

MARINE ALIEN INVASIVE SPECIES STRATEGY FOR THE MEDPAN NETWORK



DRAFT STRATEGY

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A Consultation Document

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I. RATIONALE AND SITUATION

Alien species —sometimes termed exotic, introduced or non-native species— are plants and animals that have been intentionally or unintentionally introduced, established populations and spread into the wild in the new host region (IUCN, 2002). In their home environments, these species live in balance with their local native environment, and populations are controlled by ecosystem interactions such as predation, parasitization and disease. **Alien invasive species (IAS)** are alien species which become established in natural or semi-natural ecosystems or habitat, become an agent of change, increasing in abundance and distribution, and threatening native biological diversity” (IUCN, revised). IAS compete and on some occasions can replace native species, and cause complex changes within the structure and

function of the new hosting ecosystem (Galil, 2007, 2009).

IAS are considered one of the main causes of biodiversity loss in the Mediterranean Sea (Galil, 2007, Coll *et al.*, 2010) potentially modifying all aspects of marine and other aquatic ecosystems. They represent a growing problem due to unprecedented rate of introduction (Zenetos *et al.*, 2010) and the unexpected and harmful impacts that they have on the environment, economy and human health (Galil, 2008).

This is a general phenomenon and extends to all regions of the Mediterranean (Galil, 2007, 2009; Zenetos *et al.* 2010). That is why invasive species are considered as “focal species” and should be monitored in all the regions (Pomeroy *et al.*, 2004).

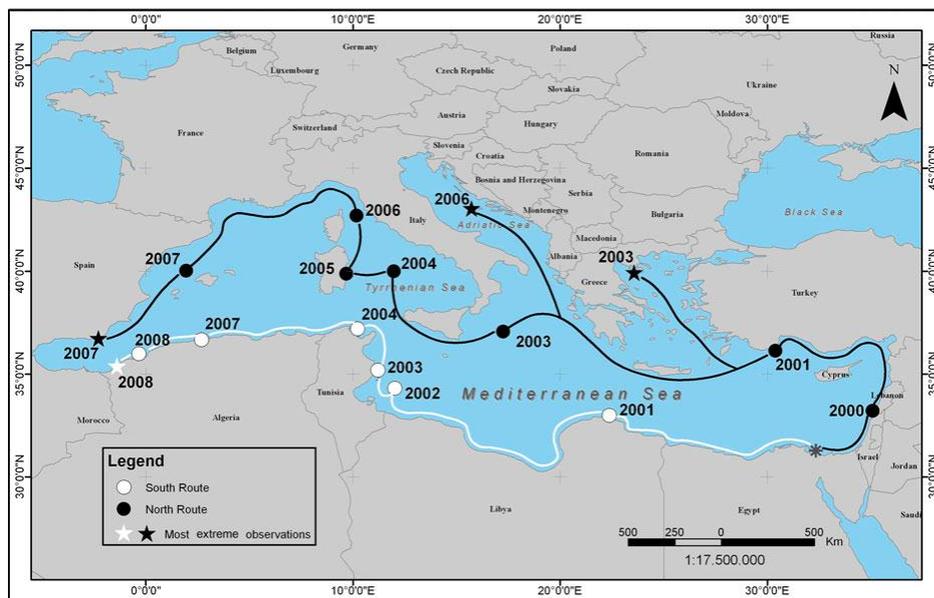


Fig. 1 Example of sightings of the bluespotted cornetfish, *Fistularia commersonii* in the Mediterranean Sea with a reconstruction of the chronology of the invasion (From E. Azzurro *et al.*, 2012).

According to the last regional reviews, 13,5% species are classified as invasive in the Mediterranean with macrophytes the dominant group in the western region and the polychaetes, crustaceans, mollusks and fish in the eastern (Galil, 2009; Zenetos *et al.*, 2010). Some of these alien species are located exclusively in the south-eastern basin; others are restricted to the western, while others have achieved colonization around the entire Mediterranean.

Marine Protected Areas in the Mediterranean don't escape of this general trend and most of them have been affected by the introduction of alien invasive species for a longtime, threatening marine biodiversity. However, very little is known about each species' sources and mechanisms of introduction, as well as about their densities, distributions, temporal patterns or ecological significance for the Mediterranean biodiversity (Abdulla *et al.*, 2008). Many MPAs in the Mediterranean are located in proximity to major ports, have aquaculture farms in or near-by, or are frequently used by small recreational or fishing boats as well as tourists. A high number of introduced species in a given MPA could be an indicator of high propagule pressure, probably due to the development of human activities that facilitate some ways of introduction (e.g. recreational navigation, aquaculture). MPAs across the MedPAN Network face common challenges, among them, the lack of awareness and understanding of the impacts of invasive species, the scarcity of information on best practices for management as well as the insufficient baseline information, guidelines and

trained local staff to identify and gather knowledge on species introductions and impacts. Furthermore, most of MPAs personnel feel that the problem is too large and nothing can be done with the limited funds available, if exist, to develop actions. At a regional level, the problematic species are different between different MPAs and there is still a weak networking, coordination and collaboration on this issue.

Most countries have little IAS information available and limited or non-existing programmes formalized to collect information in MPAs. Furthermore, information is in many cases generated by short-term research funding projects sometimes with restricted access. MPAs management's teams lack or have limited capacity and expertise to identify most non-native marine species and don't know how to combat a specific invasion when occurs. Thus, alien species might be overlooked or pass unnoticed until there are well established into the local ecosystem and eradication prompt to be difficult, costly or impossible.

The invasive algae, Caulerpa taxifolia



Enrique Ballesteros

About the Strategy

This orientation strategy for Marine Alien Invasive Species sets out the broad goals and objectives for the MedPAN network on related issues as well as key actions for each of these goals. It is addressed to actions on all non-native marine species of plants and animals with a primary focus on those species that are potentially invasive. It aims at giving answers to this issue at several scales:

- To MPA network scale, that is a scale particularly relevant due to the often very mobile behaviour of many invasive species.
- To the level of each MPA. However, the actions of different MedPAN members and MPA managers will vary with their needs and capabilities.
- To a general marine scale that create a better understanding and information on the invasive species issue

Furthermore, the strategy intends to build support and coordination with other related regional and local partners to assist MPAs for invasive species management.

It is aligned with the CBD Guiding principles¹ for action to prevent or minimise IAS impacts to biodiversity following the three-stage recommended hierarchy of interventions (prevention; early detection and rapid response; long-term control and containment). Further, it also takes into account the Barcelona Convention, the Marine Strategy Framework Directive (2008/56/EC) and the European Strategy on Alien Invasive Species (2003) that provides the framework for the regional approach for all the governments of Contracting Parties to the Bern Convention and of other European States. At this point, it presents a set of

¹ Guiding Principles for the prevention, introduction and mitigation of impacts of alien species that threaten ecosystems, habitats or species: Annex to CBD Decision VI/23, 2002 (<http://www.cbd.int/decision/cop/?id=7197>)

principles and actions to prevent unwanted introductions and mitigate the impacts of IAS in those States, particularly addressing common trade and policy actions (T-PVS 2003, 7 revised).

The Marine Strategy Framework Directive whose overall objective is to achieve a good environmental status of EU's marine waters by 2020 will further used IAS as one of the key descriptors for the initial marine strategy assessment. The criteria for assessing progress towards good environmental status will be based, among others, on (1) Abundance and state characterisation of non-indigenous species (NIS), in particular invasive species; and (2) Environmental impact of invasive non-indigenous species.

The Action Plan of the Barcelona Convention Contracting parties concerning species introductions and invasive species in the Mediterranean Sea aims to promote the development of coordinated efforts to prevent, controls and monitor the effects of species introduction (adopted by the Contracting Parties in 2003 and edited in 2005). It focused particularly on capacity building, institutional and legislative framework, collective data and monitoring, cooperation among states as well as elaboration of guidelines and technical documents. As such, the present strategy assist the Convention on the actions proposed by this plan (updated version adopted by the Contracting Parties Meeting in Almeria, 2008; UNEP-MAP-RAC/SPA, 2005).

Furthermore, in 2011, the EU biodiversity strategy to 2020 was launched, including one specific target on invasive species: "*by 2020, Invasive Alien Species (IAS) and their pathways are identified and prioritised, priority species are controlled or eradicated, and pathways are managed to prevent the introduction and establishment of new IAS*" and an action aiming at filling policy gaps in combating IAS by developing a dedicated legislative instrument by 2012 will be developed.

Consistent with the above, the perspective of the orientation strategy for the MedPAN towards invasive species, aims to facilitate implementation of international commitments as well as provides a context for local MPAs and the MedPAN network to develop actions on this important threat to the marine ecosystem.

The strategy was developed as part of the action plan of the EU-funded MedPAN North project (2010 – 2013)². This action was coordinated by IUCN Mediterranean Office. A specialist advisory group (AG) was established (see appendix 1) to advise the MedPAN North project partners on the issues of Alien Invasive Species and how to build a common strategy for the Mediterranean MedPAN network. Members of the AG are specialist researchers and practitioners on alien marine species from different areas and countries of the Mediterranean. Once finalized, this strategy will be delivered to the MedPAN association, which after reviewing it with partners, Scientific and Advisory Committee and Board of Directors, will be in charge of organizing its implementation in partnership with several regional organizations. It is intended to guide IAS management decisions and provide a general direction for efforts in MPAs over a long term (more than 5 years) and as a living document, it needs to be revised periodically in response to the variability and different conditions of MPAs.



² www.medpannorth.org

In order to establish a long term for this strategy, these efforts will require support from donors and other partner organizations. The threat of alien invasive species is a continue challenge that requires constant surveillance, adaptable management actions and innovate approaches.

II. KEY TERMINOLOGY AND QUESTIONS

The following terms have been adopted for this strategy, drawing from the CBD and IUCN work on this subject and the comments from the Advisory Group.

Alien species (AS): (non-native, non-indigenous, foreign, exotic) means a species, subspecies, or lower taxon occurring outside of its natural range (past or present) and dispersal potential (i.e. outside the range it occupies naturally or could not occupy without direct or indirect introduction or care by humans) and includes any part, gametes or propagule of such species that might survive and subsequently reproduce.

Alien invasive species (IAS): means “an alien species which becomes established in natural or semi-natural ecosystems or habitat, is an agent of change, is increasing in abundance, is spreading, and threatens native biological diversity”. The most reliable indication that a population of a species may become invasive is that it is already invasive elsewhere.

Containment: Keeping an invasive species within a defined area.

Control: Reducing the population of an invasive species.

Marine Protected Areas (MPAs): A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long term conservation of nature with associated ecosystem services and cultural values.

Native species (indigenous) means a species, subspecies, or lower taxon, occurring within its natural range (past or present) and dispersal potential (i.e. within the range it occupies naturally or could occupy without direct or indirect introduction or care by humans. Native species that become destructive should not be identified as “invasive” species, even if climate change plays a role in their expansion.

Pathway: Any means that allows the entry or spread of a pest

Vector: Any living or non-living carrier that transports living organisms intentionally or unintentionally.

Lophocladia lallemandii by Enrique Ballesteros



III. IMPACTS

The Mediterranean Sea is considered one of the marine regions most severely affected by marine species invasion in the world, nowadays harboring around 900 introduced marine species from which 13.5% have invasive character (Zenetos *et al.*, 2010).

Their introduction is a major threat to ecosystem's biodiversity, structure and function. It may displace native species, reduce community biodiversity, change species composition and abundance among habitats, modify their structure and produce cascading effects or trophic web shifts that could result in large negative impacts in the ecosystem. Nevertheless, their effects on the biodiversity and the Mediterranean habitats cannot be generalized as the effects of alien species can be particularly diverse at different locations or different times, sometimes with a strong invasive impact, sometimes not.

Scientific research has only started to glimpse the extent of some of these impacts in the Mediterranean and for most of these introductions, impacts are completely unknown.

Furthermore, invasions may carry strong socio-economic consequences. The spread of the poisonous pufferfish, *Lagocephalus sceleratus* in Israel, for example, have a large impact on the local fisheries. Their high abundance increase

fishermen's effort for cleaning the fishing gears and the strong toxin of the fish poses health hazards reducing their interest of consumers for other species (Galil, 2007). Similarly, the effects of other species, such as the invasion of cornetfish *Fistularia commersonii*, are believed to reduce the commercial captures of other commercial species in some localities. The spreading of new herbivorous fish species such as *Siganus spp.* may impact on macro-algae forests (*Cystoseira spp.*), the habitat for settlement of numerous coastal species (fish and invertebrates) or create different top-down control by top predators (Francour *et al.*, 2010).

Blooms of jellyfish, like the comb jelly *Mnemiopsis leidyi* or the nomadic jellyfish *Rhopilema nomadia* have adversely effects on beach tourism in some areas, block water intake pipes of ports and other coastal developments as well as clog fishing nets reducing fishing catches.

In Marine Protected Areas, the expansion of invasive macroalgae such as *Caulerpa spp.*, *Lophocladia lallemandii* or *Womersleyella setacea*, might reduce the attractiveness of the marine landscape for scuba divers. Threatened or endangered species in those areas could also be a risk because of the predation, parasitism, and competition of alien invasive species.

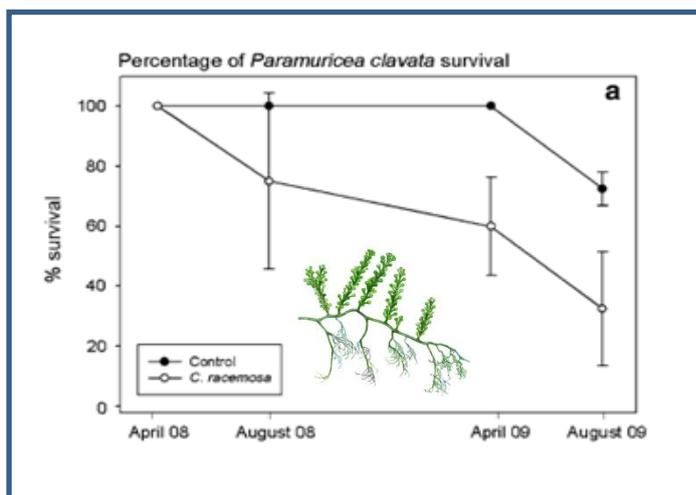


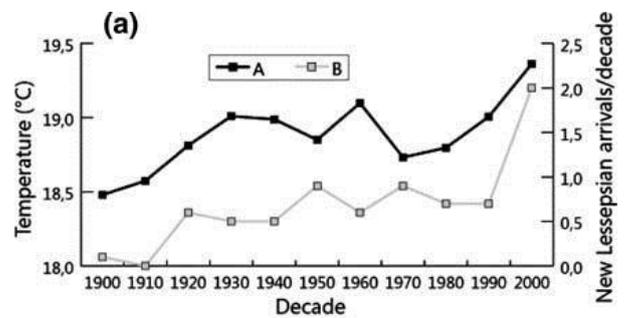
Fig 2. Survival rate of the red gorgonian *Paramuricea clavata* transplants submitted to a *Caulerpa racemosa* overgrowth (empty circle) and control conditions (full circle) in Scandola Regional Park, Corsica (From Cebrian *et al.*, 2012). Drawing: *Caulerpa racemosa*.

IV. CLIMATE CHANGE

The effects of climate change will have significant impacts on the coastal zones, as it will affect the predicted rise in sea levels, sea and air temperature and will also change other hydrological characteristics of the Mediterranean coasts where many MPAs are located. Following different scenarios on greenhouse gases emissions and considering the uncertainties of the present model projections, it is expected that coastal sea temperatures will continue to increase at least 1- 2,5 °C at the end of the 21st century over all the basin. Warmer and drier conditions which already started in the past are also expected to continue in the near future.

Fig 3. Historical invasion dynamic of exotic fish species in the Mediterranean Sea (B) versus observed changes in the Mediterranean Sea water temperature per decade (A).

From Ben Raïs Lasram F. and Mouillot D., 2009.



Temperature anomalies will affect also the Mediterranean oceanographic features, nutrient enrichment of its waters, plankton blooms and consequently, the ecosystem food webs and its biological diversity. Consequently, invasive

populations of alien thermophilic species (warmth-requiring) are or will be likely to be in the process of developing adaptations that could lead to their exponential growth and further spreading in the near future.

V. VECTORS AND PATHWAYS

There are multiple vectors or pathways that can bring invasive species into MPAs. Increasing in maritime traffic, visits of recreational boats and aquaculture farms in or near-by protected areas

are leading to an increase of marine introductions into many MPAs with, in some cases, have rendered to severe ecological impacts on biodiversity.

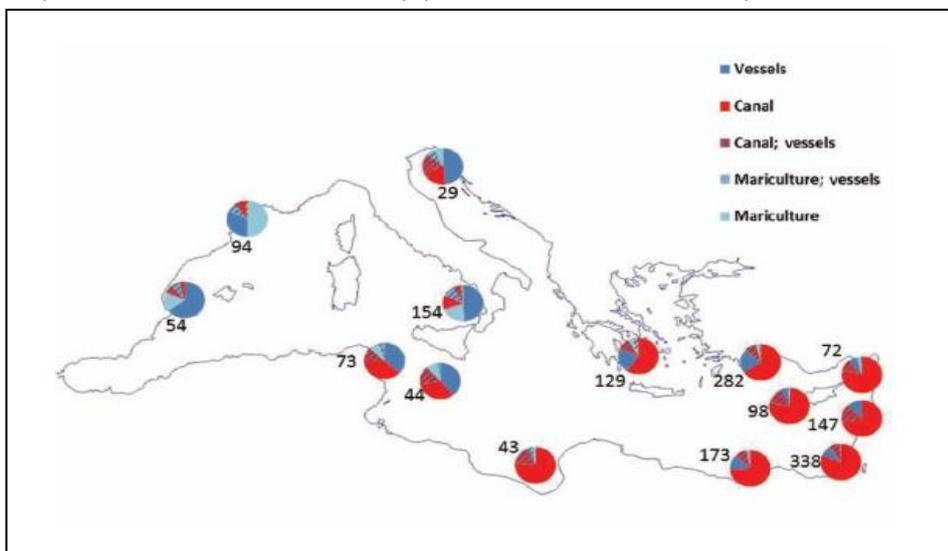


Fig 4. Presume means of introduction of marine alien species in different Mediterranean areas. From Galil, 2012.

Probably the most known vectors of introduction of alien invasive species in MPAs are:

- » Recreational boats
- » Fishing boats
- » Use of live bait
- » Diving
- » Aquaculture or mariculture
- » Anchorage and Ports
- » Commercial boats (inc. ballast waters and sediments)
- » Aquariums



Rophilema nomadica by Bella Galil

The relationship with all the different activities performed within or in close proximity to MPAs which may act as dispersion vectors for potential damaging species, is the central key to the management of present and future introductions of alien species in protected areas.

VI. STRATEGIC AXIS AND OBJECTIVES

The overall aim of the strategy on invasive species is “*To establish a common framework for the MedPAN members to develop action on marine invasive species*”. The following recommended key actions thus lay the groundwork for cooperative activities between

MPAs and their associated partners as well as within local MPAs themselves, to reduce the impacts of IAS and preventing, if possible, further introductions and spreading into these environments.

The specific aims of the strategy are:

1. Prevention

Prevention is the most important part of this strategy and should have the highest priority in management plans, because once a species is introduced, the action is normally very costly, difficult and might endanger other species. Opportunities for preventative measures imply reducing the risk of transport of invasive species into MPAs and coordinating actions with interested key groups to inform what are IAS, how to identify them and the impact of species introductions. Change on aptitudes and behavior are also important steps to improve invasive species management.

The following goals and expanded key actions aim towards addressing this component, informing on practical actions to prevent the introduction of IAS in the MPA environment:

Goal 1: Highlight the risk of invasive entering and establishing into the MPA’s environment

Key action 1.1: Identify the highest and most potentially impacting species that are easy to identify and should be subjected to more attentive monitoring and surveillance (named “The Black List”). The creation of a Black list of IAS species is critical for the MedPAN as well as coastal areas in general as it would help to identify and gather knowledge on the rate of invasive species that occur in MPAs. It is also useful to prioritize work and allocate funding. This list of species should be periodically updated with the assistance of the AG at least every two years or more frequently if necessary.

Key action 1.2.: Promote better access to information about invasive alien species, especially for interested groups such as diving clubs or recreational boats using new social media and new technologies.

Goal 2: Building awareness as well as support to prevent introductions and spreading of invasive among decision makers, relevant stakeholders and the general public through public awareness campaigns

Key action 2.1: Preparation of awareness and educational materials for general public and key selective groups as well as implement communication campaigns to increase their participation and minimize the introduction and spreading of invasive.

Key action 2.2.: Development of IAS Information Portal in the MedPAN Website to further assist MPAs to be informed and share information and resources on invasive and its management.

2. Detection

Early detection of alien invasive species requires focused surveys of the species with largest invasive potential and knowledge of the most vulnerable habitats to detect their presence and abundance. As invasive behavior may vary around the region for the same species, specific actions for individual MPAs should be encouraged. Cooperative monitoring surveys with research or community groups (such as diving clubs for instance) could additionally assist MPAs to detect new and expanding populations of IAS.

The following goals and expanded key actions work towards ensure the development of an effective program that allows the early detection of new IAS and the systematic monitoring of existing species in the MPA’s environment.

Goal 3: Improve information on the status and distribution of marine invasive alien species in the Mediterranean and in MPAs in particular

Key action 3.1.: Develop guidelines for the identification of the highest potentially impacting IAS, their monitoring, evaluation and reporting.

Key action 3.2.: Initiate and instigate continuous monitoring programmes on IAS in the coastal areas of the Med and in MPAs in particular by developing network of scientists³, managers or volunteer groups such as recreational divers. Monitoring can serve to characterize invasion patterns (in time and space), detect new invasions, and evaluate prevention and control programs or project future management needs.

Key action 3.3.: Coordinate with partners a centralised long term database for mapping and reporting invasive that includes distribution maps in MPAs as well as information through other sources on invasive distribution.

Goal 4: Standardize data collection for effective sharing and response actions

Key action 4.1.: Designate a focal point within MedPAN consortium to assist on invasive species information

Key action 4.2.: Consolidate a reporting, verification and 'early warning system' for the identification, evaluation and management of IAS in MPAs.

Key action 4.3.: Promote information on funding opportunities for AIS programmes.

Goal 5: Develop regional partnerships, coordination and cooperation to implement management plans for priority IAS species.

Key action 5.1.: Increase partnerships with other organizations at regional and local level to deliver knowledge as well as practical and cost-effective management actions for priority IAS species.

3. Rapid response

The aim of this action is to establish an effective system for rapid response to new invasions and invasions pathways. To achieve an effective IAS management, it will be essential the development and implementation of working partnerships between MPAs and other stakeholders groups such as private companies, community groups, research institutions, etc). An integrated rapid response at a network level will become an important tool to contain invasive spreading into the MPA's environment.

Goals and key actions are:

Goal 6: Identify potential vectors of introduction for problematic species and develop response action plans to reduce the introduction, establishment and expansion of IAS.

³ MedPAN Monitoring Programme will need to work alongside partners and other organisations to develop this work.

Key action 6.1.: Once the species are identified, develop programmed activities with stakeholders that could address vectors and pathways of introduction.

Goal 7: Identify national and international competent/mandated authorities or institutions that should play a major role on the management of IAS and could contribute to the prevention and controlling.

Key action 7.1.: Identify jurisdictional authorities held by national administrative institutions with regard to invasive species and coordinate and share information data with them as well as instigate Barcelona Convention (RACs) response to assist in the implementation of action plans.

Key action 7.2.: Raise awareness to external bodies of identified vectors of introduction in close proximity to the MPAs and develop actions to handle vectors inside the MPA boundaries.

4. Control/ Mitigation

Once an alien invasive species is permanently established or widely spread, control approaches are the only actions that could be available to limit the further spread of the species and their negative impact into the MPA's environment. Response and management control methods for marine species, however, are not well known and

approaches that are effective in one location might not be effective elsewhere. The coordination with different stakeholder groups and the consultation and advice of experts are essential to identify cost-effective and feasible solutions to some of these invasions.

Goal 8: Improve the decision making process and information flow to control priority IAS

Key action 8.1.: Identify possible management approaches to effectively manage and control priority IAS and implement actions to minimize their impact in the MPA's marine environment⁴.

Key action 8.2.: Identify examples of good management and share the knowledge among the MedPAN partners.

5. Cross-cutting activities

Goal 9: Develop regional partnerships, coordination and cooperation to implement detection, monitoring and rapid response for priority IAS species.

⁴ International and national collaborations on IAS projects could assist MPAs develop these actions.

Key action 9.1.: Develop partnerships with other organizations, and especially universities and other research organizations at regional and local level to deliver knowledge as well as practical and cost-effective management actions for priority IAS species.

Key action 9.2.: Maintain a Regional Advisory Group “with taxonomic and biological expertise” for marine organisms in MPAs to assist in the identification and management of marine invasive.

Goal 10: Develop the capacity of MedPAN members to identify and manage invasive species.

Key action 10.1.: Organize specialized workshops, meetings or summer camps to train MPA personnel to conduct surveys, monitoring as well as adopt management actions to minimize IAS impacts.

VII. FOCUS ON IMPLEMENTATION ASPECTS: MONITORING, REPORTING AND INFORMATION EXCHANGE

Marine monitoring programmes in MPAs are normally undertaken by a variety of institutions, managers and research bodies. There are part of an on-going process in MPA management that should involve several aspects to assess the status and distribution of native communities and species as well as high potentially impacting alien species. For this work, information can be gathered from field surveys with the help of experts and local professionals (academics, partners, etc.), NGOs, scuba clubs, fishermen or other interested groups.

Vigilance and regular monitoring are a critical component of any effective IAS management programme and the action will result in lower cost and resource use than implementing a long term control programme after an alien species is established. To conduct monitoring, a priority list of the highest potentially impacting species (The Black List) will be developed with the assistance of different taxonomic and IAS experts from the Mediterranean following an evaluation ranking exercise. The purpose of the list is to assist identifying the most invasive and damaging

species in the region that are easily identify by non-specialists to target these species for monitoring and management actions. Some of the species can be regarded as the most invaders in the whole region, while others might reflect a large problem in few countries or MPAs. Moreover, the list could serve as the basis for development of invasive species list at National or MPA level if these have not been previously produced.

The revision of the priority species and additions on new species arriving in the region should be conducted every 2-3 years with the assistance of the AG and other expert groups from the Mediterranean region (IUCN Invasive Species Specialist Group, CIESM exotic-species experts, others).

The monitoring and data collection should be based on agreed guidelines as for the information to be collected, the frequency and the best monitoring strategies. Moreover, to reduce cost and share the limit resources within MPAs, it should be built on existing national or local MPA management and monitoring programmes.

VIII. FOCUS ON IMPLEMENTATION ASPECTS: DEVELOPMENT OF AN “INFORMATION PORTAL” FOR INVASIVE SPECIES MANAGEMENT

Each of the previous goals specifies on-going objectives and the long term vision for success in MPAs. The development of an “IAS Information Portal” in the MedPAN Website for invasive species management” will facilitate these goals at the network level and will provide a framework to support the work of MPA managers and others with a variety of tools and resources. Moreover, it should be useful for those MPAs that don’t have yet a surveillance programme to detect IAS as well as for those that are interested in expanding their current monitoring programme.

The portal could also act as a focal point for information about all marine alien species in the network and link with other existing programmes and research projects to assist updating and developing maps and species information in the Mediterranean region.

The possible components of the portal could be:

» A searchable gallery for species information with identification factsheets

The MedPAN North project will provide identification factsheets for the most impacting alien invasive species in the Mediterranean. The species summaries will include information on key identification features, species description, similar species ID, field signs and possible control options with drawings and photographic illustrations. Each factsheet will be produced and revised by the AG and other experts in the region to ensure accuracy and usefulness of the products.

All the images, illustrations and species factsheets available through the portal could be used by the MedPAN managers to develop their own educational and public awareness materials acknowledging the source (Photographic and illustration credit) in the resources produced⁵.



⁵ These materials shouldn't be for commercial use.

» Long-term centralized database on marine alien species

By a collaborative partnership with other institution/s, an online database that records, tracks and map alien species in the Mediterranean, will assist managers to improve the knowledge of IAS and collect the information on the results of their monitoring activities. The partnership will thus ensure data quality, longevity and availability to the MedPAN members and others.

The database will assemble and provide information on IAS in and outside MPAs, the distribution, spreading and temporary variation.

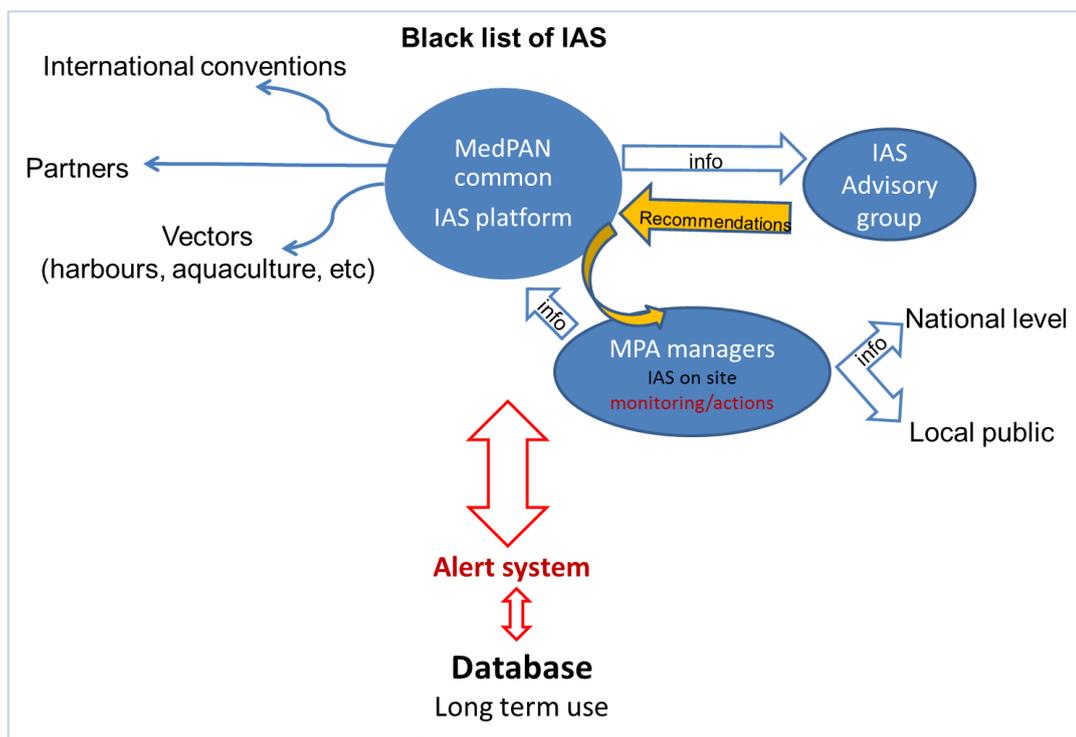
» Resource library

The resource library can provide information and communication documents related to the impacts, costs and possible management options, relevant legislation and other information on alien marine species such as invasive species action plans across the MedPAN network and National Networks (aims, objectives, actions, duration) as well as management examples conducted in different regions.

IX. ORGANISATIONAL ASPECTS WITHIN MEDPAN AND INTERNATIONAL COOPERATION

The following model shows the inclusion of identification, consultation, monitoring, evaluation and implementation of key recommendations as part of an integrated invasive management programme with the different MedPAN partners. In general, a focal point within the MedPAN network (MedPAN

common IAS platform), will coordinate IAS-related matters including the enquiries from individual MPAs, the liason and the technical advice within the MedPAN network and the coordination with other relevant instruments and other organizations and experts to develop suitable management measures.



Alert system Communication Protocol

Establishment of an alert system to report new observations on IAS can provide online information (to submit and retreat) to managers and organizations on the spread of IAS. This could allow managers and interested institutions to receive information on new species arrival into nearby areas and direct efforts to plan and manage the invasive while the numbers are still small. Records could be displayed with species

information, location and map, status and date of new sights per species or per area.

The organization of the alert system communication protocol will thus insure that once a new species is detected in the MPA, is quickly communicated and an assessment and implementation actions can be proposed. We could distinguish the following phases as part of the alert system:

1. Phase 1

When an unknown species is found in a MPA that does not seem to fit any of the species described in the common guidelines for IAS, the manager of the protected area or personnel working there can send this information to the MedPAN IAS Common Platform (E-mail contact to be provided). Record of the finding will be provided in a template form with location, date, and name and contact information of the person as well as a digital photo of the specie. When possible, a sample of the species found should also be sent for examination to confirm identity. MedPAN IAS Common Platform will contact experts from the Advisory Group or other taxonomic experts to either confirmed or disproved the presence of new IAS in the Area as well as to request any other information if needed.

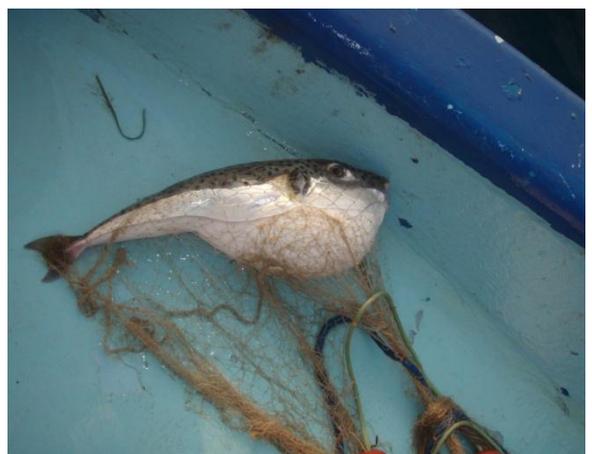
2. Phase 2

If the response result negative because the “the species is not an invader” or “was already present and recorded in the MPA”, the information will be sent to the Database and the MPA should continue with its monitoring.

In case of positive response, the MedPAN IAS Common Platform will communicate at this time to the MPA and other MPAs sites nearby, the presence of the new IAS.

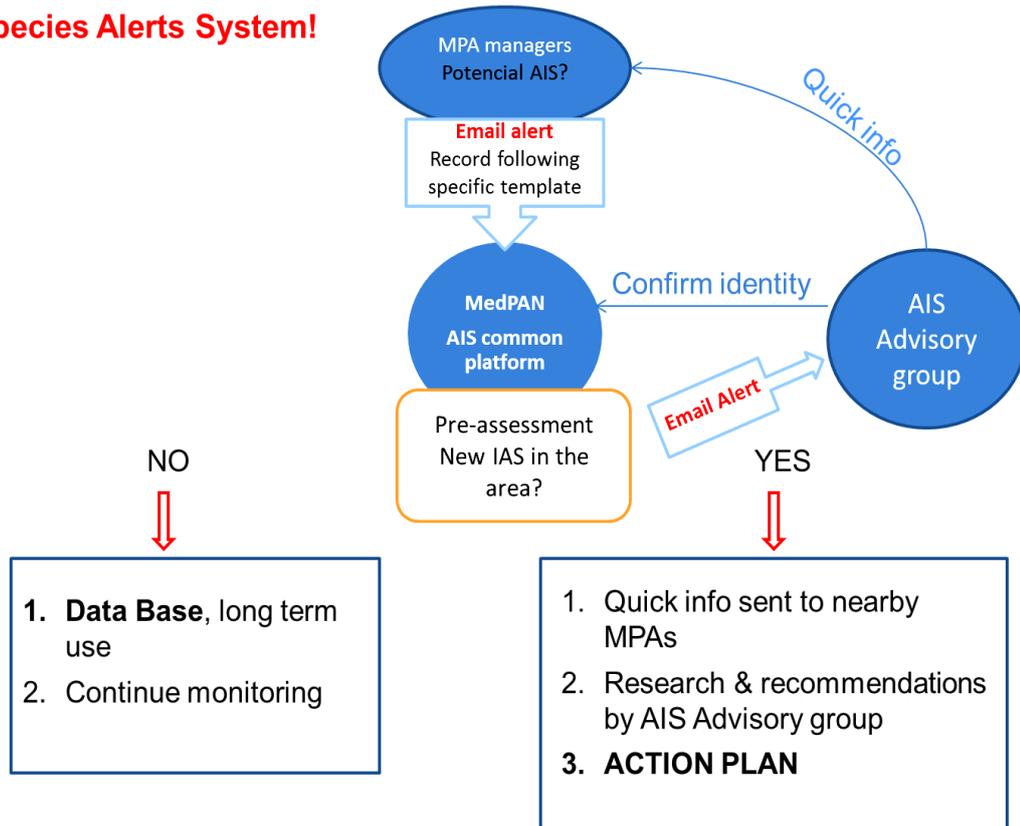
3. Phase 3

With the advice of experts, information will be gathered on the potential impacts of the new invaders and assessment is made on possible control methods. MedPAN IAS Common Platform in consultation with the MPA will discuss alternative management responses and assist in the development of efforts to decrease this impact. As marine invasive species might act different in similar environments, this response should be species/MPA-specific.



Lagocephalus sceleratus by Nikolas Michailidis

Species Alerts System!



X. FINANCIAL CONSIDERATIONS

The budget necessary to address this strategy is potentially extremely heavy and cannot be underestimated. It will be important to explore financing mechanisms with other partners that will ensure existing funding for the control and management of invasive species. These could include grants and financial partnerships with local and regional agencies (including EU sources), foundations, research groups and businesses to fund projects. To optimize costs, MPAs might prioritize on the species to be monitored in selected sites according to the Black list of species and information gather around the area or close by countries.

Development of participative programmes with volunteers and other users to watch-out of the occurrence of new invasive species in some areas is a possibility already shown to work in some coastal sites, including MPAs. The opportunity of replicating these mechanisms in other areas of

the Mediterranean as a way to lower the cost of monitoring could be investigated.

As far as research is concerned, the support to the optimization of further collaboration engagements between Mediterranean universities and MPAs to share costs and objectives should also enable to further establish implementation priorities and potential control programmes.



Boris Weitzmann
Acrothamnion preisii

XI. REFERENCES

For general information on invasive species there are various databases and websites with useful links:

Food and Agriculture Organization (FAO),
database on Introductions of Aquatic Species
(DIAS)

<http://www.fao.org/figis/servlet/static?dom=collection&xml=dias.xml>

Global Invasive Species Programme (GISP)

<http://www.gisp.org>

TNC's Global Invasive Species Team (GIST) was
disbanded in March 2009.

Global Invasive Species Database (GISD)

<http://www.invasivespecies.net/>

Global Invasive Species Information Network
(GISIN)

<http://www.gisnetwork.org>

The IUCN Invasive Species Specialist Group

<http://www.issg.org/#ISSG>

The Nature Conservancy (TNC)

<http://www.nature.org/invasivespecies>

<http://tncinvasives.ucdavis.edu/>

CIESM Atlas of Exotic Species in the
Mediterranean Sea is link to NISbase, a
distributed database managed by the
Smithsonian Institute, aiming at a census of all
non indigenous aquatic species introduced
around the world.

<http://www.nisbase.org/nisbase/index.jsp>

North European and Baltic Network on Invasive
Alien Species European (NOBANIS) Database

<http://www.nobanis.org/>

EU website:

http://ec.europa.eu/environment/nature/invasivealien/index_en.htm

Scope for EU action:

http://ec.europa.eu/environment/nature/invasivealien/docs/2006_06_ias_scope_options.pdf

European Environment Agency 'Signals':

<http://www.eea.europa.eu/pressroom/newsreleases/killer-slugs-and-otheraliens>

Delivering Alien Invasive Species Inventories for
Europe (DAISIE)

<http://www.europe-aliens.org/>

Assessing Large Scale Environmental Risks for
Biodiversity with Tested Methods (ALARM)

<http://www.alarmproject.net>

GloBallast Partnerships: To implement
sustainable, risk-based mechanisms for the
management and control of ships' ballast water
and sediments to minimize the adverse impacts
of aquatic invasive species transferred by ships.

<http://globallast.imo.org/>

Ellenic Network on Aquatic Invasive Species
(ELNAIS)

elnais.ath.hcmr.gr

Regional Activity Centre For Specially Protected
Areas (RAC/SPA) of the Barcelona Convention

<http://www.rac-spa.org/>

ESENIAS

East and South European Network for Invasive
Alien Species. Regional data portal on invasive
alien species (IAS) in East and South Europe
(Albania, Bosnia and Herzegovina, Bulgaria,
Croatia, Greece, Kosovo under UNSC Resolution
1244/99, FYR Macedonia, Montenegro, Serbia,
Romania (invited country) and Turkey.

<http://www.esenias.org/>

Other interesting references

Ben Raïs Lasram F., Mouillot D. 2009. Increasing southern invasion enhances congruence between endemic and exotic. Mediterranean fish fauna. *Biol Invasions*, 11:697–711.

Cebrian, E., Linares, C., Marchal, C., Garrabou, J., 2012. Exploring the effects of invasive algae on the persistence of gorgonian populations. *Biol Invasions* 14:2647–2656.

Philippe ROBERT3 Corralorda, J. M, Barcelo, A., Bergere, H., Houard, T., Lefebvre, C. et P. Robert., 2010. Le Parc national de Port-Cros: une structure référence dans la mise en oeuvre de stratégies de contrôle de la Chlorobionte envahissante *Caulerpa taxifolia* (Valh) C. Agardh. *Sci. Rep. Port-Cros natl. Park, Fr.*, 24: 105-126.

Galil, B., 2012. Truth and consequences: the bioinvasion of the Mediterranean Sea. *Integrative Zoology* Volume 7, Issue 3, 299–311.

Hulme PE, Roy DB, Cunha T & Larsson T-B (2008) A pan-European inventory of alien species: rationale, implementation and implications for managing biological invasions. In DIASIE (eds.) *The Handbook of European Alien Species*. Springer, Dordrech.

Veitch, C. R.; Clout, M. N. and Towns, D. R. (eds.) 2011. *Island Invasives: Eradication and Management*. Proceedings of the International Conference on Island Invasives. Gland, Switzerland: IUCN and Auckland, New Zealand: CBB. xii + 542pp.

26 March, 2008. In-Depth Review of Invasive

Alien Species - Information Compiled by the Executive Secretary. Conference of the Parties (COP) to the Convention on Biological Diversity Ninth meeting Bonn, 19-30 May 2008. Item 3.3 of the provisional agenda (UNEP/CBD/COP/9/1). MSWord | PDF CBD COP9 – 2008.

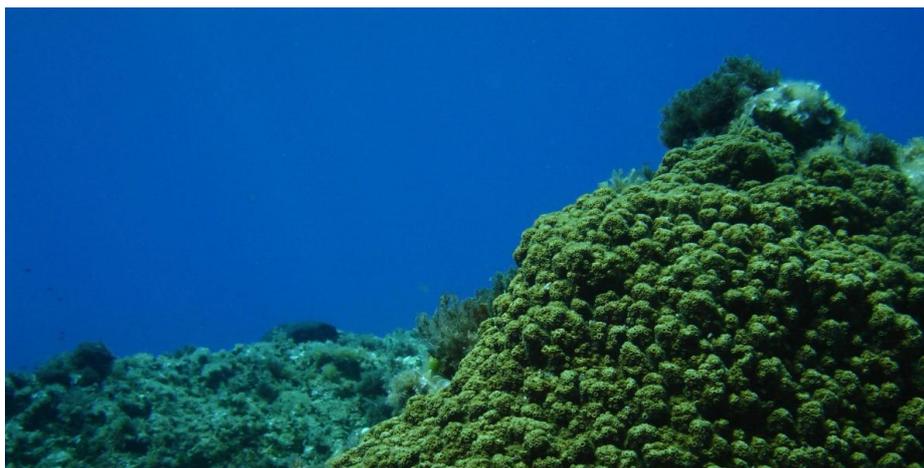
Shine, C., Kettunen, M., Genovesi, P., Essl, F., Gollasch, S., Rabitsch, W., Scalera, R., Starfinger, U. and ten Brink, P. 2010. Assessment to support continued development of the EU Strategy to combat invasive alien species. Final Report for the European Commission. Institute for European Environmental Policy (IEEP), Brussels, Belgium.

UNEP/MAP-RAC/SPA. 2008. Guidelines for Controlling the Vectors of Introduction into the Mediterranean of Non-indigenous Species and Invasive Marine Species. Ed. RAC/SPA, Tunis. 18 pp.

UNEP/MAP-RAC/SPA. 2008. Guide for Risk Analysis assessing the Impacts of the Introduction of Non-indigenous Species. Ed. RAC/SPA, Tunis. 30 pp

UNEP-MAP-RAC/SPA. 2005. Action Plan concerning species introductions and invasive species in the Mediterranean Sea. Ed. RAC/SPA, Tunis . 30 pp.

IAS Working Group, 2008. Developing an EU Framework for Invasive Alien Species Discussion Paper. http://ec.europa.eu/environment/nature/invasivealien/docs/ias_discussion_paper.pdf

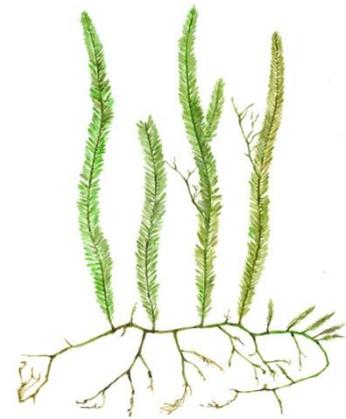


The alien coral, *Oculina patagonica* by Emma Cebrian

APPENDIX 1. BLACK LIST OF MARINE ESPECIES

Black List of Marine Invasive Species

	Macrophyta
1. <i>Acrothamnion preissii</i>	
2. <i>Asparagopsis armata</i>	
3. <i>Asparagopsis taxiformis</i>	
4. <i>Caulerpa racemosa</i> var. <i>cylindracea</i>	
5. <i>Caulerpa taxifolia</i>	
6. <i>Codium fragile</i> sp. <i>fragile</i>	
7. <i>Halophila stipulacea</i>	
8. <i>Lophocladia lallemandii</i>	
9. <i>Styopodium schimperii</i>	
10. <i>Womersleyella setacea</i>	
	Cnidaria
11. <i>Oculina patagonica</i>	
12. <i>Rhopilema nomadica</i>	
	Ascidiacea
13. <i>Microcosmus squamiger</i>	
14. <i>Herdmania momus</i>	
	Ctenophora
15. <i>Mnemiopsis leidyi</i>	
	Crustacea
16. <i>Metapeneus monocerus</i>	
17. <i>Metapeneus stebbingi</i>	
18. <i>Marsupenaeus japonicus</i>	
19. <i>Percnon gibbesi</i>	
	Mollusca
20. <i>Spondylus spinosus</i>	
21. <i>Brachidontes pharaonis</i>	
22. <i>Crassostrea gigas</i>	
23. <i>Musculista senhousia</i>	
24. <i>Pinctada imbricata radiata</i>	
25. <i>Venerupis (Ruditapes) philippinarum</i>	
26. <i>Limnoperna (Xenostrobus) securis</i>	
27. <i>Chama pacifica</i>	
28. <i>Aplysia dactylomela</i>	
29. <i>Bursatella leachi</i>	
30. <i>Crepidula fornicata</i>	
31. <i>Rapana venosa</i>	
	Fish
32. <i>Alepes djedaba</i>	
33. <i>Atherinomorus lacunosus</i>	
34. <i>Fistularia commersonii</i>	
35. <i>Nemipterus randalli</i>	
36. <i>Paraxocoetus mento</i>	
37. <i>Sargocentron rubrum</i>	
38. <i>Saurida undosquamis</i>	
39. <i>Siganus luridus</i>	
40. <i>Siganus rivulatus</i>	
41. <i>Stephanolepis diaspros</i>	
42. <i>Upeneus moluccensis</i>	
43. <i>Upeneus pori</i>	
44. <i>Upeneus moluccensis</i>	
45. <i>Lagocephalus scleratus</i>	
46. <i>Lagocephalus spadiceus</i>	
47. <i>Lagocephalus suezensis</i>	
48. <i>Apogonichthyoides pharaonis</i>	
49. <i>Pempheris vanicolensis</i>	



Caulerpa taxifolia (Juan Varela)



Percnon gibbesi (Juan Varela)



Rapana venosa (Juan Varela)

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www.medpannorth.org

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Spanish Agency for International Cooperation and Development

(AECID)

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