end-up in the water (by wind or run-off). The monitoring results have not shown any changes around these areas, the previous indications arising from observations during the monitoring process.
9. Noise measurements have been performed indicating no real problems with noise contamination (Figures 7 and 8).
10. The biological condition of the marina is interesting and needs further monitoring and examination. Limited observations have indicated the protected species of *Cymodocea nodosa* - sea grass at locations/positions 3, 4 and 5), many mussels (*Mytilus edulis*) on ropes and non-maintained boats, brown algae at locations/positions 3, 4 and 5), sea urchins and most of the fauna observed in Mediterranean waters.
11. Limited observations indicate that there is a significant impact on the sea bottom by marine debris especially at locations/positions 4 – 15.

## 7. CONCLUSION

The main aim of this study is related to the environmental implications of sustainable marina development performance. However, it serves as a good

base for achieving complex environmental management system in the marina.

The measurement activities were provided in the reporting period and consequently the intermediary report [2] has been prepared and presented here. In that way marina management is encouraged to investigate environmental loads entering the marina, to plan and apply measures to improve environmental conditions in the marina area, and finally, to document these improvements.

Applying this sustainable development concept to marina with regards to monitoring of water quality and noise level (a practical approach), it was concluded: that marina has to pass through the promoting and adapting details on the measurement and management of compliance with the Blue Flag criteria for marinas; to follow and organize ecological and educational actions to management, staff and users of the Marina Bar; to promote imperative criteria; to provide training in environmental matters and best practice methods to marina personnel in order to become aware of the benefits of all realized activities and efforts.

The good planning of the concept of sustainable development in marina and its management are essential in order to maximise the positive benefits of marina and minimise negative impacts in a sustainable manner. Marina planning applies the same basic concepts and approaches as general planning, but adapted to attributes of the marina system. Marina planning should be recognized as a continuous, flexible, adaptive and transparent process. Here we provide a simple structure and basic implementation guidelines for comprehensive strategic planning, applying and promoting the concept of sustainable marina development performance.

In addition, once the users and staff are satisfied, this will encourage the participation of local stakeholders in local ecosystem management precisely promoting sustainable and recreational activities in the area.

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**УПРАВЉАЊА ЗАШТИТОМ ЖИВОТНЕ  
СРЕДИНЕ И МОНИТОРИНГ ЗА ОДРЖИВИ  
РАЗВОЈ У МАРИНАМА**

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Управљање заштитом животне средине и мониторинг за одрживи развој у марилама представљају заједничке изазове, гдје је предложени концепт разматран као адекватан за одрживи развој у марилама. Сагласно са овим концептом могуће је увести нове активности за стратегијско планирање процеса, логистичку системску анализу и процену капацитета у марили, дефинисање развојних сценарија и стратегије развоја одрживих марила, акциони план и његову имплементацију, мониторинг аспеката животне средине са адекватним мјерењима и извјештавањима, као и остало. Надаље, један практични приступ мониторинга је разматран као адекватан за промоцију одрживог развоја у марилама у односу на мониторинг акваријума марила и нивоа буке у марилама.