



ΕΘΝΙΚΟ ΘΑΛΑΣΣΙΟ ΠΑΡΚΟ ΖΑΚΥΝΘΟΥ
NATIONAL MARINE PARK OF ZAKYNTHOS

ΔΙΕΘΝΕΣ ΕΠΙΣΤΗΜΟΝΙΚΟ ΣΥΜΠΟΣΙΟ

INTERNATIONAL SCIENTIFIC SYMPOSIUM

ΘΑΛΑΣΣΙΕΣ ΠΡΟΣΤΑΤΕΥΜΕΝΕΣ ΠΕΡΙΟΧΕΣ ΣΤΗΝ ΕΛΛΑΔΑ & ΣΤΗ ΜΕΣΟΓΕΙΟ: Η Εμπειρία του
Παρελθόντος πολύτιμος οδηγός για το Μέλλον

MARINE PROTECTED AREAS IN GREECE & THE MEDITERRANEAN: Designing for the Future
by Applying Lessons Learnt from the Past

ΠΡΑΚΤΙΚΑ - ΤΟΜΟΣ ΠΕΡΙΛΗΨΕΩΝ
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ΖΑΚΥΝΤΗΟΣ 4-6 DECEMBER 2015



NATIONAL MARINE PARK OF ZAKYNTHOS

INTERNATIONAL SCIENTIFIC SYMPOSIUM

MARINE PROTECTED AREAS IN GREECE & THE MEDITERRANEAN: 'Designing for the Future by Applying Lessons Learnt from the Past'

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Δρ ΧΑΡΑΛΑΜΠΟΣ ΔΗΜΗΤΡΙΑΔΗΣ (Ιχθυολόγος Εθνικό Θαλάσσιο Πάρκο Ζακύνθου)
Dr CHARALAMPOS DIMITRIADIS (Ichthyologist, National Marine Park of Zakynthos)

ΕΛΠΙΝΙΚΗ ΚΑΛΛΗ (MSc Βιολόγος, Εθνικό Θαλάσσιο Πάρκο Ζακύνθου)
ELPINIKI KALLI (MSc Biologist, National Marine Park of Zakynthos)

ΑΝΝΑ-ΘΑΛΑΣΣΙΝΗ ΒΑΛΛΗ (MSc Βιολόγος, Εθνικό Θαλάσσιο Πάρκο Ζακύνθου)
ANNA-THALASSINI VALLI (MSc Biologist, National Marine Park of Zakynthos)

ΧΑΡΗΣ ΦΡΑΓΚΟΓΙΑΝΝΗΣ (Μηχανολόγος Μηχανικός, Εθνικό Θαλάσσιο Πάρκο Ζακύνθου)
HARIS FRAGKOGIANNIS (Mechanical Engineer, National Marine Park of Zakynthos)

ΛΟΡΑΝ ΣΟΥΡΜΠΕΣ (MSc Οικονομολόγος Περιβάλλοντος-Συντονιστής Εθνικού Θαλάσσιου Πάρκου Ζακύνθου)
LAURENT SOURBES (MSc Environmental Economist-Manager Co-ordinator, National Marine Park of Zakynthos)

ΔΡΟΣΟΣ ΚΟΥΤΣΟΥΜΠΑΣ (Καθηγητής Θαλάσσιας Βιολογίας, Τμήμα Επιστημών της Θάλασσας, Πανεπιστήμιο Αιγαίου & Εθνικό Θαλάσσιο Πάρκο Ζακύνθου)
DROSOS KOUTSOUBAS (Professor of Marine Biology, Department of Marine Sciences, University of the Aegean & National Marine Park of Zakynthos)

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Εθνικό Θαλάσσιο Πάρκο Ζακύνθου/National Marine Park of Zakynthos

Website: <http://www.nmp-zak.org>

E-mail: info@nmp-zak.org.

Απαγορεύεται από τρίτους η αναδημοσίευση, η αναπαραγωγή, ολική, μερική ή περιληπτική με οποιοδήποτε τρόπο: μηχανικό, ηλεκτρονικό, φωτοτυπικό ή άλλο, χωρίς προηγούμενη εξουσιοδότηση του Εκδότη και του Συγγραφέα.

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 ΠΑΡΑΣΚΕΥΗ 4 Δεκεμβρίου 2015 - FRIDAY 4 December 2015

- 17:00-17:15 Προσέλευση-Εγγραφές συνέδρων - *Arrival-Registration of participants*
- 17:15-17:45 Χαιρετισμοί - *Greetings*
- 17:45-18:15 'Προβολή Ντοκυμαντέρ Ε.Θ.Π.Ζ. 2015' - *'N.M.P.Z. Documentary Film 2015'*
- 18:15-19:00 **1η ΣΥΝΕΔΡΙΑ:** Προστατευόμενες Περιοχές στην Ελλάδα και τη Μεσογείο θάλασσα: Θεσμικό πλαίσιο, εφαρμογή στην πράξη, προοπτικές για το μέλλον - *Protected areas in Greece and the Mediterranean sea: Institutional framework, experience from implementation, future perspectives*
- 19:15-19:45 **Προσκεκλημένη Ομιλία:** *'Marine Protected Areas in the Mediterranean (MedPAN Network): Practices for Effective Integrated Management'*
- 19:45-20:15 **Προσκεκλημένη Ομιλία:** *Marine Protected Areas and Sustainable Development in the Coastal Zone: Case Studies - Good Practices and Future Challenges'*
- 20:15-21:15 **1η Συζήτηση Στρογγυλής Τράπεζας / 1st Roundtable Discussion:** 'Βιώσιμη Αλιεία στις Θαλάσσιες Προστατευόμενες Περιοχές στη Μεσόγειο: Σύγχρονες Μεθοδολογικές Προσεγγίσεις & Εργαλεία για ορθολογική διαχείριση αποθεμάτων'- *'Sustainable Fisheries in the Marine Protected Areas of the Mediterranean: Methodological Approaches and Measures for Rational Management of Resources'*
- 21:15-22:15 Wine cocktail welcome party συμμετεχόντων Διεθνούς Επιστημονικού Συμποσίου / *Participants of the International Scientific Symposium*

 ΣΑΒΒΑΤΟ 5 Δεκεμβρίου 2015 - SATURDAY 5 December 2015

- 09:00-11:15 **2η ΣΥΝΕΔΡΙΑ:** Η σημασία των Επιστημονικών Προγραμμάτων Παρακολούθησης (monitoring) για αποτελεσματική διαχείριση στις Παράκτιες και Θαλάσσιες Προστατευόμενες Περιοχές στην Ελλάδα και τη Μεσόγειο θάλασσα - *The importance of the scientific monitoring programmes for the effective management in coastal and marine protected areas in greece and the mediterranean sea*
- 11:30-12:00 **Προσκεκλημένη Ομιλία:** *'CIGESMED: Coralligenous based Indicators to evaluate and monitor the "Good Environmental Status" of the Mediterranean coastal waters'*

- 12:00-12:30 **Προσκεκλημένη Ομιλία:** *'Evaluation of Climate Change Impacts on the Loggerhead Sea Turtle Nesting Beaches of the National Marine Park of Zakynthos'*
- 12:30-14:30 **3η ΣΥΝΕΔΡΙΑ:** Ολοκληρωμένη Διαχείριση σε Παράκτιες και Θαλάσσιες Προστατευόμενες Περιοχές: παραδείγματα από Φορείς Διαχείρισης στην Ελλάδα και τη Μεσόγειο θάλασσα - *Integrated management in coastal and marine protected areas: examples of management agencies in Greece and the Mediterranean sea*
- 16:00-18:00 **4η ΣΥΝΕΔΡΙΑ:** Διατήρηση απειλούμενων ειδών και οικότοπων προτεραιότητας - Βιώσιμη ανάπτυξη σε Προστατευόμενες Περιοχές: Παραδείγματα στην Ελλάδα και τη Μεσόγειο θάλασσα - *Conservation of endangered species and priority habitats & sustainable development in protected areas: Examples from Greece and the Mediterranean sea*
- 18:15-20:15 **2η Συζήτηση Στρογγυλής Τράπεζας / 2nd Roundtable Discussion:** 'Θαλάσσιος Χωροταξικός Σχεδιασμός και Προστατευόμενες Περιοχές στην Ελλάδα και στη Μεσόγειο: Σύγχρονες Μεθοδολογικές Προσεγγίσεις και Εργαλεία για αποτελεσματική διαχείριση Ο.Π.Π' - *'Sustainable Fisheries in the Marine Protected Areas of the Mediterranean: Methodological Approaches and Measures for Rational Management of Resources'*,
- 20:30-22:30 Επίσημο Δείπνο Συμμετεχόντων Δ.Ε.Σ. / *Dinner Gala Participants of the I.S.S.*

 ΚΥΡΙΑΚΗ 6 Δεκεμβρίου 2015 - SUNDAY 6 December 2015

- 10:00-10:30 'Προβολή Ντοκυμαντέρ Ε.Θ.Π.Ζ. 2015' - *'N.M.P.Z. Documentary Film 2015'*
- 10:30-11:30 **5η ΣΥΝΕΔΡΙΑ:** Το Εθνικό Θαλάσσιο Πάρκο Ζακύνθου: Το Παρελθόν, το Παρόν και το Μέλλον - *The National Marine Park of Zakynthos: Past, Present and Future*
- 11:45-12:15 Παρουσίαση Αναρτημένων Επιστημονικών Εργασιών & Δράσεων Συμμετεχόντων Φορέων Διαχείρισης Π.Π. - *Posters Presentation of Scientific Projects & Demonstration Actions of Management Agencies in Protected Areas*
- 12:15-14:15 **3η Συζήτηση Στρογγυλής Τράπεζας / 3rd Roundtable Discussion:** 'Εθνικός Σχεδιασμός και Προστατευόμενες Περιοχές στην Ελλάδα: 2014-2020' - *'National Planning and Protected Areas in Greece: 2014-2020'*,
- 14:30-16:30 Περιήγηση Συμμετεχόντων Διεθνούς Επιστημονικού Συμποσίου στο Εθνικό Θαλάσσιο Πάρκο Ζακύνθου - *Tour of the Participants of the International Scientific Symposium in the National Marine Park of Zakynthos*
- 17:00-17:30 *Καλό ταξίδι επιστροφής / Have a safe return trip...*

INTERNATIONAL SYMPOSIUM COMMITTEES

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- [Arvanitidis Christos](#) (*Hellenic Center for Marine Research, Greece*)
- [Bobori Dimitra](#) (*Aristotle University of Thessaloniki & Management Body of Volvi and Koronia, Greece*)
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- **Vice-Presidents:**
Laurent Sourbès (Management Agency of the National Marine Park of Zakynthos), George Karris (Technological Educational Institute of Ionian Islands, Greece)
- **Conference Secretariats:**
Anna-Thalassini Valli, Elpiniki Kalli, Athina Mpotoni, Dionysia Touriki, Maria Arvanitaki, Giannis Potamitis, Haris Fragkogiannis (Management Agency of the National Marine Park of Zakynthos)

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National Marine Park of Zakynthos 15 years after the beginning !!!

In an era of crisis the aim to organize an International Symposium for Marine Protected Areas in a small Greek island of the Ionian Sea for a first time in Greece was really a critical challenge. A challenge which, in the end, was completed successfully, with more than 250 Conference participants from Management Agencies of Protected Areas of Greece and the Mediterranean Network of Marine Protected Areas - MedPAN, Universities and Research Institutes, Environmental NGOs, the Ministry of the Environment and Energy, students of the Department of Environmental Technologists (TEI of Ionian Islands), Fishermen Association and members of the local society of the island of Zakynthos.

The International Symposium "*MARINE PROTECTED AREAS IN GREECE AND THE MEDITERRANEAN: Designing for the Future by Applying Lessons Learnt from the Past*" organised by the Management Agency of the National Marine Park of Zakynthos on its 15th anniversary, took place in the Conference Hall of the Technological Educational Institute of Ionian Islands in Zakynthos from the 4th to the 6th of December 2015. The International Symposium, in the framework of the Programme '*Biodiversity Conservation of the National Marine Park of Zakynthos*' was supported by the EUROPEAN REGIONAL DEVELOPMENT FUND (ERDF), the Technological Educational Institute of Ionian Islands in Zakynthos, the Prefecture of the Ionian Islands and the Municipality of Zakynthos under the auspice of the Greek Ministry of Environment and Energy (MEE).

The greek and foreign invited speakers as well as the participants of the International Symposium had the chance to present and discuss thoroughly issues related to: the Institutional Framework of the Protected Areas in Greece, the experience of its application and the new provisions, practices for effective application of the protection of biodiversity and future challenges in the Mediterranean by the Network of Marine Protected Areas in the Mediterranean (MedPAN Network), sustainable fisheries in the Marine Protected Areas of the Mediterranean, importance of the Scientific Monitoring (Avifauna, Reptiles and Amphibians; Loggerhead Sea Turtle *Caretta caretta*; Terrestrial Habitats, Flora species and Phyto-communities; Geo-environment and Erosion; Mediterranean monk seal, marine mammals and fishfauna/megabenthic fauna; Coastal and Marine Habitats of European Community's Interest) for effective management in MPAs of Greece and the Mediterranean. Additional issues presented and discussed in the Symposium included: Coralligenous based Indicators to evaluate and monitor the "*Good Environmental Status*" of the Mediterranean coastal waters; Climate change impacts on the Loggerhead Sea Turtle Nesting Beaches of the National Marine Park of Zakynthos; Integrated Management Best Practices of different National Parks and Protected Areas in Greece and the Mediterranean by Management Agencies and environmental NGOs; Marine Spatial Planning and Protected Areas in Greece and the Mediterranean.

In the framework of the Round Table '*National Planning and Protected Areas in Greece: 2014-2020*' organised by the Network of the Management Agencies of Greece, the environmental NGOs and the Greek Ministry of Environment and Energy, the Conference participants had the opportunity to discuss thoroughly issues related to the future of conservation and sustainable development in the protected areas of Greece in the framework of the current National, European and International Directives, Conventions and Policies. The Conference participants unanimously adopted the '*International Symposium RESOLUTION*' regarding the strengthening and further promotion of the Management Agencies in Greece as the most effective mechanism for biodiversity conservation and sustainable development over the last decades.

Finally, during the Symposium the participants as well as the local community of the island of Zakynthos had the chance to follow in an advanced viewing ('avant première') of the 'N.M.P.Z. Documentary Film 2015' as well as the Animation Film 'Fiora & Levante' regarding the loggerhead sea turtle *C. caretta* and the Mediterranean monk seal *M. monachus* and their habitats in the National Marine Park of Zakynthos.

The International Symposium "*MARINE PROTECTED AREAS IN GREECE AND THE MEDITERRANEAN: Designing for the Future by Applying Lessons Learnt from the Past*" was planned along with Laurent Sourbes (Manager Co-ordinator), Charis Dimitriadis and Anastasia Kolokotsa (Scientific members) of the N.M.P.Z. Many people assisted in this effort. Special thanks should be given to the members of the Scientific and Organizing Committees of the Symposium and Prof. Pouris Canals, President of the MedPAN Organisation, for her participation in the Symposium and her help for the support of the N.M.P.Z. Many thanks also to the Co-organizers of the Symposium (Technological Educational Institute of Ionian Islands in Zakynthos, the Prefecture of Ionian Islands and the Municipality of Zakynthos), the financial supporters of the Symposium (Holly Metropolis of Zakynthos, Agricultural Association of Zakynthos, the Hotel Chambers of Zakynthos – especially Mrs Vicky Vitsou, Zakynthos Winery 'OINOLPI') and all other participants whose contribution was crucial for a successful International Symposium.

Drosos Koutsoubas
Zakynthos, December 2015

RESOLUTION

of the International Scientific Symposium “MARINE PROTECTED AREAS IN GREECE AND THE MEDITERRANEAN: Designing for the Future by Applying Lessons Learnt from the Past”

The Participants of the **International Scientific Symposium**, the members of Scientific Societies for the study and protection of the Terrestrial and Marine Environment (Hellenic Ecological Society – HELECOS, Hellenic Botanical Society – HBS, Hellenic Zoological Society – HZS), the Scientists from Academic Departments, Research Institutes, Management Agencies of Protected Areas (MAPAs) and Environmental NGOs of Greece, the Scientific personnel of the involving Authorities (Municipality of Zakynthos, Region of Ionian islands, Decentralized Administration, Ministry of Environment and Energy etc) in Greece and abroad (e.g. Network of Marine Protected Area Managers in the Mediterranean MedPan), that we directly or indirectly contribute actively to the Protection and Management of the Protected Areas and the Natural Environment, we believe that Greek State’s main concern should be:

- A. The long-term (at least a five-year time period 2015-2020) **ensuring of the proper Functioning and Economic Viability of the MAPAs** through the: 1) **direct** (during the current month of December) ensuring of **State Resources for the MAPAs’ fixed operational costs** from the Regular Budget and/or the Green Fund’s grants that will cover the Fixed Operational Costs of the 28 MAPAs of Greece (an amount of about 8,000,000 €/year), 2) funding for the actions of the MAPAs from **European Community’s Financial Allocations** (e.g. Measures of the “Priority Actions’ Framework for the Protected Areas (PAs)” – PAF, Transport Infrastructure, Environment and Sustainable Development (TIESD)), 3) **possibility for MAPAs’ to raise financial resources by their own** through the provision of specialized services and products, contributory benefits from the uses/actions within the boundaries of the MAPAs, etc.
- B. The **immediate regulation of the Legislative Framework** that governs **Labor conditions of the human resource employment** of the MAPAs as well as the smooth transition from the existing Funding Framework to the new suggested/recommended one (at least in terms of the operational costs of the MAPAs).

All the above mentioned actions will contribute in avoiding:

- The inability of Greece to comply with the International Commitments (eventually followed by penalties)
- The inability to achieve the National objectives as they are described by the Law 3937/2012 for biodiversity.
- Further degradation of the environment and the loss of its value which is a top social priority
- The cancellation of the cumulative effort done by the MAPAs and the involved entities of the Ministry of Environment and Energy, as well as the waste of the financial resources that may derive as a result of the non-capitalization of the investments during the time period 2000 – 2015 and more specific during the Programme Period 2007 – 2015 (Funding of the MAPAs, Surveillance Projects).

The aforementioned actions will **prevent the shut-down of the MAPAs** after 31/12/2015, a fact that is at the moment a highly possible risk. In any case other than continuing the function of the MAPAs, Greece will be largely exposed as it will fail to meet the National, European and International Commitments.

This Text is the **Unanimous Decision** of all the Participants of **the International Scientific Symposium** organized by the Management Agency of the National Marine Park of Zakynthos.

International Symposium 'Marine Protected Areas in Greece and the Mediterranean: Designing for the Future by Applying
Lessons Learnt from the Past'

Management Agency of the National Marine Park of Zakynthos

Management Agencies of Protected Areas in Greece: 2nd Management Period

Dalaka, A.¹

¹Directorate of Biodiversity, Ministry of Environment and Energy, a.dalaka@prv.ypeka.gr

In Greece 28 Management Agencies (MAs) of Protected Areas (PAs) operate under the supervision of the Ministry of Environment and consist of 394 employees of whom the 148 have a background of university education. During the 2nd period of EU' funding (NSRF 2007-2013, active time period 2010-2015) MAs were funded with the amount of 141 million euro.

Under this EU' funding, activities such as scientific monitoring of the protected species and habitat types, surveillance of the PAs, public environmental awareness/education and management of the PAs were carried out by the MAs. More specific, 24% of the funding was allocated for the operation of the MAs (including personnel and fixed operational costs) while another 20% concerned public environmental awareness actions mainly involving infrastructures (e.g. museums, information centres), dissemination activities (e.g. conferences, events for kids) and promotion actions (e.g. publication of printed material/leaflets, signs). Another 27% of the funding was allocated in surveillance, information of visitors and prevention from illegal activities in the PAs. An important percentage of the funding (22%) was allocated to the scientific monitoring of the conservation status of protected species and habitat types. These monitoring activities were carried out by both external experts and MAs' personnel, with the latter being already specialists or have been appropriately trained in the monitoring of species and habitats.

Even though designing and implementation of management plans in the PAs is crucial for the accomplishment of the management goals that each MA has compiled, only 18 MAs have composed management plans for their PAs so far. The rest of the MAs are under the composition of such plans or intend to do so at the next management period. However, MAs have the capacity and knowledge to prioritize their needs and perform concrete actions even when a management plan is missing. In this respect, 7% of the funding was allocated to management actions that the MAs performed. Such examples are the regulation of the ecological water discharge of Nestos river, the creation of an ecosystem fishing model in Volvi lake and the restoration of Parnitha springs.

The MA of the National Marine Park of Zakynthos (NMPZ) is responsible for an area with high environmental importance which hosts a species of global interest, the sea turtle *Caretta caretta*. For this reason, the MA of NMPZ employs a high number of personnel (>35) and absorbs a high percentage of the funding allocated to the MAs.

Funding the MAs exclusively from EU' programs induce many difficulties in the implementation of projects and actions since many Authorities are involved in this process, there is heavy bureaucracy and there is no constant founding flow. It is no coincidence that projects requiring contract with other services that have managerial capacity were not implemented and therefore implementation percentage of management actions was very low. The only solution could be the regular funding from the state budget at least for the MAs' operational costs. Despite all these difficulties, a considerable amount of work has been done by the MAs during 2010-2015.

Protection and Management of Marine Protected Areas: Local, National and International role of the Management Agency of the National Marine Park of Zakynthos

Sourbès, L.¹

¹ *Management Agency of the National Marine Park of Zakynthos, Isourbes@nmp-zak.org*

The marine protected area of the N.M.P.Z., established in 1999, is one of the most important breeding and nesting areas for the sea turtle *Caretta caretta* in the Mediterranean while it forms part of Natura 2000 network (Gr. 2210002, 2210003, 2210004) including marine and terrestrial priority habitats as well as rich flora and fauna. At the same time, this area subjects to intense tourism development (> 700000 visitors/year) as well as to a wide range of other human activities (e.g. agriculture, fishery). Thereby, the effective management and conservation of the protected area (126km²), as a response to the diverse anthropogenic pressure brought to it, is an urgent priority. However, efficient conservation of migrating marine species such as the loggerhead sea turtle is by definition highly complicated since numerous threats must be addressed in terms of various anthropogenic activities in a very large geographical area. Global protection is therefore difficult to reach and any successful protection measures in a given area don't ensure an efficient protection of loggerhead sea turtles during their whole life cycle. Therefore, as a first step, there is an urgent need to move towards the development of an effective Network of small scale Marine Protected Areas in the Greek Seas. For instance, a network of MPAs including the main nesting areas of the loggerhead sea turtle in the Greek Seas (e.g. Kyparissia and Laganas Bay host almost 70% of the nesting activity in Greece) could be beneficial for the effective protection of this species. Furthermore, the operation of the MedPAN Network (N.M.P.Z. is among the founding partners), which main objective is to improve the effectiveness of MPAs management in the Mediterranean, can contribute to a more coordinated and efficient integrated conservation of the loggerhead sea turtle and the MPAs in general. In order to create such an MPA Network that will serve as an effective management tool, their planning and design has to be based on multidisciplinary scientific considerations regarding the biological, oceanographic and socio-economic characteristics of the area of interest according to the established practice worldwide. This approach allows the assessment of current ecological conditions, ensures good representativeness of marine resources in the MPAs, determines the important attributes of the MPA Network (e.g. number, size, spacing, placement and total area of MPAs), enhances the involvement of the local communities, and finally improves the chances of success and the long-term viability of any future development plan in collaboration with the local society.

The Network of Marine Protected Areas in the Mediterranean (MedPAN Network): Practices for Effective Application of the Protection of Biodiversity and Future Challenges

Canals, P.¹

¹President of MedPAN Association, pcanals@tinet.org

Marine Protected Areas (MPAs) are increasingly being recognized as one of the most effective tools for the conservation and protection of the marine environment when they are managed effectively and have sufficient resources to address local management issues.

In 2012, the inventory of Mediterranean Marine Protected Areas identified 677 Marine Protected Areas that covered 4.56% of the Mediterranean Sea. Since then, many more sites have been designated to mainly contribute to the Natura 2000 at sea network. However, despite the efforts deployed, the Mediterranean system of Marine Protected Areas is still suffering significant weaknesses: the system at large is not based on ecological representativeness and connectivity and it lacks effective management and sustainable financing.

Networking among MPAs is crucial to make an efficient use of the available resources and concentrate efforts to reach the CBD Aichi Target 11. Regional networks of MPA managers can indeed facilitate improvement of management effectiveness of existing MPAs through capacity building, exchanges among MPA managers, promote lessons learnt and best practices from MPAs, promoting participating governance, developing some guidelines on different aspects of management.

Since 1990, the MedPAN network has brought together the managers of Mediterranean MPAs and has supported them in their management activities. In 2008, MedPAN became a legally independent organization with international governance and a permanent Secretariat in Marseille. Currently, the MedPAN organization has 61 members and 39 partners in 18 Mediterranean countries.

The MedPAN network's mission is to promote the sustainability and operation of the network of MPAs in the Mediterranean. To achieve this, MedPAN has developed, through a partnership approach, a 2013-2017 strategy with 3 main axes:

1. Being a network for knowledge, information, anticipation and synthesis:

Knowledge has an essential role in an MPA network. It helps to reinforce the members' capacity to improve their MPA management and to give support to policy making on a local, national or regional level. It also facilitates anticipation and it maintains the network's information and force-mobilising role. Some key actions developed by MedPAN under this axe are: MAPAMED, the Mediterranean MPA database, the Mediterranean MPA status every 4 years, the scientific watch, the monitoring resources center.

2. Reinforce the vitality of the network, interactivity between members and building their capacity for an effective management of MPAs with stakeholders:

The strength of a network of managers lies in the activities developed and the strengthening of bonds and services between its members, while maintaining a close relationship between the management of the network and the managers in the field. Some key actions developed by MedPAN under this axe are: the sharing-experience workshops, the trainings and guidelines, the calls for small projects, the newsletter.

3. Reinforce the MedPAN network's sustainability, prominence, governance and resources:

The importance to bring the voices of managers at the European, Mediterranean and international level is to facilitate the bottom-up approach and better consider issues at local level during decision-making processes. Thanks to the synergies between the MedPAN organisation and its partners, efforts can be pooled to carry the message of Mediterranean MPAs. Some key actions developed by MedPAN under this axe are: the Mediterranean MPA Forum every 4 years and the 2020 roadmap.

MedPAN works with a large partnership approach to develop its activities. This includes its members and partners, as well as governmental and non-governmental organizations on a local, national, regional and international level.

International Symposium 'Marine Protected Areas in Greece and the Mediterranean: Designing for the Future by Applying
Lessons Learnt from the Past'

Management Agency of the National Marine Park of Zakynthos

Scientific Monitoring Programme for Avifauna, Reptiles and Amphibians in the N.M.P.Z.

Karris, G.¹, Xirouchakis, S.², Pafilis, P.³, Poirazidis, K.¹, Kornilios, P.⁴, Kokkali, A.⁵, Grivas, K.⁶, Evangelidis, A.⁷ and Lymberakis, P.²

¹ Department of Environment Technologists, Technological Educational Institute of Ionian Islands, gkarris@teion.gr, ecopaira@yahoo.gr

² Natural History Museum of Crete, University of Crete, sxirouch@nhmc.uoc.gr, lyberis@nhmc.uoc.gr

³ Department of Zoology and Marine Biology, National and Kapodistrian University of Athens, ppafil@biol.uoa.gr

⁴ Department of Biology, University of Patras, korniliospan@yahoo.gr

⁵ Institute of Marine Biological Resources and Inland Waters, Hellenic Centre for Marine Research, athkokkali@hcmr.gr

⁶ Biosfaira, iespa@hol.gr

⁷ Hellenic Ornithological Society, BirdLife Greece, evangelidis@ornithologiki.gr

The main goal of the project was the recording of the biodiversity of avifauna and herpetofauna as well as the assessment of species distribution in the protected area of the National Marine Park of Zakynthos (NMPZ) during 2014-15. An additional purpose of the project was the evaluation of the conservation status of birds, reptiles and amphibians according to Directives 2009/147/EE and 92/43/EEC, proposing favorable reference values and relevant conservation objectives for the study area which includes three NATURA 2000 sites (GR2210002, GR2210003 & GR2210004). In addition, an updated version of the NATURA 2000 network database for the three mentioned sites was developed and submitted as deliverable of this project, focusing on all recorded species. The updated report of the NATURA 2000 database was developed on the basis of the results undertaken by using a series of suitable methodological approaches within the current project (general descriptions, reviews, tables, threats etc.). Furthermore and in accordance to the needs and guidelines of the EU, favorable reference values were proposed for Scopoli's Shearwater (*Calonectris diomedea*) which is the main trigger species for the SPA site GR2210004 and for which adequate information exists. Additionally, conservation objectives for the biodiversity of avifauna and herpetofauna in the NMPZ were proposed by taking into consideration the main threats for these species.

The methodological approaches for studying the biodiversity of birds was based on a combination of widely used methods such as point counts, transect lines, raft counts for seabirds, on board observations in Laganas gulf, play-back calls for the survey of nocturnal birds of prey, ringing of spring migrants in Strofades island group by using mist nets and counting of Apparently Occupied Nests of Scopoli's Shearwater in Strofades. For reptiles we used the classical method of line transects or distance sampling. In total 107 species of birds in Strofades and 64 species of birds in Zakynthos Island were recorded while the relevant numbers of herpetofauna were 5 and 23 respectively. Strofades islands group constitutes the largest colony of Scopoli's Shearwater in Greece (5,550 pairs - C.I.95%: 3,463 - 7,626) as well as a significant stopover site for 294,000-440,000 passerines (min= 125,000-187,000, max= 577,000-860,000) in an annual basis. In addition, the area proved to be a migration bottleneck for Turtle doves (*Streptopelia turtur*) as distance sampling produced an estimate of 13,000-20,000 migrating individuals that refuel on the islets during spring migration (min= 6,700-10,000, max= 26,000-39,000). Regarding herpetofauna and Zakynthos Island, we added eight new terrestrial herpetofauna species that were missing from the former Standard Data Forms (SDFs), namely the European pond turtle (*Emys orbicularis*), the four-lined snake (*Elaphe quatorlineata*), the Balkan frog (*Pelophylax kurtmuelleri*), the Peloponnese slow worm (*Anguis cephalonicus*), the European legless lizard (*Pseudopus apodus*), the Balkan wall lizard (*Podarcis tauricus*), the Grass snake (*Natrix natrix*) and the European copper skink

(*Ablepharus kitaibelii*). In Strofades case we added two new species in the revised SDF, the Balkan wall lizard (*Podarcis tauricus*) and the Moorish gecko (*Tarentola mauritanica*).

Scientific Monitoring Programme for nesting of the Loggerhead Sea Turtle *Caretta caretta* in the area of N.M.P.Z.(Laganas Bay)

Mazaris, A.D.¹, Hasiotis, T.², Benos-Palmer, T.³ and Dimitriadis C⁴, *

¹ Department of Ecology, School of Biology, U.P. Box 119, Aristotle University, 54124 Thessaloniki (AUTH), Greece, amazaris@bio.auth.gr

² Department of Marine Sciences, University of the Aegean (UoA), University Hill, 81100 Mytilene, Lesvos, Greece, hasiotis@marine.aegean.gr

³ ARCHELON, The Sea Turtle Protection Society of Greece, Solomou 57, GR-10432 Athens, Greece, benos-palmer@archelon.gr

⁴ National Marine Park of Zakynthos (NMPZ), El. Venizelou 1, 29100 Zakynthos Island, Greece, xdimitriadis@marine.aegean.gr

***Numerous researches and volunteers from several groups participated in this study. The authors listed here represent the coordinators of each team. ADM: scientific coordinator of the project & coordinator of AUTH team; TH: coordinator of UoA team TB-P: director of ARCHELON; CD: project manager NMPZ. A full list of contributors can be found in the official documents delivered to the NMPZ**

The National Marine Park of Zakynthos represents the first park in the Mediterranean which was established with the primary goal to protect one of the most important nesting rookeries of the loggerhead sea turtles in the region. Here we present some of the basic outputs and conclusions following the sea turtle monitoring project held during 2014. Three were the main objectives of the project: a) monitoring sea turtle nesting activity, b) assessing the distributional patterns of the species in the coastal area of the National Marine Park and c) proposing complementary measures towards improving conservation efficiency, including the design of updated monitoring protocols that should be used by the Management Authority. It should be noted that an additional purpose of this project was the assessment of the conservation status for this specific population, on the basis of the European Union directive 92/43/EEC.

In total, 4,214 turtle emergences were recorded, out of which 1,069 resulted in the creation of nest. The first nest was laid on May 21st, on Sekania beach, and the last two nests on September 3rd, one on Daphni beach and one on Crystal beach. Correspondingly, for the nesting period of 2014, the first nest hatched on July 27th on Kalamaki beach and the last on October 10th on Marathonisi. Analyses of historical data showed that the number of nests is significantly declining. There are several factors which could be related to this downward trend. For example, there is evidence of high by-catch rates in the Mediterranean, causing the death of thousands sea turtles annually. Changes in the climatic conditions could also be related with the energetic requirements of individuals or the suitability of the foraging grounds, leading to a high inter-annual variability in nesting numbers. Still, given the complex life history of this highly migratory species, the identification of the actual factors that drive the downward trends of Zakynthos' nesting population is not a straightforward task. Interestingly, our analyses demonstrate no strong evidence for a reduction of reproductive performance of females in the nesting sites of Zakynthos, providing further support to the hypothesis that threats operating offshore might be acting as the main drivers for current population trends.

Our study clearly highlights the need for continued conservation and monitoring at both the coastal and offshore habitat of the species. For long lived organisms like sea turtles, which are also utilizing a variety

of habitats and cover long distances during their migrations, the standard procedures and criteria suggested by the European Environment Agency for ranking populations in situ may be rather limited. We strongly recommend that a thorough evaluation of the population status requires additional information to fill knowledge gaps on the abundance, age structure, and ecology of the Mediterranean, on their survival rates, as well as, on the conditions and threats that face in the marine habitats.

Project for the scientific monitoring of terrestrial habitats and flora in the National Marine Park of Zakynthos

Delipetrou, P.¹ and Georghiou, K.¹

¹ Department of Botany, Faculty of Biology, National and Kapodistrian University of Athens, Panepistimiopolis, Athens 15784, pindel@biol.uoa.gr, kgeroghi@biol.uoa.gr

The terrestrial habitats and important flora species of the area of the National Marine park of Zakynthos (NMPZ) were monitored for 1 sampling period within the frame of a project financed by the management body of NMPZ. The main objective of the project was the assessment of the conservation status and of the degree of conservation of habitats and flora species for the implementation of Article 17 of the Habitats' Directive (92/43/EEC) and for the completion of the Natura 2000 (N2k) Standard Data Forms for the sites GR2210002 and GR2210003. Monitoring and assessment methodology followed the national standards as those were defined by similar monitoring projects at national level and accepted by the Greek Ministry of Environment and Energy. Conservation status was assessed as Favourable (FV), Unfavourable-Inadequate (U1), Unfavourable-Bad (U2), or Unknown (XX) and conservation degrees as A (excellent), B (good), C (medium or bad), or X (unknown). The first phase of the project included a review of the relevant literature (50 sources) and the results were recorded in a database.

Flora species: The literature review identified as first priority for monitoring 1 species of Annex V 92/43/EEC and two stenoendemic *Limonium* species, *L. zacynthium* and *L. phitosianum*. *Ruscus aculeatus* is a typical and rather common species of scrub and forest habitats (types 9320, 9340, 9540) so monitoring is based on habitat monitoring. The degree of conservation of species in NMPZ is A. *Limonium phitosianum* was proved to be rather more widespread than previously thought, so only *L. zacynthium* was monitored and assessed. Population was assessed as U1 (1 subpopulation in NMPZ) but habitat and future prospects were assessed as FV (8 locations in NMPZ, most assessed as FV).

Habitats: A total of 28 Annex I Directive 92/43/EEC habitat types and 2 non-Annex I habitat types were identified and mapped in NMPZ (993 mapping polygons) based on 86 sampling plots and c 500 observation points. Conservation status and conservation degree were assessed per plot and conservation degree was then assessed at grid level, at N2k level and NMPZ level based on the algorithms determined at national level. In total, 16 habitats were assessed as A, 9 habitats as C and 4 habitats as X. Sand dune habitats which are a 1st priority for conservation both at NMPZ and national level, were of excellent status as whole and excellent within the core area of NMPZ but quite degraded at the area of Vasilikos. The widest sand dune system is at the area of Laganas. Notably, the system includes grey dune vegetation (2210) which is rare in

Greece. Primary dune vegetation (2110, 2120) which is the most important for the conservation of the whole dune system is representative and well conserved but threats such as trampling by motorised vehicles and horse riders need to be addressed. The management of sand dune forests (2270) poses problems since this habitat has actually been planted in the system and it apparently threatens the status of the other habitats since it has been expanding and includes alien invasive species. Other 1st priority habitats are the vernal pools (3170) which are best represented at Strofades, the juniper scrub and forest (5210) which are of excellent status at the islets but suffering from fires on the main island and the rare in Greece *Hypericum aegypticum* scrub (5430). Wetlands, both halophytic and fresh water are generally degraded due to hydrology modifications and other disturbances and have generally suffered loss of their initial area.

Modern Methodological Tools for the Study of Erosion in the Coastal Cliff of Gerakas Beach

Hasiotis, T.¹, Panagou, T.¹, Karambas, T.², Velegrakis, A.¹, Andreadis, O.¹ and Oikonomou, E.³

¹ Department of Marine Sciences, University of the Aegean, hasiotis@marine.aegean.gr, t.panagou@marine.aegean.gr, afv@aegean.gr

² Department of Civil Engineering, University of Thessaloniki, karambas@civil.auth.gr

³ Department of Civil Engineering and Surveying & Geoinformation, T.E.I. of Athens, eoikonomou@teiath.gr

Long-term coastal cliff erosion is controlled by a variety of processes and factors that operate at different scales and rates, stemming both from marine and subaerial processes in variable time and space. The Gerakas coastal cliff is locally a "double aspect" cliff, exposed to wave action from the east and west, it consists of marly sediments and shows intensified erosion and considerable rates of retreat the last years. The potential total erosion of this formation could result in the creation of an isolated islet in the SE tip of Laganas Gulf, alteration in the coastal hydrodynamics and possible unforeseen changes in the nesting beach of Gerakas. The scope of this contribution is (i) the detailed geomorphological mapping of the cliff with modern remote sensing techniques, (ii) the evaluation of its erosional rate, (iii) the examination of the wave climate and (iv) the recommendation, in a preliminary basis, of possible protection measures so as to constrain erosion from the sea. Field work took place in two periods (February and June 2015) for the collection of bathymetric, sedimentological, meteorological and topographical data in a study site characterized by very difficult accessibility. Topographic data of the coastal cliff were collected using terrestrial laser scanner (TLS) units. The significant wave height H_s and the peak period T_p were obtained using the JONSWAP method for the main winds affecting the cliff. Linear and nonlinear models were applied for the assessment of the hydrodynamic and sediment transport conditions. Wave erosion at the base of coastal slope was approached using a modified version of Larson et al., (2004) methodology. Two ortho-photographs (1997 and 2008) were used for the estimation of the amount and rate of cliff retreat. Field observations showed numerous features indicative of the prevailing weathering processes (small chutes and fan-shaped deposits, mudflows, local base of slope undercutting, cracks, detachment surfaces and falls) that are more intense at the eastern side of the cliff. February and June TLS mapping helped in the construction of DEMs, whose surface and

cliff profile comparisons permitted numeric calculations of volumetric changes. The TLS analysis show that the cliff volume change is $\sim 390\text{m}^3/\text{y}$. Ortho-photographs comparison (~ 11 years) indicate an annual retreat of $\sim 350\text{m}^3/\text{y}$, whereas the volume change between 2008 and 2015 TLS scan (~ 8 years) is $\sim 580\text{m}^3/\text{y}$. SE and S winds affect the eastern part of the cliff, whilst the western part is affected by W winds, although the H_s is small. Cliff erosion due to wave impact (per unit length per year) was estimated to be $\sim 0.2\text{m}^3/\text{m}/\text{y}$ (not including rain and slope failure). However, according to TLS and orthophotograph measurements the total eroded volume is $\sim 3\text{m}^3/\text{m}/\text{y}$. Due to the very fine-grained cliff sediments and the limited eroded quantity, the coastal morphology does not present any significant change. Still, erosional processes are non-linear in time, thus triggering events (i.e. storms, heavy rainfalls, earthquakes) might initiate instant large-scale erosion. Cliff erosion due to the wave action could be restrained by constructing submerged breakwaters but due to legal and NMPZ constrains densely distributed artificial reefs are considered as a more friendly protection measure that could also benefit local biodiversity. It must be mentioned that there is no similar research in the literature (i) studying morphological changes of a "double aspect" coastal cliff and (ii) modeling the wave impact in the erosion of high coastal cliffs. These signify the uniqueness of the research, whose pilot results can provide initiatives for an interdisciplinary systematic approach of that and similar coastal environments.

Monitoring megabenthic fauna and ichthyofauna with underwater visual census in the National Marine Park of Zakynthos

Sini, M.¹, Dailianis, T.², Gerovasileiou, V.², Dimitriadis, C.³, Evagelopoulos, A.¹, Vatikiotis, K.¹, Chatzigeorgiou, G.², Poursanidis, D.¹, Tsikliras, A. C.⁴, Sourbès, L.³, Arvanitidis, C.², Koutsoubas, D.^{1,3} and Katsanevakis, S.¹

¹ Department of Marine Sciences, University of the Aegean, University Hill, Mytilini

² Institute of Marine Biology, Biotechnology and Aquaculture, Hellenic Centre for Marine Research, Thalassocosmos, Heraklion, Crete

³ National Marine Park of Zakynthos, Zakynthos

⁴ School of Biology, Aristotle University of Thessaloniki, Thessaloniki

The scope of this Project Action was the monitoring of fish and megabenthic faunal species in the National Marine Park of Zakynthos (NMPZ) using underwater visual census. The main objective was the collection of data on the distribution and abundance of species protected by the EU Habitats and Species Directive - 92/43/EEC, or other relevant conservation legislation, in order to enable the evaluation of their conservation status. The study focused on 5 benthic species included in Annexes II, IV and V of the 92/43/EEC Directive, namely *Pinna nobilis*, *Lithophaga lithophaga*, *Centrostephanus longispinus*, *Scyllarides latus*, and *Corallium rubrum*. Additional information for 16 more species of special conservation interest was also collected, specifically for the sponges *Aplysina aerophoba*, *Axinella cannabina*, *A. polypoides*, and *Calyx nicaeensis*; the molluscs *Charonia variegata*, *Luria lurida*, *Tonna galea*, and *Pholas dactylus*; the echinoderm *Ophidiaster ophidianus*; and the fish species *Diplodus sargus*, *D. vulgaris*, *Epinephelus costae*, *E. marginatus*, *Sarpa salpa*, *Sparisoma cretense* and the non-indigenous species *Siganus luridus*. The study area encompassed the entire marine area of the NMPZ, including part of the Natura 2000 Network site "SCI - GR2210002". Fieldwork took place during June 2015 in 24 stations covering three characteristic habitat types; specifically 9 stations with *Posidonia* meadows (habitat type

1120), 11 with shallow Reefs (habitat type 1170) and 4 with Submerged or partially submerged sea caves (habitat type 8330). Data on species distribution and abundance were collected by SCUBA diving using distinct non-destructive visual census techniques according to the targeted species or taxonomic groups: (a) "Distance" sampling for *P. nobilis*, (b) "Occupancy" and "Belt transects" for other megabenthic species, (c) "Belt Transects" for fish fauna, and (d) "Quadrat" sampling for *L. lithophaga*. Lastly, 12 types of pressures / threats relevant to the target species were identified and their ranking was estimated. Of the 21 species initially considered, 15 species were recorded within the total area delimited by the NMPZ, whereas 11 species were recorded within the "SCI GR2210002" site. With regards to the latter site, no species of the Annex II - 92/43/EEC Directive were observed (i.e. regarding species whose conservation status needs to be evaluated according to the Natura 2000 Network). However, 3 species of Annexes IV – V were recorded: specifically *P. nobilis*, *L. lithophaga* and *S. latus*. Moreover, the presence of *A. aerophoba*, *C. variegata* and *O. ophidianus* was also noted; these species are currently protected by other European and International conservation regulations. The most important types of pressures / threats identified were «Improved access to site» (D05), «Motorized nautical sports» (G01.01.01), «Invasive non-native species» (I01), «Reduction or loss of specific habitat features» (J03.01), and «Interspecific faunal relations» (K03). It is worth noting that the invasive species *S. luridus* was found to be well established throughout the study area.

Scientific Monitoring Programme for Coastal and Marine Habitats of European Community's Interest in the N.M.P.Z.- Mapping of Marine Habitats

Fakiris, E.¹, Christodoulou, D.¹, Dimas, K.¹, Georgiou, N.¹ and Papatheodorou, G.^{1,*}

¹ Laboratory of Marine Geology and Physical Oceanography, Geology Department, University of Patras, Greece, gpapathe@upatras.gr

Benthic habitat maps are an important means of providing the basis for coastal management and ecological analysis. Developing optimal methods for rapid, cost effective multi-purpose mappings can aid the management needs of the marine environment. The preferred procedure nowadays for benthic habitat mapping is combining geoacoustical and ground truthing methods. The geoacoustical methods include the Side-Scan Sonars (SSS), the Multi Beam Echo Souders (MBES), the high resolution Sub-Bottom Profilers (SBP) as well as newly developed single beam Aquatic Habitat Echosounders (AHE, Biosonic). A combination of the above systems, in conjunction with an extensive underwater video footage, were used by the Laboratory of Marine Geology and Physical Oceanography (LMGPO), Geology Department, University of Patras, to map in detail the most important benthic habitats in Laganas gulf and the entire marine area which is under the authority of the Management Agency of the National Marine Park of Zakynthos. Five days on-board the research vessel SOCRATES (NP 4880), realizing 250km of survey lines, were more than enough to acquire raw acoustic data corresponding to 83km² of total seafloor coverage. Two more days collecting seabed video footage with an underwater tow camera, ensured that all regions with distinctive backscatter and relief signatures have been validated and securely correlated to existing benthic habitats.

Analysis of multi-platform data led to a multi-layer interpretation, each layer of which corresponds to different components of the seafloor. While backscatter and ground truth data describe the surficial seabed elements, including benthic habitats, seismic profiling revealed the seabed stratigraphy up to approximately 40m, ensuring that no substrate outcrop has been miss-interpreted as other high backscatter intensity feature, as for instance *P.oceanica* beds. On the other hand, MBES provided the interpreters with bathymetric data of such high resolution that, the micro-relief on *P.oceanica* canopy was made clearly distinct. Moreover, local relief features, such as the rugosity and the curvature, offered better insight into the general sedimentary and geological processes governing the seafloor of the survey area. Finally, *Posidonia* beds could be clearly distinct and their canopy height was roughly determined through the AHE data.

Combination of the above three dimensional information into a single two dimensional map (habitat map) was challenging and led to secure characterization of distinct seafloor types. Benthic habitat classification was comprehended using the NATURA classification scheme, leading to the differentiation of five distinct classes; 1110 (Sandbanks), 119A (Unvegetated soft bottoms), 119B (Vegetated soft bottoms), 1120 (*Posidonia* beds) and 1170 (Reefs). However, the available multiplatform – high resolution data also offered the capability to delineate even more seafloor types, revealing areas with various types of *P.oceanica* beds (e.g. degraded due to fishing activity, dead mats), which were also provided as side-project maps. Moreover, SSS data which had been acquired by LMGPO back to 2007 offered means of a low sensitivity comparison between the two time-lapsed datasets. The comparison showed that there is no significant change (>2m shift) in habitat delineations over the last eight (8) years.

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Management Agency of the National Marine Park of Zakynthos

Integrated management in coastal and marine protected areas: Examples of management agencies in Greece and the Mediterranean Sea.

De Franco, F.¹

¹National Marine Park Torre Guaceto, francescodefranco@gmail.com

In the Mediterranean context, if not the world, the experience of participatory management with artisanal fishermen operating in the Marine Reserve of Torre Guaceto is one of the best good practices that demonstrate that it is possible to engage the world of traditional fisheries management.

The Marine Protected Area of Torre Guaceto was established in 1991. A management body (formed by WWF Italy and the municipalities of Brindisi and Carovigno) began operations in 2001, when the management and surveillance of the area have become effective. Importantly, the site where Torre Guaceto was established was a stretch of coast where fishermen traditionally have operated for generations.

The Marine Protected Area is extended 2.227 hectares of land and took up 8.41 kilometers of coast; in 2000 the National Nature Reserve was instituted, which extends over an area of 1,100 hectares.

Fishermen considered the area of Torre Guaceto as an area where they could go fishing for acquired right; when the MPA (Marine Protected Area) was set up, they have felt deprived of a stretch of coast where they had fished for centuries.

The experience of Torre Guaceto MPA is based on a fishing protocol adopted within the buffer zone of the Marine Protected Area of Torre Guaceto (SE Italy, Adriatic Sea) on fishing yields. The protocol, agreed with local fishermen and the MPA authority, aims at regulating the fishing pressure within the MPA in order to balance conservation and socio-economic needs.

Fishing was completely banned in the entire MPA from 2001 to 2005. In 2005 fishing resumed within the buffer zone surrounding no-take zones. From 2005 to 2008 we monitored artisanal professional fishing (strictly exerted by trammel nets) within the buffer MPA, and compared CPUE (kg km^{-1} of net) with those obtained outside the MPA (where fishing grounds are fully open to professional and recreational fishing). Catches were higher inside than outside the MPA. Overall assemblage structures (evaluated on wet weight data) were significantly different from inside to outside the MPA, with the two most important commercial species, i.e. *Mullus surmuletus* and *Scorpaena scrofa*, accounting for ~40% of the catch inside the MPA and ~20% outside. In 2005, average CPUE within the MPA was about five-fold ($\sim 50 \text{ kg km}^{-1}$ of net) the mean value obtained outside. Such value then declined and tended to stabilize around 25 kg km^{-1} of net in 2007 and 2008.

Average CPUE outside the MPA, instead, was $\sim 10 \text{ kg km}^{-1}$ of net and remained quite stable across years. This experience shows that the use of fishing co-management protocols within MPAs that properly involve local fishermen in the decision process is a promising approach to balance fishermen's and conservation needs.

Port-Cros National Park "From revolution to evolution"

Gérardin, N.¹

¹ Port-Cros national park, NICOLASGERARDIN12@GMAIL.COM

The law of 2006 on French National Parks deeply modifies their strategy and current management. This novelty is based on four main concepts - The attention granted to the "spirit of the site" ; the ecological solidarities between central and buffer zones ; the tight interdependency of local economy in these two areas and the co-construction process of the national park's project with the local society.

As ever, novelty creates uncertainty and fear. Consequently, the new process first generated hostility, although it was based on the contract and goodwill rather than on constraint. The law imposes the elaboration of a "Charter" which defines a 15 years territory sustainable project. It applies differently to the central zone dedicated to biodiversity, landscape, local culture patrimony protection and welcoming visitors, while the peripheral zone is dedicated to sustainable economic development promotion. A first step was made in the end of 2012 and the beginning of 2013 with the mayors of the 11 communities included in the park. They defined 6 main "ambitions" as the strategic frame of the Charter.

1 – Preserve and enhance the natural, cultural and marine, insular and littoral landscape patrimonies of the park

2 - Preserve biodiversity and the capacity of the marine and terrestrial environment

3 - Support and promote a sustainable local development, using the potential of the territory and in respect of its capacities

4 - Promote sustainable equipment and temper mobility

5 – Prepare future by investing on research, innovation, awareness on sustainable development and by anticipating the evolutions of the territory

6 - Develop a real land / sea integrated approach through a tighter cooperation, a better coordination and solidarity in action amongst actors

These six ambitions can be considered as a formal translation of their political prospective views in the field of sustainable development. During a three years intensive work with the stakeholders (60 workshops, 20 specific meetings with marine and terrestrial professional sectors) the Economic, Social and Cultural Council (CESC) produced more than 1100 proposals of actions (buffer zone) or regulations (central zone) to feed the national park's charter.

As a conclusion the public enquiry on the charter gathered 87 % of favourable opinions, it was approved by 90% of the members of the National Council for Nature Protection (CNPN) and was agreed unanimously by the national park administration board. It will be shortly submitted for approval to the Council of State, and published in a decree after signature by the prime minister.

Honesty imposes to say that this success mainly depended on dedicated human and material means (3 full time senior agents and one half time GIS technician) under the supervision of the Park's manager and assistant manager. It was a necessary (but not sufficient) condition to allow an efficient preparation and strict organization of the workshops, the involvement of the wide range of local economic sectors, the fidelity in the transcription of the proposals and the traceability of the successive versions at every step of the working out process.

Integrated management of the Natural Park "Montgrí, Medes islands and Baix Ter Natural Park"

Marí I Romeo, M.¹

¹ Parc Natural del Montgrí, les illes Medes i el Baix Ter, Departament de Territori i Sostenibilitat, Generalitat de Catalunya, marc.mari@gencat.cat

The Montgrí, Medes islands and Baix Ter Natural Park is located in Catalonia (NE of Spain) a few km from the French border, and it contains 6.164,92 ha of land, including the Montgrí massif and Baix Ter wetlands, and 2.036,99 ha of marine area, including 100,29 ha of the Medes Islands Marine Reserve.

Medes islands are a non-fishing area since 1983, it's been an MPA with a specific law for regulation of nautical and diving activities since 1990, and from 1999 on there have been different management plans in course.

Nautical activities, such as glass-bottom-boat cruises or recreational mooring are regulated with the help of mooring buoys, and diving is limited and controlled through a tax.

The main challenge at the moment for the marine reserve managers is to find the correct balance between conservation and recreational activities. With this purpose, some changes are being made to the current management plan, in order to review nautical and diving regulation -namely number of dives allowed per year in every diving spot- yearly, as an answer to biodiversity indicators' evolution

Hence, a marine biodiversity monitoring program is conducted to get information about marine habitats and species conservation status. Chosen bio indicators are vulnerable fish, *Posidonia oceanica*, big decapods, red coral, red gorgonian, bryozoans (*Myriapora truncata*, *P. fascialis*, *R. beanina*), macroalgae, *Lythophyllum byssoides* (starting to be monitored on 2015). Indicators are monitored every one or two years

After more than 30 years of fishing interdiction, fish populations have reached a near climax status; meanwhile, thanks to mooring regulation, *Posidonia oceanica* meadows are in very good condition and host a large amount of *Pinna nobilis*.

On the other hand, though, other habitats, like caverns and coraligenous bottoms, and populations, like some bryozoans (namely *Pentapora fascialis*, and *reteporella beanina*), red coral (*Corallium rubrum*), or red gorgonians (*Paramuricea clavata*), are slowly declining in some diving spots (though not in all of them), so provided this tendency does not change, it will be needed to decrease the number of dives in those areas.

Other measures are in progress, such as diving' leaders training, in order to enhance their awareness during their professional underwater activity and to teach them how to eco-brief their customers before each dive. This has proved to be very effective in relation with number of divers' contacts with the bottom or other bad practices.

International Symposium 'Marine Protected Areas in Greece and the Mediterranean: Designing for the Future by Applying
Lessons Learnt from the Past'

Management Agency of the National Marine Park of Zakynthos

32 years of monitoring and protection of the Loggerhead sea turtle *Caretta caretta* populations in the Greek seas.

Theodorou, P.¹, Benos – Palmer, T.², Arapis, T.³ and Dimopoulos, D.⁴

¹ ARCHELON, the Sea Turtle Protection Society of Greece, Athens, CONSERVATION@ARCHELON.GR

² ARCHELON, the Sea Turtle Protection Society of Greece, Athens, BENOS-PALMER@ARCHELON.GR

³ ARCHELON, the Sea Turtle Protection Society of Greece, Athens, THOMAS@ATEPE.GR

⁴ ARCHELON, the Sea Turtle Protection Society of Greece, Athens, D-DIMOP@OTENET.GR

Since its formulation in 1983, the primary objective of ARCHELON, the Sea Turtle Protection Society of Greece has been to protect sea turtles and their habitats in Greece through monitoring and research, developing and implementing management plans, habitat restoration, raising public awareness and rehabilitating sick and injured turtles.

In the summer of 1977 the founding member of ARCHELON, Dimitris Margaritoulis, first recorded the sea turtle nesting activity on Zakynthos, which was until then not known to the scientific community. In 1984 systematic monitoring projects initiated in Zakynthos and Kyparissia Bay, which continue until today, while similar projects started a few years later in other nesting areas (Lakonikos Bay, Rethymno, Chania, Messaras Bay, Koroni etc.). In 1985 ARCHELON launched an Environmental Education programme in the schools of Zakynthos, which soon was extended to schools all over the country, while the next year ARCHELON set up the first information station in Laganas Bay. In the context of LIFE projects, pilot fishermen awareness and sand dune restoration projects were carried out (Lakonikos Bay), while Management Plans were drafted for the nesting areas in Crete, Lakonikos Bay and southern Kyparissia Bay. In Zakynthos ARCHELON collaborated closely with the competent authorities and other NGOs for the establishment of the National Marine Park and supported WWF Greece to purchase the private land behind Sekania, the most important loggerhead nesting beach in the Mediterranean, to protect it.

ARCHELON relies heavily on voluntary work. Every year over 500 volunteers from all over the world help with the work on the nesting beaches and at the Sea Turtle Rescue Centre in Glyfada. With their help every summer the major nesting areas in Greece, around 75 km in length, are daily monitored and over 2,500 nests are protected against human threats, predation and sea inundation. Around 300 turtles are tagged each year, at the nesting and foraging areas, in order to monitor their movements. Annually over 70 injured sea turtles are treated at the Rescue Centre and about 600 stranded turtles are recorded through the nationwide Rescue Network. Through three permanent, ten seasonal stations and other outreach venues ARCHELON informs annually about 200,000 visitors and residents on the need to protect sea turtles. Moreover, 20,000 students and other groups participate each year in the educational programmes of the ARCHELON Sea Turtle Rescue Centre.

For the achievement of its objectives ARCHELON works closely with international, european and national agencies, the local authorities, institutions, other NGOs, fishermen and inhabitants. Certain projects have been co-funded by the European Commission. Moreover priority is given to the elaboration and implementation of integrated management and action plans in the major nesting and foraging areas in Greece. Members of ARCHELON participate in the IUCN/Marine Turtle Specialist Group and contribute to the formulation of international strategies for the conservation of sea turtles.

Nowadays there are still many challenges to be faced. The establishment of a National Park in Kyparissia Bay, the elaboration of a Management Plan in the NMPZ to deal with enduring land and maritime threats and an Action Plan for both terrestrial and maritime areas across Greece are just a few examples.

25 Years of Scientific Research and Conservation Actions for the Mediterranean Monk Seal in Greece.

Dendrinos, P.¹, Adamantopoulou, S.¹, Tounta, E.¹ and Karamanlidis, A. A.¹

¹MOM/Hellenic Society for the Study and Protection of the Monk Seal, info@mom.gr

The Mediterranean monk seal (*Monachus monachus*) is the only representative of the genus *Monachus*. The species is currently the most endangered Pinniped in the world, with an estimated total population of approximately 600 – 700 individuals. In the Mediterranean Sea, the stronghold of the species is at the Greek islands and coasts in the Ionian and Aegean Seas. Greece, with a total coastline of approximately 16.000 km and more than 3.000 islands and islets, hosts more than 50% of the total species population. Thus the country is considered a focal point for the conservation of this rare species. The latter justifies the establishment, in 1988, of MOM/Hellenic Society for the Study and Protection of the Monk Seal, a Greek NGO dedicated to the conservation of this charismatic species. The main goal of MOM is the conservation of the natural environment and the biodiversity of Greek seas, through the protection of the monk seal. Since its establishment MOM has been one of the most active organizations in this field and has established long term actions and projects for the scientific monitoring and the protection of the species, such as:

- The establishment and continuous operation of a National Monk Seal Rescue and Information Network.
- The establishment of a Rescue and Rehabilitation Program.
- The *in situ* monitoring of important seal populations throughout the country.
- The continuous promotion of the establishment of MPAs for the species through scientific documentation and policy intervention.
- Numerous public awareness and environmental education projects.

All the aforementioned activities have resulted in:

- 8.600 monk seal observations throughout the country have been collected, evaluated and stored in a specially designed geo-database.
- More than 4.000 photographs of monk seals have been collected.
- 1.600 biological samples have been collected and stored in a unique sample bank for this species.
- 11 orphan monk seal pups have been rehabilitated and released back to their natural environment.
- The National Marine Park of Alonissos Northern Sporades was established in 1992.
- Northern Karpathos and Saria Marine Park was established in 2003.
- The islands of Kimolos and Polyaigos and the surrounding marine area have been included in the Natura 2000 network of ecological important areas.
- Gyaros island and the surrounding marine area have been included in the Natura 2000 network and declared as a no fishing zone.
- The importance of three new areas has been scientifically documented to the National and European authorities in order to be included in the Natura 2000 network.

- 35 scientific articles have been published in peer reviewed journals covering different topics on the biology, ecology, behavior and conservation of the species.
- Hundreds of thousands of pupils and citizens have been educated and informed through MOM's educational and awareness projects and activities.

A high priority for the coming years is the completion of the detailed mapping of all important pupping sites for the species throughout the 16.000 km of Greek coastline, in order to conclude with a complete conservation plan and a complete network of protected areas.

CYCLADES Life: Integrated Monk Seal Conservation in the Northern Cyclades (LIFE 12 NAT/GR/000688)

Papadas, C.¹, Samara, E.¹, Livanou, M.¹, Christopoulou, I.¹, Alberini, A.¹, Liarikos, C.¹ and Kotomatas, S.¹

¹ WWF Greece, c.papadas@wwf.gr

The CYCLADES Life project aims at establishing through demonstrative and innovative methods a model marine protected area in the Gyaros Natura 2000 site: NISOS GYAROS KAI THALASSIA ZONI GR4220033 and its adjacent water in Cyclades, Greece. The objectives of the project are:

- The conservation of the local population of the endangered Mediterranean monk seal.
- The protection and the improvement of the conservation status of the Posidonia beds, the reefs and the partially submerged marine caves' habitats
- The overall improvement and involvement of local stakeholders in the conservation and co-management of the protected area of Gyaros, following Ecosystem Based Management and Marine Spatial Planning principles, and
- The significant positive change in local stakeholders' conceptions, attitudes and conduct, towards the marine environment of their area.

The project is being implemented through a number of integrated actions that involve field research, *in situ* conservation actions, technical measures, surveillance activities, monitoring of key biodiversity and social parameters, awareness raising tools and activities and policy work. The expected results of the project are:

1. Creation of an extensive knowledge base on the natural and human environment of the project area
2. Formal designation of the Gyaros Natura site as a Wildlife Refuge (WR) and a Marine Protected Area (MPA), with concrete and specific conservation measures
3. Establishment of an integrated management framework and of an Ecosystem Based Management Scheme, accepted by local societies and co-managed through the active participation of all major groups of stakeholders
4. The long term preservation and improvement of the good conservation status of the species and habitats of the project's area
5. Enforcement of the existing and prospect regulations regarding fisheries and other human activities, through an efficient and model surveillance system, that shall ensure the long-term protection of the project area.

6. Regulation and minimisation of activities causing disturbance and / or habitat degradation, including human related mortality of Mediterranean monk seals within the project area
7. Increase of *Octopus vulgaris* densities in selected habitats of the project area
8. Increase the Mediterranean monk seal pups' survival rates and an increase in recruitment rates in the local monk seal population
9. Removal of marine debris and ghost fishing gear present from all monk seal pupping habitat (marine caves and beaches)
10. Significant reduction in the damages caused to Posidonia beds due to uncontrolled mooring and anchoring from marine users of the project area through the constructions and installation of designated moorings.

Contribution to the Protection of Sea Turtles in Greece and the Mediterranean

Stamogiannis, V.¹

¹*Mediterranean Association to Save the Sea Turtles, vstamogiannis@medasset.org*

MEDASSET is an international environmental NGO, Permanent Observer-Member to the Bern Convention, Council of Europe and partner to the UN's Mediterranean Action Plan (UNEP/MAP). Since 1988, has been working hard to win a place for sea turtles in the hearts of the public and to establish them as an emblematic species for the conservation needs of marine and coastal biotopes throughout the Mediterranean region. Those goals are achieved through scientific research, environmental education, lobbying relevant decision makers, and raising public awareness. It is the only organisation that is exclusively dedicated to sea turtle conservation at a Mediterranean-wide level.

Although the rapid and uncontrolled tourism development in Zakynthos, the most important nesting habitat of the *Caretta caretta* sea turtle in the Mediterranean was the reason that led to the creation of MEDASSET, the organization has been active in the whole Mediterranean region due to the migratory nature of the sea turtle species. In 27 years of action, MEDASSET has been working in 9 countries, performing 22 research projects, published 120 Technical reports, 103 publications and articles and has been lobbying for the protection of 15 nesting sites: Kefalonia, Zakynthos, Kyparissia, Akamas Peninsula & Limni, Episkopi Bay, Fethiye, Belek, Patara, Dalyan, Akyatan, Anamur, Sugözü, Samandag and Kazanlı. In order to help develop sea turtle conservation in the Mediterranean, MEDASSET gets involved in projects where research has never been carried out before and where little or no commitment to sea turtle conservation exists, therefore often operating under challenging research conditions. A key aim of MEDASSET's projects is to build local capacity so that local teams can continue sea turtle research and conservation.

Artificial Reefs and Diving Tourism

Dounas, C.¹, Androulakis, N.D.^{1,2} and Koulouri, P.¹

¹ *Institute of Marine Biology Biotechnology & Aquaculture, Hellenic Centre for Marine Research, kdounas@hcmr.gr*

² *Fluid Mechanics Laboratory, Mechanical Engineering and Aeronautics Department, University of Patras,, d.n.androulakis@gmail.com*

The growth of marine tourism has resulted in an ever increasing environmental pressure and a decrease in biodiversity mainly apparent in destinations with a particular diving interest. These negative effects are mainly due to the presence of divers themselves as they dive on natural reefs either with an autonomous diving apparatus (SCUBA divers) or using an observation mask and snorkel (snorkelers). It has been verified through direct observations in the field that almost in each recreational dive incidents of deliberate or unconscious contacts of the divers with sensitive marine organisms are being recorded, such incidents cumulatively resulting in the injury or killing of many of them. This continued negative impact of visiting divers gradually leads to the degradation of the ecosystem that might locally even result in severe and irreversible environmental damage. The recent observed degradation of many underwater diving destinations because of the massive marine tourism necessitates the adoption of management measures aiming at decongesting visits, such as the reduction of the number of diving and the diverting of a portion of visitors from sensitive marine natural areas of high ecological and aesthetic value.

One of the solutions being provided to address this problem is the creation of artificial underwater ecotourism attractions using specially constructed artificial reefs attempting to simulate the functional and morphological characteristics of the sublittoral rocky substrata, known as natural reefs. Nevertheless, a large portion of the public opinion and mainly of the visitors of the underwater areas with artificial reefs having aesthetics and form far distant from those of natural reefs, reject these forms of intervention in the natural environment. Some even believe that this practice is a pretense and in reality it is nothing more than a practice of polluting the seabed through the disposal or even the deliberate concealment of "trash" material.

Given the well documented lack of artificial reef types that satisfy modern recreational diving requirements research conducted at the Institute of Marine Biology, Biotechnology and Aquaculture (IMBBC) of the Hellenic Centre for Marine Research (HCMR) revealed an alternative and innovative methodology in order to overcome the drawbacks and deficiencies of the prior art. This includes the construction of a new type of artificial reef dedicated for recreational diving that fully retains or excels the functionality of natural reefs through providing an enhanced availability and heterogeneity of microhabitats and refuges for benthic and benthopelagic marine organisms whilst simulating the form and aesthetics of the natural reefs.

The new technology developed by IMBBC research team is based on the construction of artificial habitats made by concrete that mimic perfectly the natural rocky reef habitat in such a degree that can substitute or even avert at some extent the modern trend of establishing diving parks in remote and environmentally sensitive natural reef areas characterized by outstanding ecological and conservation importance. It has been tested successfully in the Underwater Biotechnological Park of HCMR in Crete. By using this new innovative technology, a large number of artificial underwater "oases" suitable for recreational diving can be installed on small parts of the seabed (20,000-30,000 m²), at relatively small

depths (from 15 to 30 meters), at the proximity of the main urban and touristic centers and in coastal areas that do not display any particular ecological, archaeological or fishing interest.

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Management Agency of the National Marine Park of Zakynthos

Systematic Conservation Planning in the Mediterranean in the framework of Marine Spatial Planning

Katsanevakis, S.¹

¹*Department of Marine Sciences, University of the Aegean, stelios@katsanevakis.com*

The Mediterranean Sea is a hotspot of marine diversity but at the same time it is one of the most heavily impacted ecoregions of the world, affected by many anthropogenic threats. Mediterranean conservation faces major challenges such as data and knowledge gaps on the distribution of species, habitats and human activities, and the need for spatial prioritization within a comprehensive framework for regional conservation planning. Spatial prioritization of conservation efforts in the Mediterranean is required to direct limited resources to where actions are most urgently needed and most likely to produce effective conservation outcomes. Socio-economic drivers may accelerate the process of Exclusive Economic Zone (EEZ) declarations in the Mediterranean, which may provide important opportunities for leveraging change to national policy towards the development of large-scale conservation of marine ecosystems and biodiversity.

Systematic conservation planning provides an efficient and transparent approach, guiding the location, configuration and management of conservation areas. It helps creating alternative zoning configurations that maximize the achievement of social, economic, and ecological objectives while minimising the total socioeconomic cost. Within systematic conservation planning, it is important to explicitly incorporate information about species distribution and to set quantitative conservation targets for each species. The mapping of ecosystem components is often a bottleneck for conservation planning, and the claim of insufficient information on the distribution, state, functioning, and interactions of ecological components is often used as a justification for not taking action. While some of this information exists only in the grey literature or in repositories of local institutes, NGOs, or of individual experts and therefore its access is limited, with coordinated and targeted efforts it may become available for conservation planning.

Such an example of effective applying systematic conservation planning principles in a typically thought of as data poor area is an initiative taken for the north-eastern Ionian Sea in the framework of the FP7 project MESMA. A coordinated effort was made to collect spatial information on priority ecological features (including important habitat types and species such as cetaceans, monk seal, loggerhead turtle, and selected fish, seabirds, and invertebrates) and also human pressures (fisheries, aquaculture, tourism, coastal development, industry). MESMA brought together a large group of scientists from research institutes and NGOs and also resulted in thorough review of scientific and grey literature. Within less than a year, layers for many ecological features and human pressures were created, and priority areas for conservation were identified by applying the decision support tool Marxan.

Hence, as shown in the north-eastern Ionian Sea case study, there is no justification for inaction. Conservation in the Mediterranean is urgently needed now to halt biodiversity loss. Systematic conservation planning should be applied based on an adaptive management approach, i.e. managing according to a plan by which decisions are made and modified as a function of what is known and learned about the system, including information about the effect of previous management actions. The time has come to act to systematically advance conservation in the Mediterranean Sea.

Marine Spatial Planning and Marine Protected Areas

Papageorgiou, M.¹

¹Department of Spatial Planning and Regional Development, University of Thessaly, mpapageorgiou95@hotmail.com

To date, MSP is considered to be the means for tackling the constantly growing user-user and user-environment conflicts, taking place in and on the oceans. At the same time, M.S.P. is considered to be an effective "tool" for implementing the Ecosystem Approach (EcAp) in the marine space.

As international literature suggests, implementation of the EcAp in MSP, considerably lies in the identification of the appropriate management units, which in the best case, considers and adapts to the: a) ecosystem boundaries (including marine and terrestrial areas), b) geopolitical boundaries (as described in the UNCLOS) and c) administrative boundaries (national, regional etc) of each coastal state. However, adaption to the above limits (for the identification of the appropriate management units), should not be seen as a mono-scalar task; on the contrary, as in the case of terrestrial spatial planning, in M.S.P. too, management units and Plans have to be multi-scalar; that means that MSP should be tackled at a national, regional and local scale.

As regards the planning models for M.S.P., international planning practice shows that, elaboration of marine spatial plans have to be based on a zoning system, adapted to the national legislations and functions. This zoning system, is recommended to include the following types of zones:

- **High-level protection zones** (of natural or cultural heritage), within which varying limitations and interdictions will apply, as regards the practice of human uses and activities,
- **Sectoral Zones** (for the development of economic and productive activities): designated and organized according to the needs of marine uses and activities in each coastal country
- **Zero-use zones**, within which no activity or use is allowed, either because these zones are destined for military use, archaeological excavations etc, or because they are kept as "reserve areas" (for future use), or because of hazardous phenomena taking place within (whirlpools, currents, etc.)
- **Networks and linear zones**, for transportation, energy infrastructures (e.g pipelines, cables) etc

As in terrestrial spatial planning, in M.S.P. too, among the above zones, priority should be set to the identification of high-level protection zones at the sea, which in most of the cases regard ecologically and biologically sensitive marine areas, as are the Marine Protected Areas (MPAs). Designation of such zones should then be followed by a more detailed Plan (with the definition of spatial regulations and a pertinent permit system), which in the case of MPAs (in which ecosystem protection is a priority), should put emphasis to the conservation of local habitats and species interaction. To this purpose, i.e. in order to assure optimal organization of current and future sea uses in MPAs (so as the ecosystem maintains its capacity to deliver valuable services for future generations) valuable and useful tools can be: a) the Cumulative Impact Assessment tools b) the Vulnerability Assessment tools, c) the Risk Analysis tools.

Ultimately, it is of paramount importance to notice that, even the most pertinent and wise spatial regulations are adopted in a Marine Protected Area, this is never enough, if the wider area (marine and terrestrial) is void of planning measures and regulations. In other words, if integrated and effective M.S.P. is to be implemented, this can only happen if management units include marine and coastal areas much wider than a MPA; that is if they include wider marine and coastal regions, in which MPAs would only be a part and not the whole of the management unit.

MARISCA: Marine spatial planning in the Aegean Sea for the protection and conservation of biodiversity

Katsanevakis, S.^{1,11}, Buhl-Mortensen, L.², Giakoumi, S.¹, Gonzalez-Mirelis, G.², Hasiotis, T.¹, Kavadas, S.³, Karachle, P.K.³, Koutsoubas, D.¹, Panayotidis, P.⁴, Papadopoulos, E.⁵, Topouzelis, K.¹, Vassilopoulou, V.³ and Velegrakis, A.¹

¹ Department of Marine Sciences, University of the Aegean, stelios@katsanevakis.com, sylvaine.giakoumi1@gmail.com, hasiotis@aegean.gr, drosos@aegean.gr, topouzelis@marine.aegean.gr, beachtour@marine.aegean.gr

² Institute of Marine Research, Norway, lenebu@imr.no, genoveva.gonzalez-mirelis@imr.gr

³ Institute of Marine Biological Recourses and Inland Waters, Hellenic Centre for Marine Research, stefanos@hcmr.gr, pkarachle@hcmr.gr, celia@hcmr.gr

⁴ Institute of Oceanography, Hellenic Centre for Marine Research, ppanag@hcmr.gr

⁵ Hellenic Centre for Marine Research, euripap@hcmr.gr

European Seas, especially coastal areas, are strongly impacted by a multitude of human pressures. Consequently, marine ecosystems are degrading, biological resources collapse, and a substantial loss of marine biodiversity is recorded. At the same time, the demand for marine resources and space is constantly increasing. Therefore, there is an urgent need to conserve marine biodiversity and maintain marine ecosystem services through an integrated approach of marine spatial management.

The Marisca project, financed by the European Economic Area Financial Mechanism 2009-2014 and the National Public Investments Program, is expected to increase our knowledge on best practices to achieve protection and management of coastal areas and inform integrated marine and insular policy-making. The objective of the project is to contribute towards the integrated management of marine resources and the conservation of marine biodiversity in the Aegean Sea. The main deliverable of the project will be a proposed network of marine protected areas (MPAs) and protection zones, for the conservation of important and vulnerable habitats and species. Towards that direction, a large amount of information on the spatial distribution of marine habitats and species will be collected. This will contribute to the knowledge base needed for the implementation of the Habitats Directive and the Marine Strategy Framework Directive.

During the project, the spatial distribution of several habitats and species, as well as of human activities will be mapped. Required data will be retrieved by collecting and integrating all existing information from scientific and gray literature, and unpublished data available in repositories. Satellite data of medium scale will be used for habitat mapping, spatial distribution models will be developed for selected species and habitats, and empirical knowledge of fishermen, scientists, and other stakeholders will be acquired through interviews or questionnaires. New data will be collected during extensive field surveys for the validation of low-reliability data, verification of results from spatial distribution models, and ground-truthing for remote sensing analyses. Furthermore, the value of goods and services of selected important habitats/species in the Aegean will be assessed. In consultation with the competent Public Administration and with related stakeholders, operational objectives for the targeted ecological features in the proposed MPA network will be defined. The design of the MPA network and the associated Spatial Plan will be based on the principles of systematic conservation planning, using the software Marxan with Zones. After defining conservation targets for a number of biodiversity features, Marxan will assist the selection of priority sites for conservation while minimizing the impacts for other marine uses.

¹ The first author is the Coordinator of the project. All other authors are key-contributors to the project, and are listed in alphabetical order

International Symposium 'Marine Protected Areas in Greece and the Mediterranean: Designing for the Future by Applying
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Management Agency of the National Marine Park of Zakynthos

The reinforcement of Local Society's participation, the maintenance in the 'age of memorandum' and the challenges for the future of the Management Agency of the National Marine Park of Zakynthos

Koutsoubas, D.^{1,2}

¹ Management Agency of the National Marine Park of Zakynthos,

² Department of Marine Sciences, Faculty of the Environment, University of Aegean, drosos@aegean.gr

N.M.P.Z.' Management Agency implements, in the area of its jurisdiction, several Management actions on an annual basis aiming to achieve an effective conservation of the Marine Protected Area including Loggerhead Sea Turtle *Caretta caretta*, its habitats and biological resources (i.e. Laganas Bay and nesting beaches). The Management actions in both the nesting beaches and the marine environment are the synergistic effect of three different but interactive programmes: a) The Wardening of Activities and Public Awareness/Environmental Education Programme, b) the Scientific Monitoring Programme and c) the Volunteers Programme. N.M.P.Z also participates in National and International Projects (e.g. CIGESMED, Argomarine, MedPan North, LIFE, ARCHICARTER, EPPERAA, EPPER, *Caretta* Odyssey), workshops, scientific articles, conferences, exhibitions and media whereas cooperation with universities, research institutes, organizations and managers networks throughout the Mediterranean (e.g. MEDPAN NETWORK) is well developed. The surveillance of the terrestrial part of the MPA is mainly carried out at 9 posts which are distributed across the nesting beaches, whereas at the marine area surveillance is fulfilled by means of patrol boats (total: 48300 hours of surveillance/year). The daily tasks of the Park rangers (19 persons throughout the year and 43 during the summer period) are aiming to ensure that MPA users comply with management measures. Furthermore, monitoring of the observed violations/problems is conducted on daily basis (through specific logbook), thus allowing MPA's managers to directly resolve immediate threats and implement appropriate management measures (adaptive management). The Management Agency of the MPA of NMPZ has developed official cooperation and/or specific agreements with several Public Authorities and NGOs. Such cases include the local Port Police authority (e.g. common patrols at the marine area, common operations in the marine area) as well as the local Fire Brigade Agency (common firefighting operations in the MPA). Close cooperation has also been developed with NGOs, especially with the NGO "Archelon", mainly regarding the sea turtle monitoring and WWF Ellas regarding the management of Sekania strictly protected area. Moreover, an effort to engage the local society and stakeholders in the surveillance/sustainable management of the MPA has been put forward.

All the above actions aim to reduce the human induced negative effects on the protected fauna and flora, to ensure that both habitats and species are under a favorable conservation status as well as to establish the principles of sustainable development for the long term benefit of the local societies.

International Symposium 'Marine Protected Areas in Greece and the Mediterranean: Designing for the Future by Applying
Lessons Learnt from the Past'

Management Agency of the National Marine Park of Zakynthos

Ecological assessment of coralligenous assemblages in the National Marine Park of Zakynthos (Ionian Sea, Greece)

Dailianis, T.¹, Sini, M.^{2,3}, Gerovasileiou, V.^{1,3}, Dimitriadis, C.³, Sapouna A.², Vatikiotis, K.^{2,3}, Katsoupis, C.², Çinar, M.E.⁴, Féral, J-P.⁵, Koutsoubas, D.^{2,3}, and Arvanitidis, C.¹

¹ Institute of Marine Biology, Biotechnology and Aquaculture, Hellenic Centre for Marine Research, Heraklion, Crete, Greece, thanosd@hcmr.gr, arvanitidis@hcmr.gr

² Department of Marine Sciences, School of Environment, University of the Aegean, Mytilene, Greece, mariasini@marine.aegean.gr, drosos@aegean.gr

³ National Marine Park of Zakynthos, Greece, xdimitriadis@marine.aegean.gr

⁴ Department of Hydrobiology, Faculty of Fisheries, Ege University, Bornova, Izmir, Turkey, melih.cinar@ege.edu.tr

⁵ Mediterranean Institute of Biodiversity and marine and terrestrial Ecology (IMBE), Station Marine d'Endoume, Marseille, France, jean-pierre.feral@imbe.fr

CIGESMED (Coralligenous based Indicators to evaluate and monitor the “Good Environmental Status” of the Mediterranean coastal waters) is an international SEAS-ERA research project aiming to fulfill the key gaps in the current scientific knowledge regarding the Mediterranean coralligenous, an ecologically important and highly sensitive marine habitat. This aim is addressed through an array of approaches, including evaluation of novel ecological indices, application of state-of-the art genetic methods, and establishment of networks of Mediterranean experts and volunteering citizen-scientists. Scientific cooperation between France, Greece and Turkey, and the concerted application of all applying methodologies promote the scaling-up of conducted research at the Mediterranean level.

In the above context, two joint missions involving scientists from the Hellenic Centre for Marine Research, the University of the Aegean, and the National Marine Park of Zakynthos (NMPZ) were conducted during the summer months of 2014 and 2015. Through the course of these surveys, two sites with well-developed coralligenous formations, and distinct topographic and bathymetric profiles, were identified within the protected coastal area of Lakka, in the SW coast of the island. An array of protocols was applied, allowing the description of the abiotic features and the characterization of the benthic assemblages occupying both sites. Underwater surveys were conducted by diving scientists using non-destructive methods, including *in situ* application of indices, visual census methods, and photographic sampling of quadrats. Moreover, biological samples of typical organisms forming the coralligenous were collected for molecular analyses. Permanent transects and temperature loggers were deployed in collaboration with the NMPZ management authorities, in order to support and facilitate long-term monitoring of the identified sites. All data, along with meta-data information, were stored in the LifeWatchGreece Research Infrastructure after quality inspection following international standards and protocols. Future analysis will utilize the appropriate functions of the R virtual laboratory (R_vLab) of the aforementioned Infrastructure. Moreover, organized surveys with volunteering divers, as well as communication of the project’s objectives and outcomes to the local diving clubs and associations, were carried out to promote participatory monitoring and management processes. This work enabled the ecological assessment of coralligenous assemblages in the NMPZ, the identification of associated pressures and threats acting against their sustainability, and the recommendation of effective conservation measures and actions.

Monitoring the small scale coastal fisheries catches in Zakynthos Island, Ionian Sea

Fournari-Konstantinidou, Y.¹, Tsalkou, E.¹, Ntislidou, C.¹, Dimitriadis, C.², Koutsoubas, D.^{2,3} and Tsikliras, A.C.¹

¹ School of Biology, Aristotle University of Thessaloniki, Thessaloniki, Greece atsik@bio.auth.gr

² National Marine Park of Zakynthos, Zakynthos, Greece

³ Department of Marine Sciences, University of the Aegean, Mytilene, Greece

The catches of the small scale coastal fisheries fleet were monitored within the framework of monitoring activities for the implementation of the Directive 92/43/EEC in the National Marine Park of Zakynthos, which includes Laganas Gulf (Natura 2000 site code: GR2210002) in the southern part of Zakynthos, and adjacent fishing grounds.

Samples were collected onboard three small-scale coastal fisheries vessels that operate in the study area between April and October 2015. The vessels were using trammel nets (usually 22/110 mm inner/outer mesh size, 4000 m in length; usually set for 9 hours), and long-lines (180 to 750 hooks, sizes 10 to 13, set for 2-3 hours). Overall 25 hauls were conducted, 20 in vessels using trammel nets and 5 in vessels using long-lines. Catch per unit of effort (CPUE) was estimated only for trammel nets and was measured as biomass per soaking time x net length at each haul. Total biomass and abundance per species were measured for every haul, while for the species of special interest and those with the highest catches, total length (TL, cm) and total weight (TW, g) were also measured onboard.

The catches were diverse. Overall, 72 species were recorded (65 fishes, of which 59 actinopterygians and 6 elasmobranchs; 2 crustaceans; 5 cephalopods) belonging to 4 classes, 18 orders and 38 families. Among them, 2 actinopterygians (parrotfish *Sparisoma cretense*, pearly razorfish *Xyrichthys novacula*) are listed as protected by the national legislation, while the dusky spinefoot *Siganus luridus* and blunthead puffer *Sphoeroides pachygaster* are listed among the 100 worst invasive species in the Mediterranean. Most species were caught in May (n=42). Although Sparidae was the most represented family with 17 species, the species with the highest average and total biomass and the highest abundance were the parrotfish (Scaridae) and surmullet *Mullus surmuletus* (Mullidae). These two species along with common Pandora *Pagellus erythrinus*, red scorpionfish *Scorpaena scrofa*, cuttlefish *Sepia officinalis* and painted comber *Serranus scriba* were present in over 75% of the hauls. Out of the seven fish species that were selected as species of special interest (white seabream *Diplodus sargus*, common two-banded seabream *D. vulgaris*, dusky grouper *Epinephelus marginatus*, Goldblotch grouper *E. costae*, salema *Sarpa salpa*, parrotfish *Sparisoma cretense* and dusky spinefoot *Siganus luridus*), all but two (*E. marginatus* and *Sarpa salpa*) were collected. CPUE was highest in August and September. All catches were sold to the market; no part of the catch is discarded. The percentage of the catch that was undersized (i.e. below size at maturity as reported in the literature for central Mediterranean stocks) was high for the vast majority of species, ranging from 55 to 91% for commercially important species.

Despite the high catch of undersized individuals, a preliminary analysis on the length frequency distribution showed that the populations of species vulnerable to (over)fishing maintain a not-very-disturbed age/length structure, which is encouraging for the structure and function of the marine ecosystem. It is also indicative of the positive effect of the measures and regulations that confine fisheries within the national park. However, commercial overfishing, because of the high fishing effort in terms of gear size and the numerous fishers, remain the main threats to the fish populations and further measures regulating the fishing gears, areas and yields should be implemented in the future.

Evaluation of by-catch as a threat for the conservation of seabird populations in the southern Ionian Sea based on onboard observations and a questionnaire-based survey of local fisheries

Karris, G.¹ and Poirazidis, K.¹

¹ Department of Environment Technologists, Technological Educational Institute of Ionian Islands, gkarris@teiion.gr, ecopaira@yahoo.gr

A significant number of studies worldwide have shown that incidental catches (by-catch) of seabirds in fishing gear might pose a considerable risk for the conservation of their populations. Nevertheless, reliable data on by-catch rates of seabirds in European marine ecosystems are patchy and need to be improved. The present study was carried out as part of the LIFE07/NAT/GR/000285 project titled as "Concrete conservation actions for Mediterranean Shag and Audouin's Gull in Greece including the inventory of relevant Marine IBAs" and constitutes a first attempt at the evaluation of by-catch rates in the southern Ionian Sea.

The first assessment of the by-catch problem was undertaken from May to October 2009 and 2010 by implementing on-board observations in major fishing areas in the Ionian Sea. The research team assessed possible effects of two different fishing gears (gillnet and demersal longline) on seabird mortality. The on-board observations, checking a total length of 190 km of gillnets and 30,000 hooks of bottom longline, showed no incidents of accidentally trapped seabirds. Bait loss was mainly due to Scopoli's Shearwaters (*Calonectris diomedea*) and in a less extent to Yellow Legged Gulls (*Larus michahellis*). Setting gears took place in different hours during the day, looking for possible differences on by-catch risk.

Additional data were collected through a questionnaire-based survey which was conducted in collaboration with the Fishery Department of the Prefecture of Zakynthos. 150 professional fishers (representing 90% of the local fishing fleet) participated in the survey, and were interviewed during July-December 2010. The questionnaire which was distributed to local fishermen was consisted of closed and open-ended questions. The method used was based on personal interviews with fishermen and the obtained data were analysed in a time-spatial scale. The collected fishery data included, fishery characteristics, types of fishing gear used, fishing months per gear type, marine fishing areas, average fishing days per month, and average daily fishing effort (number of hooks per days for longlines and meters of nets for nets). The data related to seabird by-catch included main by-catch seasons, marine areas and average annual number of seabirds caught per seabird species per type of fishing gear. The questions relating to specific species incidentally captured were accompanied by images so as to increase the reliability of the collected data based on interviews. The information collected showed that commercial longline (mainly) and gillnet fishery gears caused incidental catches mostly of Scopoli's Shearwater and Mediterranean Shag (*Phalacrocorax aristotelis desmarestii*). The temporal analysis of incidental bird mortality showed that seabirds were more susceptible to be trapped in fishery gears set around sunrise during spring and summer whereas spatial analysis of by-catch data indicated variations in the number of seabirds caught in different fishery areas.

Marine Protected Areas aiming for fisheries recovery: just do it!

Tsikliras, A.C.¹

¹*School of Biology, Aristotle University of Thessaloniki, Thessaloniki, Greece atsik@bio.auth.gr*

The establishment of marine protected areas (MPAs) has long been considered among the solutions fisheries scientists demand in order to confront the overexploitation of marine resources and habitat loss. MPAs within the framework of ecosystem based fisheries management (EBFM) are generally preferred compared to single and multi species fisheries management because of the complexity of marine food webs, interspecific relationships, and the indirect effects of fishing gear to habitats. Indeed, MPAs are known to increase the reproductive potential and biomass of marine organisms, preserve their age and length structure, while protecting essential habitats, biodiversity and food web structure.

Designing and establishing a network of MPAs is a complex and time consuming task that requires large datasets that include information on habitat characteristics, oceanographic processes (circulation, fronts, tide), life-history data (maturity, fecundity, time of spawning, recruitment, growth and mortality) of a large number of species as well as fisheries related data (yields, gears, effort), including socioeconomic effects of closure, potential subsidies, running costs and future benefits.

In Greek waters, MPAs closed to all fisheries activities that have been designed to promote EBFM do not really exist. The two national marine parks in Greek Seas were designed to protect the spawning areas of loggerhead sea turtle (National Marine Park of Zakynthos) and the habitats of Mediterranean monk seal (National Marine Park of Alonnisos and northern Sporades). With respect to fishing activities, bottom trawling is prohibited in a few closed gulfs, within 3nm from coastline or 50m depth should that depth is reached at shorter distance, and within 1.5nm from the coastline regardless sea depth, over seagrass beds and at depths > 1000m.

Therefore, in order to achieve good environmental status for all Marine Strategy Framework Directive (MSFD) descriptors, especially commercial fish and shellfish, MPAs should be established soon in Greek Seas, even if not all criteria and steps required for their design are met. It is already late, compared to other European countries in the Mediterranean, and the state of fisheries stocks is not encouraging. Spawning habitats, nursery grounds and sensitive habitats should be given top priority in designing a network of MPAs, bearing two things in mind: (a) the entire life cycle of most species should be protected, not only certain stages, and (b) the protection of habitats is essential for all species and ecosystems.

A lot of work is needed from the scientific community (two ongoing research projects will provide significant input) together with the consent of local societies and fishers, which would have been impossible a few years ago. Local societies are gradually maturing, seem care about the marine environment and become ready to invest to their future. Public awareness is the fortunate side of the human factor. The unfortunate one is that politicians and policy makers are not aware that the fish stocks (and fish sizes) are getting so small that we might end up without viable fish populations. Or maybe they are aware and they just do not care by legislating against public good.

Preliminary results on the wintering population and diet of the Great Cormorant *Phalacrocorax carbo sinensis* at a Greek coastal wetland

Kazantzidis, S.¹, Panagiotopoulou, M.², Christidis, A.², Patetsini, E.², Donth, S.², Terzis, V.², Michailidou, A.², Katsoulis, V.², Piakis, N.², Minasidou, K.² and Chartzoulaki, E.²

¹Forest Research Institute, GR 57006 Thessaloniki, Greece, savkaz@fri.gr

²Management authority of the East Macedonia and Thrace National Park, GR 67063, Porto Lagos, Xanthi. Greece

The growth of the wintering population of the Great Cormorant *Phalacrocorax carbo sinensis* caused concern among commercial fishermen of the National Park of Eastern Macedonia and Thrace (northeastern Greece) regarding the impact of this species on fisheries. In response, the Management authority of the National Park initiated a research project in order to provide data on the potential impact of Great Cormorants on fisheries and to suggest the best solution for both, fisheries and wildlife. The research included systematic count of Great Cormorant numbers wintering in the National Park, their distribution and their diet, as well. The research was carried out during the period October 2013 – February 2014. Great Cormorants were counted at their night roosts and their number ranged from 1800 to 12000 individuals. The highest numbers were recorded in November and December 2013. Great Cormorants mostly exploited the lagoons of the National Park (in a percentage of 99%) for food and especially Vistonis and Porto Lagos lagoons. The diet of the Great Cormorants was conducted based on pellets that had been collected in the main roosting and resting sites. In 72 pellets collected from two different sites, 547 remains of fish (mostly otoliths) were recorded belonging to at least 13 fish species. The most abundant species was Boyer's Sand Smelt *Atherina boyeri* (23.2% by number) followed by Golden Grey Mullet *Liza aurata* (20.3%) and unidentified species of Mugilidae family (14.8%). Golden Grey Mullet dominated in pellets by frequency of occurrence (present in 44.0% of pellets) followed by Thin-lipped Grey Mullet *Liza ramada* (40.3%). Great Cormorants consumed low percentage (8.0%) of high commercial value fish (European Seabass *Dicentrarchus labrax*, Flathead Grey Mullet *Mugil cephalus* and Sharpnout Seabream *Diplodus puntazzo*) while they consumed high percentage (53.0%) of medium commercial value fish (mugilidae and *Liza* spp). We are currently expanding this research to include more intensive diet sampling.

Actions of Samaria National Park Management Body

Peroulaki, E.¹ and Lymberakis, P.¹

¹ *Samaria National Park Management Body, eperoulaki@samaria.gr , lyberis@samaria.gr*

Samaria National Park Management Body (MB) is a non-profit private entity, which was established for the protection and management of the National Park of Samaria (Lefka Ori), in Crete, Greece.

The protected area (PA) has a total size of 58,484 ha, that includes the Natura 2000 sites GR4340008 and GR4340014. The PA is divided into smaller conservation zones, with the Gorge of Samaria being the core zone.

Within the borders of the PA important terrestrial and marine habitat types exist, which host a large number of species of flora and fauna, many of which are endemic/stenoendemic. Specifically, 21 habitat types, 256 bird species, 32 mammals, and almost half of the known 1,800 species and subspecies of the flora of Crete have been recorded at Lefka Ori. The existence of occasional only data for the presence and conservation status of species and their habitats led to the design of a systematic monitoring program. The program, which started in 2013, includes the collection and evaluation of existing data, the creation of databases and the design and implementation of field protocols for the study of habitat types and species of flora and fauna recorded in the protected area.

Public awareness programs are also implemented, to enhance the efforts for the protection of the natural environment. These include, amongst others, visits to schools for environmental education, the implementation of a volunteer program as well as the operation of an Information Center at the entrance to the Gorge (Xyloskalo, Omalos).

Samaria National Park is not only significant for the biodiversity it hosts, but also for its history and its cultural elements (food, customs, and songs). Thus, one of the priorities set is the support of local sustainable development that will lead to the most effective preservation of the traditional character of the human activities. Towards this direction the MB has participated in several actions. Two of the most characteristic are:

(i) issuing of a quality agreement and the subsequent award of a quality label to enterprises operating within its jurisdiction area. The quality agreement is addressed to enterprises of catering, accommodation, food and drinks, tourism services and wholesale and retail trade. The quality label bears the name "NH ZA", and has three levels of distinction, for enterprises meeting the minimum, average and all criteria respectively. The first quality labels were recently granted to ten enterprises which met the standards set by the quality agreement.

(ii) participation to the project "MEET" (<http://www.medecotourism.org/>) which resulted in the design of an eco-tourism package that involves a holistic hiking and swimming experience in combination with gastronomy-wine testing seminars in the Samaria National Park. After evaluation from tourism experts, this package was considered as "ready" to be promoted to tour operators abroad.

The Gorge of Samaria is one of the most popular destinations in Crete and during its operation period receives approximately 850 visitors per day, reaching 1,400 at peak periods. The effort of the Management Body to protect, record and maintain the elements of the important and particular ecosystem as well as of the traditional landscape of Lefka Ori, and especially the Gorge of Samaria is a challenging and continuous task.

Strategic sustainable development and ecotourism in mountainous areas: The case of Tithorea’s trail at the Parnassos National Park region

Mertzanis, A.¹, Lanara, T.², Tsaprounis, N.², Varvarigos, G.², Mertzani, A.⁴ and Tsitsoni, T.^{2,3}

¹Technological Educational Institute of Sterea Hellas, Department of Forestry and Management of Natural Environment, 36100, Karpenisi, Greece

² Parnassos National Park Management Body, 35002, Amfikliia, Greece

³ Aristotle University of Thessaloniki, Department of Forestry and Natural Environment, University Campus, 54124, Thessaloniki, Greece

⁴ National Technical University (NTUA), School of Electrical and Computer Engineering, Zografou Campus, Heroon Polytechniou 9, GR-15780, Zografou, Greece

The mountain of Parnassos, crisscrossed by a dense network of trails, is one of the ten Mountainous National Parks of Greece (Parnassos National Park). The trails and especially the so-called “Thematic Trails” such as the “Nature Trails”, “Geological Trails”, etc, besides the outdoor recreation and physical activity that offer to the modern man, they are also significant “tools”, used by the specialists for highlighting the characteristics of natural environment, the geology-geomorphology, the historical background and tradition of certain areas. The Tithorea’s trail, part of the “aesthetic forest of Tithorea”, near the village of Tithorea, located at the northeastern side of Parnassos National Park, is the subject of the present research.

The main purposes of this research are: a. the promotion of specific characteristics concerning biodiversity, landscape, geomorphology and history b. the management and protection of the ecosystems and archaeological heritage resources and c. the strategic of sustainable development and ecotourism in the wider area of Tithorea’s trail at the Parnassos National Park. The management and promotion of Tithorea’s trail could become a model for alternative forms of tourism in mountainous areas and the appropriate signage and maintenance of the trail are prerequisites for its safe use.

Bird species of the National Park of lakes Koronia-Volvi and Macedonian Tempe: new bird records in Lake Koronia

Karta, E.¹, Tserkezidou, E.¹, Vafeiadou, A.¹, Patsia, A.¹ and Bobori, D.C.^{1,2}

¹Lakes Koronia-Volvi Management Authority, a_patsia@hotmail.com, foreaskv@otenet.gr

²Laboratory of Ichthyology, School of Biology, Aristotle University of Thessaloniki, E-mail: bobori@bio.auth.gr

Monitoring of bird species that hibernate, park and breed in the National of lakes Koronia Volvi and Macedonian Tempe, started in 2006 by the staff of the Management Authority (M.A.), which is responsible for the protection and the management of the National Park. Monitoring realized by direct measurement of the species, mapping points or territories and observations in straight lines or points, covering lakes Koronia and Volvi, agricultural and mountainous areas and riparian forests. Up to 300 species have been recorded in the area. In particular, the presence and the populations of the bird species recorded in Lake Koronia, are directly related to the adverse hydrologic conditions dominated

the previous years. However, diversity indices increased between 2010 and 2012. Moreover, in January 2013, three new species were recorded in the area: *Branta ruficollis* (Red-breasted Goose), *Falco cherrug* (Saker Falcon) and *Tetrax tetrax* (Little Bustard). In addition, the presence of *Anser erythropus* (Lesser White-fronted Goose) was confirmed in the area, since its last appearance in 1921. All the above species are listed in the Red Data Book of IUCN. Red-breasted Goose and Saker Falcon are characterized as endangered species, Little Bustard as near threatened and Lesser White-fronted Goose as vulnerable. The significance of these records is dual. Despite the ecological degradation of Lake Koronia, the diversity of birds is increasing. However, since the new recorded species have particular ecological requirements, it seems that the ecosystem of Lake Koronia alters, providing more specific habitats for hosting these species.

Management Body of Lake Pamvotis, a multitask action plan

Kouroutos, V.¹, Tsoumanis, P.¹ and Chiotelli, K.¹

¹ Management Body of Lake Pamvotis, malpi@otenet.gr

Established in 2003, the Management Body (MB) of Lake Pamvotis is responsible for the day-to-day management of almost the entire Ioannina basin (approx. 340km²), which includes the Lake Pamvotis, one of the oldest lakes worldwide and the second oldest at European level. The Protected Area (PA) constitutes a vigorous ecosystem with great biological diversity, striking landscape and important cultural elements. Nineteen (19) different habitat types have been recorded in the area. The aquatic and wetland flora of Lake Pamvotis consists of 115 species and subspecies of plants. Forty-nine (49) species of terrestrial invertebrates have been recorded. In the PA, 169 bird species can be found. Here are reproduced two out of the ten species in Greece, threatened worldwide with extinction: the ferruginous duck (*Aythya nyroca*) and the Lesser Kestrel (*Falco naumanni*). In the area 28 mammal species can be found, out of which 13 are protected. Of particular interest is the presence of the otter (*Lutra lutra*) and 7 protected species of bats. Many human activities affect the PA, including fishing and livestock breeding, and it is our belief that it is vital for the Management Body to work with these sectors and involve local stakeholders as participants in the PA's management.

The MB's action plan aims to provide: Protection, conservation and management of the wildlife, landscape/ cultural and heritage values; Manage impacts and ecosystem; Surveillance and guarding of the area; Education, information and awareness of the public; Volunteering opportunities for motivated individuals willing to assist in the implementation of the PA's day-to-day Management Programme and; Planning, preparation and implementation of operational environmental policies (Management Plan). Since 2007, through structural funds: ten (10) scientists and rangers have been employed; an Information & Public Awareness Centre and an Ecosystem Interpretation Park have been established; a speed boat, two cars and various surveillance and monitoring equipment for the guarding and environmental monitoring, have been purchased; various printed material for public information and sensitisation have been created; and an extensive fauna & flora monitoring programme has been funded.

PA's rangers, during their daily patrols, have informed a large number of PA's users (professional and amateur fishermen, farmers, visitors, tourists, etc.) regarding the regulations and permitted activities within the PA's area. Over the last few years, uncontrolled infillings, widespread pollution, uncontrolled hunting and illegal fishing have been significantly reduced. The implemented monitoring activities and research programmes have given us the opportunity to: measure the condition of the environment and evaluate the effectiveness of management; Assess threats to the PA; and Monitor experiences and attitudes of visitors to assist future communication strategies. PA's personnel, at the Information Centre and Ecosystem Interpretation Park, have informed thousands of visitors, school children and commercial users. We consider that PA management is mostly about managing human activities, so this must be at the heart of our approach. We follow the principle that management should be responsive and adaptive, working with local interests in a way that builds support for the conservation objectives. There is a strong need to show demonstrable benefits for local stakeholders, and this takes time and diplomacy.

Protection – Conservation- Enhancement of Biodiversity of the National Marine Park of Alonissos Northern Sporades

Paraskevopoulos, S.¹, Iosifidis, S.², Maniakas, J.³, Mouratidis, T.⁴, Papadamakis, P.⁵ and Rovisi, S.⁶

¹ University of Thessaly, President of the Management Body of the National Marine Park of Alonissos Northern Sporades, pstefano1@gmail.com

² Management Body of the National Marine Park of Alonissos Northern Sporades, siosifidis@alonissos-park.gr

³ Management Body of the National Marine Park of Alonissos Northern Sporades, gmaniakas@alonissos-park.gr

⁴ Management Body of the National Marine Park of Alonissos Northern Sporades, tmourati@alonissos-park.gr

⁵ Management Body of the National Marine Park of Alonissos Northern Sporades, ppapadamakis@alonissos-park.gr

⁶ Management Body of the National Marine Park of Alonissos Northern Sporades, srovisi@alonissos-park.gr

The National Marine Park of Alonissos Northern Sporades (NMPANS) was established in May 1992, becoming the first of the two Marine Parks of Greece and one of the largest marine protected areas in Europe, covering an open area of 2.265 km². The responsibility area of NMPANS Management represents a unique combination of terrestrial and marine habitats of high biodiversity in the Mediterranean region, with notable geomorphological and cultural characteristics. In addition, apart from marine area, the park contains a cluster of islands, consisting of Alonissos, 6 smaller islands and 22 islets. The geographical isolation of the region, the Mediterranean climate with the typical phrygana and makia, the particular morphology and little or no human intervention, make both marine and terrestrial area, ideal habitat for numerous species of flora and fauna, with many of these species being endemic, rare or protected.

Management Body's work is to combine the protection of the monk seal (*Monachus monachus*) and its habitat, which today is considered to be one of the most endangered marine mammals on the planet, and has been classified by the International Union for Conservation of Nature (IUCN) as critically endangered under extinction. The existence of numerous caves along the coastline of NMPANS is one of the characteristics of the geology of the area, as derived from the weathering of limestone rocks and for this reason it constitutes ideal shelter for the population of the monk seal. Piperi island is the "Core" of the Park and the main place of monk seal's reproduction.

The lack of knowledge of the Mediterranean monk seal is a consequence of its small total population, its inaccessible habitat and its cryptic nature. The threat of current status of the species sets limits and priorities to the study and protection, and therefore still requires study actions to be done with appropriate planning and maximum caution not to bring in any manner probability to endanger the survival of the species (non- invasive methods). Therefore, last year placed in two caves, which are the main breeding and resting shelters on the island Piperi, automatic infrared cameras aimed at the systematic and comprehensive data collection for the total number of pups and older animals. After examination of these data the population of the animals raised to 12 persons from September to November 2014.

Actions for the protection and restoration of the riparian forest of Lake Kerkini

Lake Kerkini Management Authority¹

¹Kerkini, 62055 Kato Poroia, tel +30 23270 28004, fax: +30 23270 28005, e-mail: info@kerkini.gr, URL: <http://kerkini.gr>

In this paper, there is a reference to the actions implemented by Lake Kerkini Management Authority for the protection and restoration of riparian forest of Lake Kerkini. Since the functioning of the new dam of the lake in 1982, the extended reed beds (important breeding and feeding sites for many fauna species) are disappeared due to flooding caused by the raising of the lake water level. Additionally, due to the reduction of available grazing areas the pressure of livestock is increased in these areas and thereby the revival and expansion of reed beds and riparian forest in other parts of the wetland is eliminated. Today, the riparian forest reaches 244 acres instead of 6,700 acres that was in early 1980. To address this major problem, Lake Kerkini Management Authority decided to implement two major management projects which are implemented currently and is expected to be completed by the end of 2015. The first project is the "Rehabilitation of riparian forest-reed beds", budget 498,000.00 Euros, which is part of the act "Actions for the protection and promotion of Lake Kerkini National Park". This act is included in the Operational Program "Macedonia - Thrace 2007-2013" under the code MIS 390207. This is a pilot project for the restoration of the riparian forest by creating artificial islands for the development of protected vegetation and nesting priority species, according to Directive 92/43. In particular, it is expected on the islands, priority habitats for the National Park to be grown, such as reeds (code 72A0), *Salix alba* and *Populus alba* (code 92A0), while it is expected to be used as nesting sites for various species of birds, especially the Dalmatian pelican (*Pelecanus crispus*) who the last years nests in the artificial platforms built by the Management Authority on preexisting artificial islands.

The second project is complementary to the first and part of the program «Wetland Management and Dalmatian Pelican Conservation in the Mediterranean Basin (Albania, Greece, Montenegro) (2014-2016)" budget 711,485.00 Euros. The program aims at the conservation of pelicans and their habitats. The pilot nature of the program aims at assessing the current situation in each area and the implementation of local action plans. The three areas of interest are three notable wetlands of the Ramsar Convention:

- Lake Kerkini National Park in Greece (pilot area)
- Skadar Lake National Park in Montenegro

- Divjake-Karavasta National Park in Albania

In particular, the Management Authority undertakes to implement a series of actions such as the construction of wooden fences to replenish the reed and the monitoring of Dalmatian pelicans at Lake Kerkini National Park.

Project partners:

- Noé Conservation
- La Tour du Valat
- EuroNatur
- Lake Kerkini Management Authority
- National Park of Skadar Lake
- Center for Protection and Research of Birds of Montenegro
- Natural History Museum of Montenegro
- Association for Protection of Aquatic Wildlife in Albania
- Institute of Nature Conservation in Albania
- Protection and Preservation of Natural Environment in Albania
- Karavasta National Park (KNP)

The completion of the above actions is expected to have positive effects on priority habitats and the populations of Dalmatian pelicans and other species nest in reeds or trees (herons, pygmy cormorants, etc.) and for certain species of wading birds.

Status of the Mediterranean Monk Seal (*Monachus monachus*) in the National Marine Park of Zakynthos

Dendrinos, P.¹ and Karamanlidis, A. A.¹

¹MOM/Hellenic Society for the Study and Protection of the Monk Seal, info@mom.gr

In autumn 2015 field research conducted in order to collect data on the status of Mediterranean monk seal (*Monachus monachus*) within the boundaries of the National Marine Park of Zakynthos. This research was conducted by MOM's field research team within the framework of the Scientific Monitoring of the Marine Fauna of the area coordinated by the Aristotle's University of Thessaloniki for the Management Body of the National Marine Park of Zakynthos.

The total coastline within the borders of the National Marine Park of Zakynthos was thoroughly investigated in order to:

- Record and evaluate all existing marine caves suitable for breeding and/or resting use by the monk seals (monk seal shelters).
- Record monk seal presence directly (through direct observations) or indirectly (through the presence of hollow depressions, scats, smell etc on the internal beach of the suitable marine caves). The investigation was performed with the use of a small speed boat and every possible suitable marine cave was thoroughly investigated by snorkeling. It should be noted that especially for Strophades islets an ultra-light aircraft was used in order to check the coastline for the possible existence of marine caves. In order to overall evaluate the current status of the species, the researchers took also under

consideration, all available data collected through MOM's Rescue and Information Network (RINT) for the monk seal for this area.

Three (3) suitable marine caves (monk seal shelters) were recorded within the borders of the protected area, of which one (1) suitable for breeding. On the beach of this suitable for breeding marine cave, a fresh track (hollow depression) was found, verifying recent use by a monk seal individual. In addition a monk seal was observed and photographed swimming (most possible in search for food) in the shallow waters of Vassilikos area. Furthermore 54 monk seal observations collected through MOM's RINT were evaluated.

Taking under consideration all the above data recorded, the study concluded that: The presence of the species is permanent within the area of the National Marine Park, mostly due to monk seal individuals wandering for food. There is no breeding activity within the borders of the Marine Park due to very limited availability of suitable habitat, in combination to high levels of human disturbance, due to tourist activities taking place until mid autumn. It is suggested that the Management Body should:

- Organize a Local Information Network for the species keeping detailed records of all monk seal observations
- Organize a simple monitoring scheme of the monk seal shelters through direct observations and through the use of the installation of infrared cameras.

The authors would like to thank the President and the Staff of the National Marine Park of Zakynthos and especially Park's coordinator Mr Laurent Sourbes for his assistance during field work.

Implemented actions of subproject - 1 (2011-2015) "Conservation of biodiversity of the area Karla-Mavrouni-Kefalovriso-Velestino" under the operational EU Programme "Environment - Sustainable Development 2007-2013".

Chamoglou, M.¹, Sidiropoulos, P.¹, Michalakakis, D.¹, Vergos, I.¹, Chatzigoulas, A.¹, Delivasi, G.¹, Maredis, A.¹ and Kagalou, I.¹

¹ Management Body of Ecodevelopment Area of Karla – Mavrovouni – Kefalovriso-Velestino, info@fdkarlas.gr, mchamoglou@gmail.com

The Management Body of Ecodevelopment Ka.Ma.Ke.Ve was founded in 2002 under the 3044 Environment legislation Act (Government Gazette 197A / 08.27.2002). It is a private legal entity and a non-profit organization supervised by the Ministry of Environment & Energy, and in particular the Department of Biodiversity and Protected Areas.

The function of the Management Body is supported by an Administrative Council of 11 members and a Scientific Committee comprised of 7 members. The staff of the Management Body consists of 10 employees of various expertise which are responsible for implementing the actions referred to in the project.

In the framework of the subproject 1 "Programme for the Protection and Conservation of Biodiversity of the Regional Eco-development Karla, Mavrovouni, Kefalovrysos Velestino, four activities are presented implemented by self-supervision of the Management Body staff Ka.Ma.Ke.Ve. It summarizes the results

of actions from 2011 to 2015 which and are related to monitoring, surveillance and raising public awareness, aiming to avoid environmental degradation of the protected area and acquisition of knowledge on the conservation status of bird species, fish fauna and habitat types. Upon completion of the Management Body's actions, all necessary data was collected required for the completion of the third six-year report of the country in accordance with the Directive 92/43 / EEC.

However, urgent priority for the Management Body is the issue of Presidential Decree on the designation of protection zones within the Protected Area of Ka.Ma.Ke.Ve. and the framework of responsibilities of the Management Body.

Thus, through the actions developed in the years 2011-2015, the Management Body of Karla Mavrovouni, Kefalovrysos, Velestino managed to implement 92% of the objectives and absorb 76.19% of the financial objectives of subproject 1 implemented by self-supervision.

This work has been co-financed by the European Union (ERDF: European Regional Development Fund-ERDF) and Greek national funds through the Operational Program "Environment and Sustainable Development" 2007-2013 - Priority Axis "Protecting Nature and Biodiversity".

The Kalamos and Kastos islands sustainable development project: A private conservation initiative in the heart of the inner Ionian Marine protected area, Greece

Karfakis, T.¹

¹ Terra Sylvestris nongovernmental organization and Kalamos island biological field station, theokarfak@gmail.com

Throughout the world private conservation initiatives have increased significantly over the past 20 years and include areas on both water and land. The objective of this paper is to describe a private conservation project in Southern Greece and more specifically on and around the Ionian Islands of Kalamos and Kastos.

Kalamos and Kastos are two islands situated in the central part of the inner Ionian archipelago marine protected area. The terrestrial habitats on land in the islands of the area have been characterized as important for the birds of Greece and have ideal conditions for conducting large scale ecosystem restoration due to the relatively small human population and socioeconomic conditions related to this.

The marine reserve surrounding the islands is a NATURA 2000 site and is protected officially by several national and international treaties. It is the second largest marine protected area in Greece The area includes fish spawning grounds of national and international importance for species like the eastern Mediterranean sardine (*Sardina pilchardus*).It also hosts a complete marine mega fauna with species such as the critically endangered monk seal (*Monachus monachus*) Several important marine habitats including *Posidonia oceanica* sea grass communities are also found here.

The Kalamos and Kastos sustainable development project is a private conservation project run by the non-governmental non-profit organization Terra Sylvestris. It is based on Kalamos Island.

The goal of the project is to create the conditions and implement sustainable development through rewilding of the islands and the adjacent area of the marine protected area.

Means to achieve this goal include scientific studies, biodiversity monitoring programs and direct actions in the following thematic areas: halting the loss of biodiversity in Kalamos and Kastos islands and their satellite islands and their surrounding waters, protection and restoration of habitats and species on sea and land, empowerment of local societies, legal actions for better protection of the environment, increasing awareness about the unique environment of the region and finally creation and implementation of a sustainable model of daily living for inhabitants of the islands via experimentation. The expected end result of the project is the creation and implementation of a sustainable development model in the area that respects the rights and wishes of local communities that is focused around the conservation of biological diversity and sustainable living that will stimulate the growth of the local economy and improve the standard of living while protecting and restoring biological diversity. For this purpose a biological field station and eco-community operates on Kalamos island by Terra Sylvestris where participants to the project from all over the world stay and work on the project.

Assessment of ecological quality of the Mygdonia's basin's streams (September 2013)

Perivolioti, T.¹, Ntislidou, C.¹, Patsia, A.^{1,2}, Chronis, I.¹, Lazaridou, M.¹ and Vouvalidis, K.³

¹ Department of Zoology, Faculty of Biology, Aristotle University of Thessaloniki, perivotg@bio.auth.gr, chntisli@bio.auth.gr, ichronis@auth.gr, mlazarid@bio.auth.gr

² Lakes Koronia-Volvi Management Authority, a_patsia@hotmail.com

³ Department of Physical and Environmental Geography, Faculty of Geology, Aristotle University of Thessaloniki, vouval@geo.auth.gr

The purpose of this study was to investigate the ecological quality of 9 stations from 7 streams, located in Mygdonia basin (September 2013). Benthic macroinvertebrates were collected with the 3 minutes kick-sweep method (plus one minute when vegetation was present). Furthermore, physicochemical parameters were measured: dissolved oxygen (D.O., mg/l), pH, conductivity ($\mu\text{S}/\text{cm}$), temperature ($^{\circ}\text{C}$), PO_4^{3-} , NO_3^- , Cl^- , SO_4^{2-} and Ca^{2+} concentrations (ppm); the substrate composition was determined. The benthic macroinvertebrates were identified at the lowest possible taxon level. For the ecological quality assessment, the Hellenic Evaluation System (HESY) and the polymetric index STAR ICMi were applied. All stations belonged to the types RM-1 and RM-2 (Intercalibration Exercise). Totally, 22.074 benthic macroinvertebrates have been identified and classified in 55 taxa. According to HESY and STAR ICMi, the ecological quality was good for one station and lower than good for seven stations. In Melissourgos-Mylos station the ecological quality was estimated as moderate based on HESY, while with STAR ICMi as good. The non-hierarchical FUZZY statistical analysis divided stations into six groups. The stations Sxolari-Ananti, Arethousa, Apollonia-Symvoli belonged to the same group. Each of the rest of the stations created a separate group, excluding Mikrokomi which did not belong to any of the groups. The BIO-ENV analysis showed as important variables conductivity, D.O. and pebbles ($p = 0,350$). The station Gerakarou-Ananti was differentiated from the other stations (LINKTREE, $B = 90\%$) due to high concentrations of NO_3^- (ppm). Finally, the Redundancy analysis (RDA) showed that none of the studied environmental variables was statistically significant ($p < 0.05$ according to Monte-Carlo test). On the first axis pH was the most significant variable, while on the second axis Cl^- .

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The breeding population of the White stork in the National Park of Nestos Delta – Vistonida and Ismarida Lakes

Michailidou, A.¹, Stets, E.², Terzis, V.¹, Charalambous, E.³, Berberidis, T.¹, Chatziefraimidou, G.¹, Katsouli, K.¹, Zlatini, P.¹, Maggos, K.¹, Katsoulis, V.¹, Patetsini, E.¹, Chartzoulaki, E.¹ and Panagiotopoulou, M.⁴

¹ Management Body of Delta Nestos-Lakes Vistonida-Ismarida, 67063 Porto Lagos, email: sasam@fd-nestosvistonis.gr

² Hellenic Storks Group "CICONIA", Asklipiou 104, 11471 Athens, email: evastets@gmail.com

³ GEOMAR, Dürstenbrooker Weg 20, 24105 Kiel Germany, email: evachara@gmail.com

⁴ Frangini str., 9, Thessaloniki, 54624, email: buru97@gmail.com

The area of East Macedonia and Thrace holds the majority (77%) of White stork breeding pairs in Greece and thus it is very important for the conservation of the species in the country. Between 2012-2014, we monitored on average $290 \pm 22,72$ nests annually, in the National Park of Nestos Delta, Vistonida and Ismarida Lakes, covering an expanse of 1.510 km^2 . Earlier studies in the area are available for the period 1970-1991 and were used for assessing changes in demography and distribution of the population. Mean number of occupied nests (HPa) is $221 \pm 30,64$ and the mean number of nests with fledged young (HPm) is $198,33 \pm 22,81$. Compared to the first study period, average breeding success (JZa) has increased from $1,54 \pm 0,51$ to $2,78 \pm 0,36$ FY/pair and average brood size (JZm) from $2,25 \pm 0,49$ to $3,09 \pm 0,44$ FY/nest. Currently average nest density is 11,52 breeding pairs/ 100 km^2 and the highest breeding density reached 45 pairs/ 100 km^2 locally in two areas of Xanthi prefecture. There are 5 villages which hold the largest concentrations (8-20 active nests), but the number of nests in these villages is reduced by 27-67% since 1970, with the exception of Genissea that still maintains a stable population of 20 active pairs. The most pronounced reduction of active nests is in the Chrysoupoli province, ranging from -25,7 to -89,6% locally. This dramatic decline is caused by agricultural intensification. Since 1970 there is a marked drop of nests located on buildings (50,5% in 1970, 3,8% at present) and on trees (25,8% to 0,38% respectively), with most nests (54,7%) currently located on electric poles with platforms.

Monitoring of physicochemical and microbial parameters at the outputs of sewage treatment plants in Mygdonia area

Tsakoumis, E.¹, Patsia, A.², Vafeiadou, A.², Karta, E.² and Bobori, D.C.^{1,2}

¹ Laboratory of Ichthyology, School of Biology, Aristotle University of Thessaloniki, bobori@bio.auth.gr

² Lakes Koronia-Volvi Management Authority, a_patsia@hotmail.com, foreaskv@otenet.gr

During the monitoring program of the surface water's quality in the protected area of the Management Authority of Lakes Koroneia-Volvi, samples were taken at the outputs of the wastewater treatment plants (WWTP), located within the concerned area, during summer of 2012. More specifically, seven samplings were realized on a weekly basis, from the WWTPs of Lagadas, Liti, Xyloupoli, Madytos and Apollonian Thermal Baths, during July-August 2012. In each sampling, physical [(temperature (T), turbidity (TURB))] and chemical [pH, conductivity (COND), dissolved oxygen (DO), biochemical oxygen demand (BOD₅) and total suspended solids (TSS)] parameters were recorded. Microbial parameters (total

coliforms and *Escherichia coli*) were also analyzed in five out of the seven samplings. Generally, the mean values of the physical and chemical parameters recorded were exceeded the acceptable limits proposed for the protected area (FEK 1079/B/15-7-2010). Moreover, the mean values of the microbial parameters were extremely higher, compared to the above mentioned limits. Additionally, during August, benthic macroinvertebrates were also used for assessing the ecological quality of water at the sampling station downstream of the output of Lagada's WWTP, in the Bogdanas stream. According to the Hellenic Evaluation System (HESY) used, the water quality was evaluated as «bad», and it was in agreement to the results of physico-chemical and microbial parameters. In conclusion, it is necessary the monitoring program of the WWTP's outputs to be continued in order to additional measures to be proposed and applied for improving the WWTP's function. Thus, the pollution loads of the surface waters in Mygdonia basin will be prevented.

The contribution of the Management Body in the Protection and Promotion of Evros Delta National Park

Ioannidis, P.¹, Makrigianni, E.¹, Elias, V.¹ and Athanasiadis, A.¹

¹ Evros Delta Management Body, info@evros-delta.gr

Evros Delta is located at the North-East end of the Aegean Sea, at the estuaries of the Evros river, at the borders with Turkey. It is among the most important wetlands for wintering waterfowl in the Mediterranean and it is also very important for the migration of many species. The favorable, compared to birds migration routes, location of the Delta, the variety of habitats and the relatively mild climate of the region contributed to this high biodiversity present today. It is included in the Natura 2000 Network, protected by the Ramsar Convention and designated as IBA, while part of the wetland is a Wildlife Refuge.

The Evros Delta Management Body is responsible for the Management of the Protected Area. The main purposes of the operation of the Evros Delta Management Body is the protection, management and promotion of the wetland, which are achieved through the actions that it implements. Over the last decade, the Management Body (M.B.) has implemented many actions and projects and the core funding for their implementation came from the Operational Programs "Environment" and "Environment and Sustainable Development" although there were also other sources of funding. The main actions/projects implemented in the period 2005 - 2015 were:

- Operation of the Evros Delta Visitor Center - Ecotouristic actions: The M.B. promotes the values of the wetland, provides information and guided tours for the visitors. Over the last decade, the Visitor Center was visited by more than 65,000 visitors from 46 countries.
- Birds and Water Quality Monitoring Program: The M.B. is implementing Birds Monitoring Program since 2006. The data that have emerged demonstrate that the Delta is the most important wintering place for waterfowl nationwide. Additionally, through the ringing program, 10,500 birds were ringed by the staff of the M.B.

- Patrolling – Guarding: Till today in over 1,000 patrols that were carried out by the guards of the M.B., 222 cases of illegal actions have been testified
- Educational Activities and Programs: For school children in the wider region of Evros Delta, annual Environmental Education Programs have been implemented together with 7 events every year (World Wetlands, Day, Eurobirdwatch, etc.). At the same time, daily Environmental Education programs have been carried out for the visiting schools
- Participation in International Projects: The M.B. has participated in several international programs, including two Life Projects for the Protection of Lesser White fronted Goose and a Project for the Study of Avian Influenza
- Promotion activities of the area: Participation at fairs of ecotourist interest in Greece and abroad is one of the most important activities of the M.B. Furthermore the operation of a new upgraded website and briefing through the Social Networking media firmly contribute to the extroversion of the Management Body
- Actions financed by the Green Fund: Through the funding from the Green Fund, 26 projects and actions were implemented between 2011-2014. The use of those funds came to close the gaps of the Operational Program "Environment and Sustainable Development" in no financing periods.

Marine mammal visual and acoustic surveys in southern Zakynthos, Ionian Sea

Trygonis, V.¹, Diogou, N.^{1,2}, Andreadis, O.¹, Kapota, S.¹, Dimitriadis, C.³, Koutsoubas, D.^{1,3} and Katsanevakis, S.¹

¹ Department of Marine Sciences, University of the Aegean, vtrygonis@marine.aegean.gr

² Oregon State University, CIMRS Bioacoustics Lab

³ National Marine Park of Zakynthos

In the framework of monitoring activities for the implementation of the Habitats Directive (92/47/EEC), visual and acoustic surveys of marine mammals were conducted in the Laganas Gulf (Natura 2000 site code: GR2210002) in the southern part of Zakynthos and the surrounding waters out to 10–15 km offshore, as well as Strofades islands (GR2210003).

Under research permit granted by the National Marine Park of Zakynthos, line transect visual and acoustic surveys were conducted during daylight hours and in sea state ≤ 3 Bf, using a 5 m inflatable boat equipped with a 90 HP engine. The surveys took place between 18–25 July and 28–30 September, 2015. The vertical distance between the parallel transects was 2 km, with a mean transect length of 11.2 km (orientation: $308^\circ/128^\circ$ relative to North). While cruising along each transect at a speed of 6–9 knots, visual observations were carried out by two experienced observers who maintained continuous visual effort by scanning the sea in a 90° arc centred to the vessel's bow. Upon sighting marine mammals, the observer estimated their bearing and distance relative to the boat using an angle board and range-finding stick, and commented on the initial (undisturbed) behavioural status and travel direction of the group. The boat's speed, heading, and GPS position was also logged. The research team would then carefully approach the sighted mammals to acquire photographs and record detailed information regarding species, number of animals, and behaviour. During these proximity observations, visual survey effort was considered as "off". Throughout the surveys, 5 minute-long passive acoustic samples were

acquired every 30 min (boat in drift mode), using an SQ26-08 hydrophone and a Yamaha C24 recorder unit (96 kHz, 24 bit). Whenever identified, the presence of known pressures/threats to marine mammals was also noted (e.g. plastic litter, fishing gear, oil spills) and the information was logged into appropriate protocols.

A total distance of 157.5 km was travelled along line transects in the region of Laganas gulf (sampling effort "on"), while a single research visit was conducted in Strofades islands under a haphazard survey scheme. No marine mammals were sighted in Strofades islands. In the Laganas region, 10 marine mammal sightings were made with sampling effort "on", corresponding to 7 groups of striped dolphins (*Stenella coeruleoalba*, group size: 1–20, 55 animals total) and 3 distant (1 km) observations of individual dolphins for which species identification was not possible. Additionally, two groups of common dolphins (*Delphinus delphis*) were opportunistically sighted (group size: 3–7, 10 animals total) inside the gulf of Laganas. Geographically, sightings were distributed across the entire span of the sampling area (from west of cape Keri to the waters east of cape Gerakas), although 9 out of the 12 total sightings were recorded in waters deeper than 200 m and well-outside the designated Natura 2000 borders. The presence of calves was confirmed in 4 out of 7 groups of *S. coeruleoalba* sighted, and in one group of *D. delphis*. Regardless species, the sighting rate index was 6.3 dolphins per 100 km effort, while the visual relative abundance index was 36.8 dolphins per 100 km (for *S. coeruleoalba* solely, the corresponding indices were 4.4 and 34.9, respectively). The striped dolphin was the most common species encountered. The main pressures/threats identified were plastic litter (mainly around cape Gerakas) and increased underwater noise levels within the west part of Laganas gulf due to recreational traffic during the summer season.

Striped and common dolphin populations were documented in the wider marine area around Laganas Gulf, but additional research effort is needed to assess the spatiotemporal distribution patterns of these species and the viability of their populations.

Lessons learned from the application of the Open Standards for the Practice of Conservation in Axios Loudias Aliakmonas National Park: the example of garbage strategy

Vareltzidou, S.¹, Giamouzis, V.¹, Pantazopoulos, C.¹ and Alvanou, L.¹

¹Axios Delta Management Authority, 57300 Chalastra, Thessaloniki info@axiosdelta.gr

Axios Loudias Aliakmonas National Park includes the lower reaches and estuaries of four main rivers (Gallikos, Axios, Loudias and Aliakmonas Rivers), the Kalohori lagoon and the Alyki Kitros salt marshes, which contain the associated habitats and species protected under the Habitats and Birds Directives. Thus, these areas are part of the European Natura 2000 Network as Special Protection Area (GR1220010) and two Special Areas for Conservation (GR1220002 and GR1250004).

Due to its proximity to the city of Thessaloniki and its industrial zone, the protected area receives uncontrolled waste and garbage, and this is one of the main threats it faces. The accumulation of waste and garbage at various spots of the protected area influences very negatively the perception and appreciation of the area. In this framework, the Axios Delta Management Authority (ADMA) prioritized highly the implementation of the "Garbage Strategy" for the management of the garbage and waste

problem using the CMP Open Standards for the Practice of Conservation (OS) (www.conservationmeasures.org).

This adaptive management methodology is world widely used in protected areas management as a systematic process of planning, implementing and monitoring which can be adaptive on the basis of the results achieved or not achieved. This way the protected area management actions can be much more focused and effective. The ADMA decided to apply the OS in order to improve the effectiveness of the management actions for the area under its mandate a national park and three Natura 2000 sites. Using the OS helped the ADMA to: define the scope and increase it to include all the area of the three Natura 2000 sites, set clear targets and rank the threats.

Furthermore, for the "Garbage Strategy", OS facilitated a participatory approach in a round table planning meeting (June 2011) with the Region of Central Macedonia, the Municipality of Delta and ADMA. Working together with other stakeholders led to more applicable activities with greater acceptance. In addition, OS led to result oriented, focused activities and monitoring of results.

Focus Activities:

- Organization of workshops with local authorities
- Record of all solid waste and garbage disposal spots in the protected area
- Plan and implementation of a pilot clean-up program in the A' Zone of the National Park. Budget: 120.000 €
- Yearly cleanup campaigns (16 volunteer cleanups in 2011-2015)
- Written complaints to the qualified public services in case of construction waste disposals
- Promotion of recycling through the environmental education programs
- Consultations in the framework of Environmental Impact Assessment approvals for Uncontrolled Garbage Dumping Sites restoration projects within the protected area

Results:

- ✓ Reduction of waste in the protected area
- ✓ Removal of 3.840 m³ of solid waste in four selected spots in the A' Zone of the National Park
- ✓ Restoration of all Uncontrolled Dumping Sites in the National Park
- ✓ 2.800 volunteers participated in Volunteer Cleanups Campaign in 2011-2015
- ✓ Improvement of the image of the Axios Delta National Park

In conclusion, the lessons learned from the application of the above adaptive management methodology are summarized as follows. Integrated protected area management is a complicated task. The participation of stakeholders at an early stage of planning leads to more applicable actions and achievable results. The Open Standards (OS) provide a toolbox to help practitioners improve their efforts. The software Miradi provides a tool that allows for changes and flexibility in the planning and managing process undertaken in a very dynamic and changing world. The common terminology allows feedback and cooperation with other protected areas in Europe.

Integrated management actions for the conservation of wetland biodiversity threatened by residential development planning within a Natura 2000 site

Alvanou, L.¹, Vareltzidou, S.¹, Katrana, E.¹ and Pantazopoulos, C.¹

¹*Axios Delta Management Authority, 57300 Chalastra, Thessaloniki info@axiosdelta.gr*

One of the Axios Delta Management Authority overarching goals is safeguarding the conservation status and ecological integrity of the protected area and ensuring the conduction of the appropriate environmental assessment and subsequent authorization according to the requirements of Art. 6(3) of the 92/43/EEC Directive.

The National Park is an area significantly altered by man, still holding great biodiversity. It faces many threats and challenges, especially because of its proximity to the city of Thessaloniki, situated just 10 km from the Park. In order to succeed in managing the area effectively, the Authority of the National Park needs to adopt an integrated approach, in addition to adaptive management tools such as the CMP Open Standards that lead to the compilation of its *Strategic Plan of the Management Authority*. According to this, the selected conservation targets implying the whole biodiversity of Alyki Kitrous are *coastal wetland habitat types* (such as 1150*, 1310, 1410, 1420) and *sand dune habitat types* (2110, 2120, 2220, 2195) that support populations of nesting birds and various reptiles.

One of the recorded direct threats affecting the above targets is the summer housing development planning along the coast of Korinos. The Management Authority while addressing this issue initiated certain management actions including informing the competent authorities on the ecological value of the wetland area, reporting to the EC Directorate-General Environment to provide relevant information, monitoring of avifauna species and habitats and raising public awareness and sensitization of local communities. Among the obtained results were the halt of the construction works, the realization by the authorities that the issue was not one of minor importance, the EC intervention reminding the national obligation for compliance with legal provisions and the launch of a consistent Monitoring Program of birds and their habitats producing a valuable data base of the biodiversity of the area and its conservation status. These data will serve as a baseline for further management actions in the area and will offer all the necessary scientific evidence for the restoration works that will be proposed.

It should be added here that the shift in environmental consciousness of local communities, although being the "Holy Grail" of conservation management, is a daring venture requiring time and the consistent, targeted efforts and actions of the Management Authority towards the information and sensitization of all users involved.

Priority Habitats of the Directive 92/43/EEC in the area of the National Marine Park of Zakynthos

Valli, A. T.¹, Kalli, E.¹, Delipetrou, P.² and Georghiou, K.²

¹ Management Agency of National Marine Park of Zakynthos, Venizelou 1, Zakynthos 29100,

² Department of Botany, Faculty of Biology, National and Kapodistrian University of Athens, Panepistimiopolis, Athens 15784,
info@nmp-zak.org, pindel@biol.uoa.gr, kgeroghi@biol.uoa.gr

Within the framework of the project "Scientific monitoring of terrestrial habitats and flora in the National Marine Park of Zakynthos (N.M.P.Z.)" 30 habitats were recorded and mapped at the Natura 2000 (Nk2) sites GR2210002 and GR2210003 which fall within the limits of the National Marine Park of Zakynthos (N.M.P.Z.). Among these habitats 6 (codes 2250, 2270, 3170, 6220, 7210, and 9560) are classified as high priority ones according to the Habitats Directive 92/43/EEC (Annex I). The main objective of this study was to assess the conservation degree of these habitats at local level and to provide the information for the assessment of conservation status at national level.

Fieldwork took place from February till October of 2015. The conservation degree of the habitats was first assessed per sampling plot and then, based on national standards, the conservation degree was calculated at grid level (10x10 km and 1x1, 2x2 or 5x5 km), N2k level, and eventually at N.M.P.Z. level. The parameters used for the assessment were area covered by the habitat, structures and functions (including typical species), and future perspectives (based on pressures and threats). The conservation degree of the habitat types was assessed as: A (excellent), B (good), C (medium or bad), X (unknown).

Coastal dunes with *Juniperus* spp. (habitat type 2250) had been mapped in the past at Vasilikos area but no representative stands were identified during the field survey probably due to tourism infrastructure expansion. The conservation degree of wooded dunes with *Pinus* spp. (habitat type 2270), which occurred in Laganas and Vasilikos coastal area and has originated from plantings, was assessed as B at N2k level. Mediterranean temporary ponds (habitat type 3170) was present in Strofades islands and was recorded for first time in Kalamaki area. Its conservation degree was assessed as B at N2k level. Xerophytic thermo-Mediterranean grasslands (habitat type 6220) developed at burned or otherwise disturbed areas of Skopos Mountain and Dafni. The unique stands of calcareous fens with *Cladium mariscus* (habitat type 7210) occurred at the wetland of Limni Keriou area its conservation degree at N2k level was assessed as B. Forests with *Juniperus phoenicea* (habitat type 9560) represent the optimum stage of *Juiperus phoenicea* scrub (habitat type 5210) and developed only at the islets Stamfani (Strofades) and Pelouzo. Its conservation degree was assessed as A at N2k level.

The main pressures on the habitats were: cultivation, grazing, human intrusions and disturbances, discontinuous urbanization, fire, trampling, and plantations of alien species.

Our study clearly highlights the need for continual monitoring of the priority habitat types which should be in line with the established sampling network and methodology so as to enable their proper long term management and conservation.

Climate Variability and Change (CV & MC) impacts on beaches: A new methodological approach focusing on a loggerhead sea turtle nesting beach (Gerakas, National Marine Park of Zakynthos)

Velegrakis, A. F.¹, Trygonis, V.¹, Monioudi, I.¹, Vousdoukas, M. I.^{1,2}, Ghionis, G.³, Karambas, T.⁴, Andreadis, O.¹, Psarros, F.¹, Hasiotis, T.¹, Poulos, S.³, Chatzipavlis, A.¹ and Karditsa, A.³

¹ Department of Marine Sciences, University of the Aegean, University Hill 81100, Greece; e-mail: beachtour@aegean.gr (V.A.F.)

² Institute of Environment and Sustainability, Joint European Research Center, Via Enrico Fermi 274 9I-21027-Ispra, Italy

³ Faculty of Geology and Geoenvironment, University of Athens, Panepistimioupolis Zografou 15784, Greece

⁴ Department of Civil Engineering, Aristotle University of Thessaloniki, University Campus 54124, Thessaloniki, Greece

Beaches are valuable ecosystems, form the first line of defense against marine erosion/inundation for the back-barrier environments and the valuable infrastructure/assets they front and are critical economic resources being the focus of the 3S (Sea-Sun-Sand) tourist industry. Beaches are also sensitive ecosystems, projected to bear the brunt of the adverse impacts of CV & C, particularly of the sea level rise (SLR). In order to get a first estimation of the Greek beach erosion risk, a database containing the geospatial characteristics (beach length, area, maximum width, sediment etc) of all Greek beaches was collated; 7384 beaches were recorded (3950 island beaches), with a total area of 52 km². Greek beaches were found to be narrow, with 67 % having maximum widths < 25 m and 24 % between 25 and 50 m. Predictions on the basis of ensembles of (1-d) analytical and numerical models run for different wave conditions, beach slopes and sediment sizes (17300 experiments) have shown that SLR will severely impact Greek beaches; 0.5 m SLR will result in retreats of up to 50 % of the maximum width of the 88 % of all Greek beaches.

The SLR impacts on a major loggerhead sea turtle nesting beach (Gerakas) of the NMPZ were investigated in more detail, using detailed bathymetric/topographic data, high frequency hydrodynamic measurements, numerical modelling, as well as a novel optical system that was installed at the beach to monitor its long-term morphodynamics in high spatio-temporal resolution. Gerakas beach, a sandy beach backed by low dunes and cliffs about 0.6 km long, has a spatially variable width (25-30 m), with 'dry' beach elevations of < 3 m. Repeated DGPS topographic/bathymetric surveys showed large spatio-temporal morphological variability, with the NW margin of the beach showing a consistent erosional trend. On the basis of the ensemble modeling (see above), Gerakas will be seriously affected by SLR: SLR of 0.15 m (RCP4.5/RCP8.5, 2040) will result in retreats of up to 6.6 m, whereas a SLR of 0.5 m (RCP4.5, 2100) of up to 16.7 m; these retreats will reduce substantially the carrying capacity of the beach as turtle nesting site. Beach morphodynamic modeling using a state-of-the-art Boussinesq 2-D model also showed that a 0.5 m storm surge will force the beach to retreat by about 16 m.

The optical system was set to record the shoreline position (at 5 Hz) for 10 min each hour with sunlight. Following geo-referencing (by DGPS Ground Control Points (GCPs)), automated detection of the shoreline was achieved using a fast algorithm that employs a localised kernel that progressively grows along the geo-rectified TIMEX digital images (the 'average' RGB images of the 10 min bursts) following the median line of the most inshore maximum backscatter intensity zone. The analysis suggests that, even for the limited time period of the preliminary analysis (23/07 - 08/09/2014), shoreline position can show high spatio-temporal variability, with cross-shore position shifts of up to 10 m. It appears that video monitoring can be a fast and efficient tool for beach morphodynamic studies; moreover, the analysis

showed that with the right set of algorithms the optical system can also be used to monitor beach usage by both turtles and humans; this makes it a useful tool for monitoring conservation areas.

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