Enhancing Sustainable Tourism in Adriatic-Ionian Region through co-creation: the role of Universities and Public-Private Partnerships

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Luca Emanueli*, Gianni Lobosco*

Disclosing Maritime Landscapes

1. *Disclosing strategy*

Disclosing Maritime Landscapes (i.e. D-mLand) is an on-going research project developed by the Research Centre of the University of Ferrara *Sealine* (Architecture Department) in the main framework of the *EU Strategy for the Adriatic and Ionian Region* (i.e. EUSAIR). The topics developed by this proposal mostly deal with EUSAIR's specific objectives Pillars 3 and 4: "Environmental Quality" and "Sustainable Tourism". In particular, the work investigates a possible effective strategy capable of improving the *Marine Protected Areas* (i.e. MPAs) and their touristic attractiveness, while boosting the positive environmental impact on the Adriatic and Ionian basin ecosystems.

The project grounds on the main reference-tool of the SPAMI protocol, which aims at promoting and enforcing the *Specially Protected Areas of Mediterranean Importance*. Shaped and inspired by these guidelines, the D-mLand strategy focuses on achieving around each existing or forthcoming SPAMI a new touristic cluster made by different satellites and, afterwards, on implementing several macro-regional networks among these clusters, to enable specific physical and thematic itineraries.

In fact, as the touristic demand is changing and specific types of tourism are growing stronger and stronger – associated for example with recreational scuba-diving (van Treeck,

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Schuhmacher, 1999) –, proper systems able to arrange, control and manage new and increasing flows become necessary. The carrying capacity of each singular MPA is far from fulfil such requirements, and therefore needs to be somehow enhanced in a *landscape perspective*, in order to develop – without threatening the already fragile balances – more integrated and coordinated approaches to support both conservation and tourism agendas.

In this perspective, D-mLand identifies a set of ignored or unconventional sites which do not present yet all the features to become MPA themselves, but have the potential if clustered with the already existing SPAMI to act as satellites and positively influence from the outside the general exploitation of these areas. Following the framework of the *Protected Destination System* (i.e. PDS) elaborated by Miller *et al.* (2016), the research investigates an operative way to plan and design the relationships between its two, spatial and conceptual, components: the *Protected Area* and the *Gateway Region*.

According to this vision, the existing or potential new SPAMI area is expected to act as the core of a cluster made by numerous satellites. These satellites may have different features (such as geo-sites; cultural, archaeological and industrial spots; offshore platforms; industrial heritage; etc.) and locations (coastal, deltaic and offshore areas, sub-tidal and intertidal sites, etc.), but might contribute in fostering the touristic attractiveness by hosting those facilities and activities that would not be settled in a MPA, although they are essential for the whole area accessibility, usability and competitiveness. For this reason every cluster should be planned according some basic requirements: being recognizable, reachable, inviting and well-dimensioned in terms of services according to site-specific environmental assessments.

In order to face such objectives, the research has been organized in 3 different steps designed to tackle the main issues that commonly arise from debating with stakeholders.

The first one concerns the creation of a *Maritime Landscapes Atlas*: an instrument to build a network at Macro-regional level addressing the sustainable development and preservation of maritime natural and cultural heritage, through the showcase of new landscapes made by protected areas and their satellites.

The second step focuses on formulating possible *Strategies for Cluster-Districts' Touristic Upgrade*. A range of parameters, guide-lines and analysis will be taken into account for implementation in order to give a preliminary feedback to local stakeholders (public agencies, economic operators, etc.) about the utility and convenience for a territory to apply for the SPAMI label, according to the cluster scheme.

The third step deals with *Testing the Network Potentials*, and aims at evaluating the effectiveness of the theoretical model and its transnational operability within the context of real operative experiences; events organized over several days and locations (as, for example, international events based on scuba diving) will be specifically planned to measure the impact on local economy and environment.

The aforementioned propositions have also been submitted by *Sealine* (as lead partner) to the first call of the *EU Interreg-Adrion Programme*. Such funding would represent a chance to validate the thesis according to which such maritime protected areas, if gathered and managed in a more comprehensive network, could be able to better influence the whole Adriatic-Ionian ecosystem, not only in terms of environmental benefits (protection of maritime and coastal biomasses) and blue growth (restrictions for fisheries, monitoring of marine species, etc.), but also in terms of economic development (for instance through the development of sustainable tourism).

Such hypothesis grounds on a main desirable shift in the way the EU and its State Members' policies consider the *Maritime Spatial Planning* (i.e. MPS) purposes in relation to the established definitions given by the *European Landscape Convention* (2000).

As stated in its first Article at point a): "'*Landscape' means an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors*".

Such "double genesis" of Landscape gets further reiterated and highlighted in the same Article by defining the concepts of *Landscape protection*, *management* and *planning*.

In particular, as "'*Landscape planning' means strong forward-looking action to enhance, restore or create landscapes*"(*Article*

1, f) we believe that the principles guiding the MSP should take into account and even work towards such Landscape "*creation*".

In this direction, there are at least two crucial consecutive actions that have been the subtle subjects of the present research:

1) to disclose marginal and hidden landscapes, affecting what can be "*perceived by people*" in order to go beyond the zoning-oriented approach that is commonly used to describe the maritime space, while providing a more holistic and dynamic interpretation of the relationships among its components;
2) to conceive operative strategies intended to combine sustainable development and protection, promoting the view of future landscapes as the "*[…] result of the action and interaction of natural and/or human factors […]*".

2. *Maritime Landscapes Atlas*

Wrecks, pipelines, cable-ducts, extractive offshore platforms, LNG terminals, energy plants, docks, piers, artificial reefs against costal erosion and/or in favour of the ichthyic repopulation; sampling, measuring and monitoring networks as marker buoys of oceanographic instrumentation; breeding areas of mussels, oysters and clams; suitable areas for shellfish farming, discharge areas for rivers' dredging material, reported waterways and bathing areas; mooring sites for yachting, offshore sand mining sites, as well as archaeological and industrial heritage spots.

This is only a partial list collecting infrastructures and functional areas insisting on the maritime space.

A more exhaustive representation of how such items deeply characterise the sea has been, for example, developed by ARPA Emilia-Romagna agency, looking at a limited span of the Adriatic basin (Preti *et al.*, 2009). The map reported in Figure 1, giving an outstanding depiction of complexity, aims at providing both an overall and detailed view of the uses and the monitoring activities happening in the sea area in front of the Emilia-Romagna coast. Furthermore, it suggests the chance to question a certain picturesque and idyllic sight of the Sea as some sort of untouched natural realm.

In fact, the vast range of human artefacts, uses and regulations that here overlap suggests an intrinsic continuity of the sea with its hinterland built environment (Figure 2) and, as a consequence, allows to consider such environment under a *Landscape perspective*, beyond the inventory. This means disclosing the existing as well as planning the future interactions between Protected and Marginal ecosystems, their possible synergy towards new fruition scenarios, even changing their appearance.

Indeed, taking this argument to the extreme, also the MPAs, as a result of policies, prescriptions, tangible and intangible actions aimed at preserving ecologic features, should be considered in this continuum. That is the case, for example, of many deltaic areas in the Mediterranean whose habitats and morphologic features are preserved as they are, frozen by the human intervention against evolution phenomena (subsidence, sea level rise, coastal erosion, etc.) dealing both with anthropic and natural causes which have always affected such liminal, dynamic and fragile environments. Their current appearance is the simulacrum of an ideal status, deliberately chosen and fixed at a very specific moment of its evolution. So such kind of landscape could be considered as artificial as many of those marginal ones from which it is surrounded, and for this reason they should all be dealt with together and analysed in their mutual relationships.

The aforementioned neglected and marginal sites actually create a widespread maritime landscape crossing the sea and affecting its habitats' evolution, as some scientific literature has already demonstrated (ISPRA, 2012), often contributing in their biological differentiation and richness. Especially in the AI basin, they represent an underestimated biodiversity reserve which could be exploited to reach the main targets that EU policies on MPAs have fixed for the next years.

It should be noted that many diverse definitions of MPAs exist, and every country has its own regulation in this field. In general, MPAs are geographically well-defined areas in which human impact is kept to a minimum level (e.g. extraction is not permitted), often established with the main purpose to strike a

Figure 1. Simplified version of the "Sea uses' Chart of the Adriatic sea in front of the Emilia-Romagna Region coastline". (Source: ARPA Emilia-Romagna)

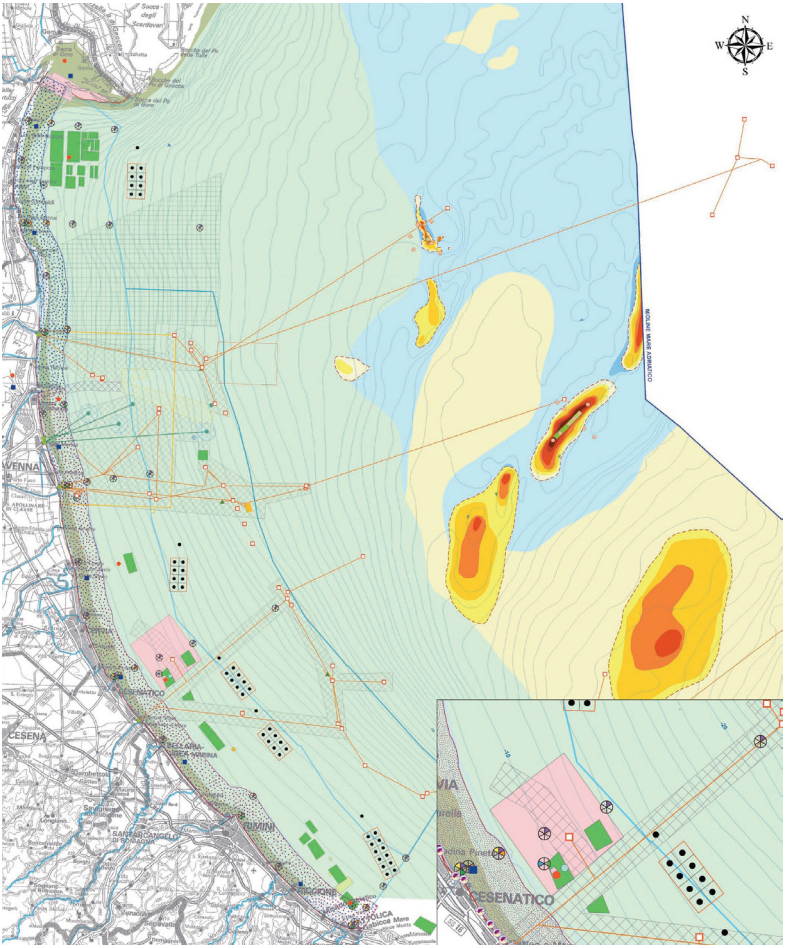
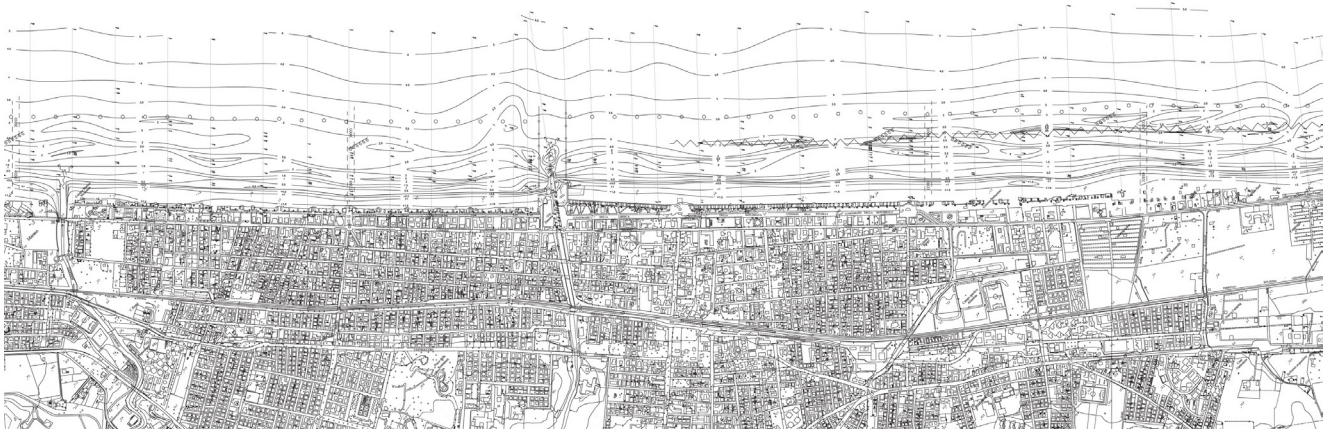


Figure 2. Composed chart of Riccione (Italy) showing the items which characterise the sea as an urbanised landscape (Source: Sealine)



balance between ecological constraints and economic activity (EEA, 2015a).

Both globally and across Europe, MPA designation is evolving towards the construction of more representative and ecologically coherent MPAs networks: from the protection of singular sites, presenting vulnerable and essential features (e.g. rare habitats or vulnerable species), to a more holistic assessment and design of entire MPAs networks, based on an ecosystem approach.

The *Marine Strategy Framework Directive* (i.e. MSFD), foreshadows that EU Member States will have to launch – possibly by the end of 2016 – programmes and specific measures that will contribute to achieve consistent and coherent MPAs networks, by firstly designating new single MPA areas and then grouping them together (EC, 2014). In fact, as Smith *et al.* (2009) remind us, the importance of constructing and officially recognizing MPAs networks lays in the potential environmental achievements that these could lead to by working synergistically, while covering different protection levels and targeting specific goals that – if considered singularly – MPAs couldn't achieve.

Referring to the MSFD's Article 13.4, the main future challenge in MPA design concerns the concepts of "network coherence and representativity" and their meaning for Europe's regional seas in practical, scientific, and legal terms (EEA, 2015b).

Until now, the marine *Natura2000* network, for instance, has played a key role in such direction for it includes over 23 countries and has brought to the improvement of the MPA coverage in the EU's seas. On the other hand, focusing on a specific, limited number of vulnerable marine species (seabirds, turtles and marine mammals) and habitats, such network seems to be inadequate for future developments in the integrated approach of marine ecosystem management and protection. This becomes even more evident if looking at the distribution of the Natura2000 network (Figure 3) where offshore habitats, e.g. sandbanks below 20 m or soft-bottom habitats, and the associated communities of fauna and flora have struggled to find a collocation.

Figure 3. Portion (%) of near shore waters, coastal waters and offshore covered by Natura2000 sites (Source: European Environment Agency)

Table 4.1 Proportion (%) of near shore waters, coastal waters and offshore covered by Natura 2000 sites

MPA assessment area regions	Near shore waters	Coastal waters	Offshore waters
Baltic Sea	**30.9**	**15.3**	**3.9**
North-east Atlantic Ocean	**42.9**	**15.4**	**2.0**
Celtic Sea	31.9	7.8	2.3
Greater North Sea incl. Kattegat and English Channel	59.0	31.5	11.2
Bay of Biscay and the Iberian Coast	47.7	15.6	1.7
Macaronesia	16.3	2.4	< 0.1
Mediterranean Sea	**24.5**	**4.8**	**< 0.1**
Western Mediterranean Sea	45.7	8.5	< 0.1
Ionian Sea and Central Mediterranean Sea	27.0	2.1	0.0
Adriatic Sea	10.1	1.0	0.0
Aegean-Levantine Sea	14.1	2.3	0.0
Black Sea	**77.9**	**19.2**	**0.0**
Total	**33.3**	**11.3**	**1.7**

Note: Near shore = 0–1 NM zone, coastal waters = 1–12 NM zone (for Greece, 1–6 NM), offshore = 12 NM – END, where END = equidistance to neighbouring state or 200 NM.

Source: EEA, 2015. See EEA, 2015 for the delineation of the assessment areas (regional seas). Zones within each assessment area have been chosen to help illustrate the current distribution of the Natura 2000 network and inform future discussions on completeness.

A more effective and comprehensive tool in this perspective might be represented by the *Protocol Concerning Specially Protected Areas of Mediterranean Interest* (RAC/SPA, 1995) set by the Barcelona Convention. In 2012, 32 SPAMIs were established in the basin: they were MPAs already organised by contracting parties according to the Protocol, following some general features whose main interest – from the present research point of view – lays in the concept of "regional value" as an area basic requirement for being included in the SPAMI List. Under this concept, some of the criteria used in evaluating potential SPAMIs recall a more inclusive and landscape-oriented approach: among others, the criteria of "Diversity" and "Cultural representativeness".

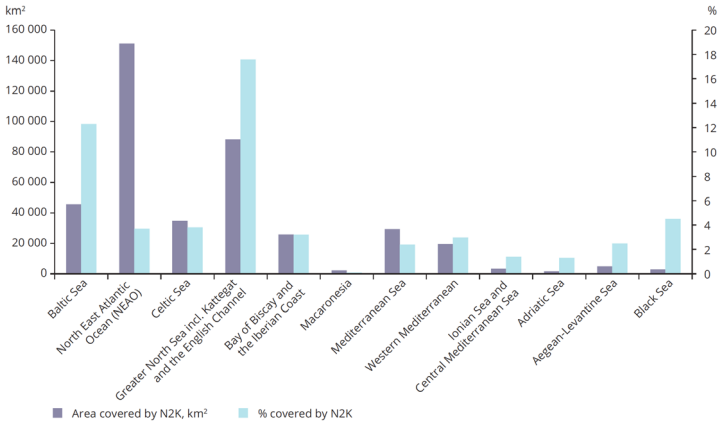
The Protocol seems to give a great role to existing and potential connections of SPAMIs, underling at the same time the importance of their protection, planning and management. Although some restrictions and prejudices concerning human activities, artefacts and industrial heritage appear in these guidelines, the Protocol represents the more effective and well-recognised tool from which to start in order to update and improve the existing EU directives dealing with Maritime Protected Areas.

From this assumption, D-mLand project firstly aims at providing a system of landscape indicators and a common methodology for the recognition of "usual and unusual valuable sites" that together could be identified as potential areas to include in the SPAMI list. That is the *Maritime Landscape Atlas* main goal, together with the chance of providing a network of suitable spots over which planning a sustainable touristic fruition of maritime areas.

The whole Adriatic-Ionian Macro-region is characterized by specific excellence spots in terms of marine environment, but only a few of these have all the SPAMI's requested features. Furthermore the coverage of Natura2000 network in the Adriatic regional seas is not sufficiently developed if compared to other contexts (Figure 4). This gap reflects a lack of underwater heritage protection and entrenchment that even affects the areas in which strategic and national parks insist.

Figure 4. Coverage of Natura2000 network in Europe's regional seas (Source: European Environment Agency)

Figure 4.1 Coverage of Natura 2000 network in Europe's regional seas



Note: N2K = Natura 2000. The category 'North-east Atlantic Ocean' represents the sum of Natura 2000 coverage for the Greater North Sea, the Celtic Sea, the Bay of Biscay and the Iberian Coast and Macaronesia. The category 'Mediterranean Sea' represents the sum of Natura 2000 coverage of the Western Mediterranean Sea, the Ionian and Central Mediterranean Sea, the Adriatic Sea and the Aegean-Levantine Sea.

Figure 5. Some maritime habitats considered for the Taxonomy (Source: Sealine)

As many studies have already highlighted – for example on the role of seagrass meadows in the mitigation of the erosive phenomena (Fonseca, Fisher, 1986) –, coastal protection can be attended effectively through the development of promotion policies for submerged areas, but they need a preliminary deep knowledge of such habitats, along with their natural and cultural maritime heritage.

The Atlas-related activities have then been structured to classify and map the potential SPAMI areas in the AI basin with the final goal to enhance the protection from natural and anthropogenic hazards. In fact, beside creating an ICT-GIS database of the AI maritime environment's assets in order to provide policy makers with the necessary tools to plan for future operations, it is important to identify risk factors and cross-border resilience strategies from which defining development priorities and guidelines for a proper distribution of SPAMIs' clusters over the sea.

One of the main tasks of the project is therefore represented by the "*SPAMIs' Satellites Taxonomy*", which targets a typologic classification of maritime coastal and/or submarine habitats not yet officially recognized nor protected, but interesting for their ecologic and landscaping value. In partnership with other research centres and Universities, *Sealine* is spotting and studying such landscapes (Figure 5) in terms of environmental impact, analysing their actual capacity to increase biodiversity as well as to potentially affect users behaviours and fruition dynamics of the sea.

Their effect on marine habitats has been analysed on the basis of a wide literature review dealing with the concept of "artificial reefs". According to Baine (2001), Artificial reefs (ARs) are manmade structures deployed on sea bottoms with the primary purpose of protecting coastal habitats and/or increasing biotic resources by aggregating marine species and preventing trawling. Traditionally, in the oligotrophic waters (e.g. western Mediterranean Sea), the ARs goals were to protect Posidonia oceanica meadows from illegal trawling, to increase habitat complexity and promote higher species diversity (Relini *et al.*, 1994; Riggio *et al.*, 2000; Gonzalez-Correa *et al.*, 2005).

Conversely, in the eutrophic waters (e.g. central and northern Adriatic Sea) the main purpose of ARs was to increase fishery yields (Bombace *et al.*, 1994; Ardizzone *et al.*, 1996; Bombace *et al.*, 1997).

Widening the artificial reefs definition to all those structures whose main aim don't fit this purpose (such as offshore platforms and energy plants, sub-tidal and intertidal structures for coastal defence, wrecks, harbours and similar works) it is possible to describe a broader census of items across the sea that interact with the environment supporting, for example, sessile filter feeders, providing nourishment and refuges for motile species, and attracting bentho-nectonic fishes (Bohnsack, Sutherland, 1985; Baine, 2001).

In fact, fish aggregating effects of artificial reefs and similar structures are well known, and the effectiveness of different structure typologies in this respect are well documented (Santos *et al.*, 1997); on the other hand, such interactions are not cause-effect, and happen according to complex ecological processes affected by external phenomena like seasonal larval supply, water circulation, turbidity and nutrients, depths, orientation and physical-chemical features of the substrata (Anderson, Underwood, 1994; Relini *et al.*, 1994; Riggio *et al.*, 2000; Turner, Todd, 1993). This explains why, besides the study of environmental conditions, structures' age and typology (i.e. the Taxonomy), it is necessary to develop a more holistic tool that enables to monitor and plan the interactions between different spots working as Fishing Aggregating Devices (FADs) by considering their mutual spatial and temporal relationship in the waterscape also in the light of fluctuation in environmental condition and variability of recruitment processes (Ponti *et al.*, 2015).

Therefore the Atlas, by mixing spatial, topological and typological data, aims at providing such dynamic representation of the maritime landscape, in order to support effective planning choices that should consider:

1) spatial arrangement of MPA and marginal spots;
2) changes in local species composition, interactions and food webs;

3) interactions between organism and substrata (encrusting, bio-erosion, etc.);
4) alteration in exploitation of biotic resources;
5) alteration of population connectivity and genetic diversity;
6) facilitation of the spread of non-indigenous species by creating suitable habitats with reduced competition with native species and migrating corridors (Sheehy and Vik, 2010).

Finally, the Atlas major expected goals concern:

7) providing the project beneficiaries, stakeholders and target groups (public authorities and private investors) with a clear overview of the current situation (a sort of SPAMI and MPA state of the art), highlighting the network potentiality and multiplicity;
8) providing proper instruments to detect and discover attractive sites around potential SPAMI areas, showing their features in terms of landscape and environmental quality;
9) creating a platform to inform target groups with a first implementable representation of the AI Maritime Landscape conceived as a network of cluster-districts (made of MPAs and their satellites) that are about to apply to the SPAMI procedure;
10) facing the issues raising from national rules contradictions in order to define a shared protocol to recognise at local and cross-border level such cluster-based system.

Together with the efforts at EU level for MPA enhancement, a new work should be done to define actual and future sites where biodiversity could flourish around existing and new human activities on the sea. D-mLand has been focusing on this topic by developing a set of strategies and guidelines concerning the touristic upgrade of significant "cluster-districts" in the AI basin, in order to implement new ways of fruition designed for the purpose of job creation in the tourism sector through new creative industries dedicated to the enjoyment of maritime environments.

3. *Strategies for Cluster-Districts' Touristic Upgrade*

Following the SPAMI's Protocol's quality standards, the project general aim is to involve in such conservation and promotion process a higher possible number of territories. Developing a protection model based on cluster-districts, and able to boost the touristic flows could give additional reasons to public authorities and stakeholders to apply for the SPAMI label, making its convenience more evident.

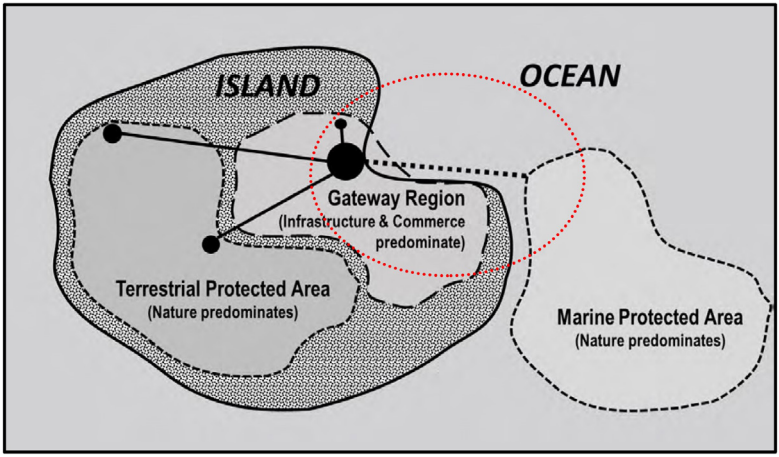
In fact, as the Satellites do not have the SPAMIs' constraints, their ecological value might be easily combined with a touristic use of the marine environment, so that more proactive policies and planning activities could be developed both in medium and long term perspectives. Networking integrated services for the exploitation of natural and cultural maritime heritage gives, at the same time, the chance to reduce the operating costs for sustainably managing the habitats. The creation of cultural and creative industries, besides increasing touristic attractiveness and support the running costs of higher-level environmental protection, could also raise awareness among citizens on the value of maritime tangible and intangible heritage.

In such framework, where public and private actors are encouraged to collectively upgrade sustainable tourism products, the development of new MPAs and strong *gateway communities* (Eagles, McCool, 2000; Howe *et al.*, 1997) becomes an essential prerequisite to the success of the cluster-district model.

Referring to the image in Figure 6 proposed by Miller *et al.* (2016: 10), the cluster-district model can be interpreted as an operative application of the *Protected Destination System* (i.e. PDS), whose main aim is "*[…] highlight[s] the interdependency between tourism destinations and protected areas.*" introducing a conceptual framework "*[…] for the multidisciplinary study of the human, artifactual (e.g., the built environment, laws, policies, projects) and natural domains*".

According to this model, the principal PDS components are: a *Protected Area* devoted, at least in part, to recreational and touristic activities; a *Gateway Region* accommodating the human communities (i.e. residents and occasional users) which

Figure 6. Hypothetical protected destination system (PDS) and, in red, the operative field of the Cluster-district model (Source: Miller *et al.* (2016: 10), edited by Sealine)



should somehow take advantage of the characteristics of the first one.

In particular, the cluster-district model we propose around SPAMIs is meant to foster the connection, as well as the landscape and the ecologic continuity between the two PDS components. In such perspective, the SPAMI's Satellites can be inside or just at the borders of the gateway region on the hinterland and the coastline, as well as adjacent to an offshore protected area (this is the case of the already mentioned marginal maritime landscapes). Satellites, depending on the context and according to site-specific strategies, are supposed to work in four different ways:

1) as *accessibility devices* (for example, a network of landing spots working as cluster's gates) they should enable a better management, control and regulation of visitor flows over the year, setting the cluster-district's carrying capacity on the basis of environmental assessments and touristic demands;
2) as *showcase devices* (for instance, a set of open diving areas and underwater parks) they might provide visitors with a preview of the SPAMI different habitats under controlled

and safe conditions, catalysing the interest of tourists and general public on specific itineraries and future experiences;
3) as *service providers* (for example, thematic and specialised hotels) they should supply visitors with a high-quality standard availability of accommodation, with catering and other facilities designed on the basis of different types of tourism specific needs;
4) as *monitoring devices* (for example, spots integrating remote sensing technologies) they would contribute to data gathering, analysis, and communication in support of planning actions aimed at establishing proper usage thresholds for the cluster-district, in orders to avoid conflicts between biological and anthropic processes.

Clearly, the actual function of Satellites in the cluster-district model depends on the context, but also on the type of tourism it mainly addresses. Since the ecotourism definition (Hetzer, 1965), a vast literature has insisted on the respect for nature and the importance of creating and supporting protected areas (De Los Monteros, 2002). This orientation can also be found at different scales in other similar tourism forms: nature tourism, geo-tourism, wildlife tourism, green tourism, conservation tourism, environmental tourism and endangered species tourism, among the variants.

But, beyond definitions, the present research focuses on the proactive role that maritime landscape may have in boosting and supporting a range of tourism forms through a strong engagement in disclosing the opportunities provided by neglected or underestimated sites; places where touristic formal and informal practices are often already performed, even though not officially recognised.

Around the Adriatic, the most valuable example is represented by the so called "Paguro experience": an unintended example of "rigs-to-reefs" procedure originated by the explosion and the consequent sinking – on 29 September 1965 – of the AGIP drilling platform "Paguro", placed 12 nm offshore Ravenna (Ponti *et al.*, 2002). The platform wreck became in a few years a major scuba-diving destination due to the fast proliferation of marine flora and fauna, and thanks to the active engagement

of several diving associations in promoting, protecting and maintaining the area. Such spontaneous, but well organised actions brought, since 1995, national and regional authorities to recognise the ecological value of the area, declaring its status of "biological reserve".

Nowadays, according to the estimation given by local diving associations and limited to summer flows, the "Paguro's spot" is visited by 4.000 divers every year; it creates job opportunities related to move tourists and divers around (at lest seven charter boats are involved in their transportation and supporting safe diving), and to train them in several Diving Centres based on the coast. Also, it increases profits because of the logistic required by scientific research and didactic activities. Other forms of business could involve the underwater park maintenance and improvement thanks to the installation of plug-in structures for different trails.

Looking at the touristic trends data, it is also important to highlight how, in only ten years, the "Paguro's spot" has been able to reach almost 40.000 scuba diving sessions, half of which have been performed by divers coming from outside the Emilia-Romagna region, and 12% by foreign divers mainly from Austria and Germany. Another important factor to be considered is that the divers' spending capacity is usually higher than the average-tourist one as their stay in touristic destinations (Stoll, Ditton, 2002).

4. *Alternative ways to decommissioning: an applicative case-study in the Adriatic*

All these data and considerations have been taken into account for formulating a project proposal dealing with alternative ways to the so-called issue of offshore platforms "decommissioning" in the Adriatic, concerning the chance to develop among them touristic cluster-districts related with recreational scuba-diving activities, which could apply to be recognised as SPAMIs. Such operative case-study has been developed as a Master thesis project in Landscape Design (Architecture Department of the University of Ferrara, academic year 2014/15) by students

Alessio Ghiselli and Virginia Melandri, guided and supported by *Sealine* and a multidisciplinary team of external advisors in the fields of underwater archeology, maritime engineering, marine biology, ecology and professional scuba-diving practitioners.

The project (titled "*Offshore Life. Alternative ways to decommissioning*") faces the issues raising from the decommissioning procedures required by law for exhausted offshore platforms in the Adriatic. At the end of their life-cycle, gas and petroleum companies are committed to remove all the extractive structures and proceed with a complete remediation of the site. In fact, while the "rig to reef" procedure (i.e. the practice of converting offshore, gas, oil and petroleum rigs into artificial reefs, diving spots, tourism attraction) has been already successfully adopted in the Gulf of Mexico (Scarborough Bull, Kendall, 1994) and is being considered for the North Sea (Aabel *et al.*, 1996; 1997), the complete removal of decommissioned platforms is still the main disposal strategy adopted by the EU.

After an accurate analysis of the extraction data concerning the Adriatic platforms (Figure 7), their actual productive period has been set on an average of 30 years. Nevertheless, due to the massive costs that decommissioning implies, companies usually prefer to keep the platforms in use at a low operational level-rate, well beyond the normal end of their productive and remunerable lives. Such information, together with the risk of loosing the marine habitats that meanwhile have colonized the underwater platform structures, led to the idea of a progressive reconversion of exhausted platforms into offshore underwater and scuba parks.

Evaluating the expected residual production period of each platform, the project establishes a step-by-step reuse scenario for the whole platforms' network, mixing different techniques and approaches to their decommissioning (as the total removal or "rigs-to-reefs" by "partial removal", "topple in place" or "tow and place",) and proposing for some of them more specific interventions aimed at hosting recreational, educational and research activities related to scuba-diving, fishing and industrial heritage discovery. Depending on the typology, the distance from the coast and the proximity to other spots, each platform

has been planned to contribute to the cluster-district operation, according to the above-mentioned criteria for the SPAMIs' satellites.

In this project, the PCW-B/C platforms (Figure 8) have been strategically identified as the best spot for developing the Diving Centre facilities: only 7Km from the Ravenna harbour, it is a two-rig composed structure connected by a 30m bridge with a footstep of 2.400m^2 and an overall surface of 4.800m^2.

After the capping of the gas wells and the complete removal of their pipes, the project plans to arrange on the main platform (the PCW-B) all those functions related with users accessibility (such as docks and mooring areas) and accommodation (reception, hosting and recreational rooms, relax areas, canteen, etc.), while on the second (the PCW-C) the Diving Centre facilities such as a offices, dressing and teaching rooms, workshops, tank storages, rental shop, and all the equipment and functional spaces. A good part of the proposal consists in the design of the underwater landscape (Figure 9) both at the bottom and between the steel framework of the PCW-C; the main challenge was to create an original and attractive diving experience, addressing both the beginners' needs and the professionals' expectations.

The landscape design concept (Figure 10) has been mainly inspired by three types of analysis. The first one, concerning the procedures of a standard 45-minutes scuba-diving session (with its pertinent waiting depths, periods and ascent timings), was used to define the location of several triangular wire-mesh platforms within the existing framework, specifically designed to signal the pauses to amateurs and to enrich the divers' experience with additional exploration areas. In fact, as outcome of the second analysis, the wire-mesh platforms were studied to promote the flora re-population depending on the incidence of solar radiation at different depths; these consist of modular metal cages that can be filled with inert materials, and easily fixed to the structure. Their filling density, orientation and position depend on the study of solar radiation in order to create a multiplicity of micro-habitats for the proliferation of coloured seaweeds (such as *chlorophyta*, *phaeophyta*, *rhodophyta*), and to house as much and various aquatic fauna as possible. The

Figure 7. Extraction platforms in the northern Adriatic and their actual production rate (Source: Master thesis "Offshore Life. Alternative ways to decommissioning")

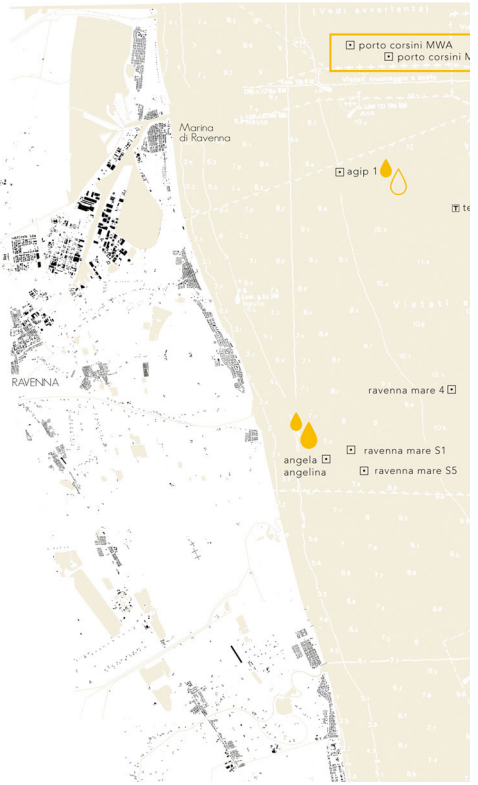


Figure 8. The PCW-B/C platforms (Source: Master thesis "Offshore Life. Alternative ways to decommissioning")

Figure 9. The underwater park project (Source: Master thesis "Offshore Life. Alternative ways to decommissioning")

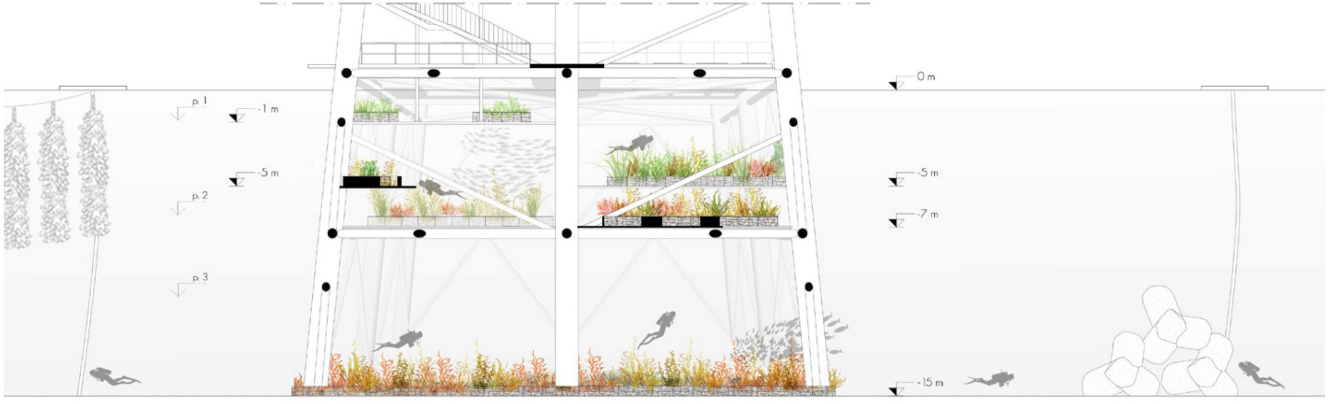
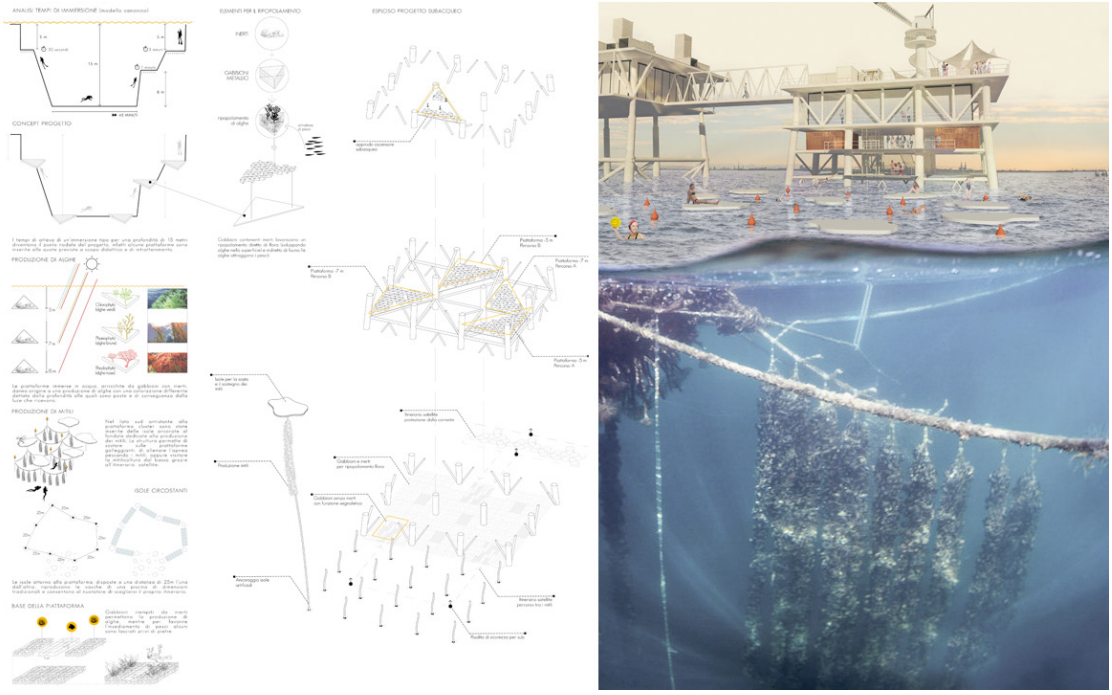


Figure 10. The landscape design guidelines and a rendering of the project (Source: Master thesis “Offshore Life. Alternative ways to decommissioning”)



third and last analysis concerning the local wave climate was essential to address the seabed landscape design outside the platform footprint, where security conditions could be critical due to sea currents coming from north. A great attention was payed to mark fixed paths for divers using guide-wires, visible metal cage patterns, and artificial reef devices to mitigate sea currents.

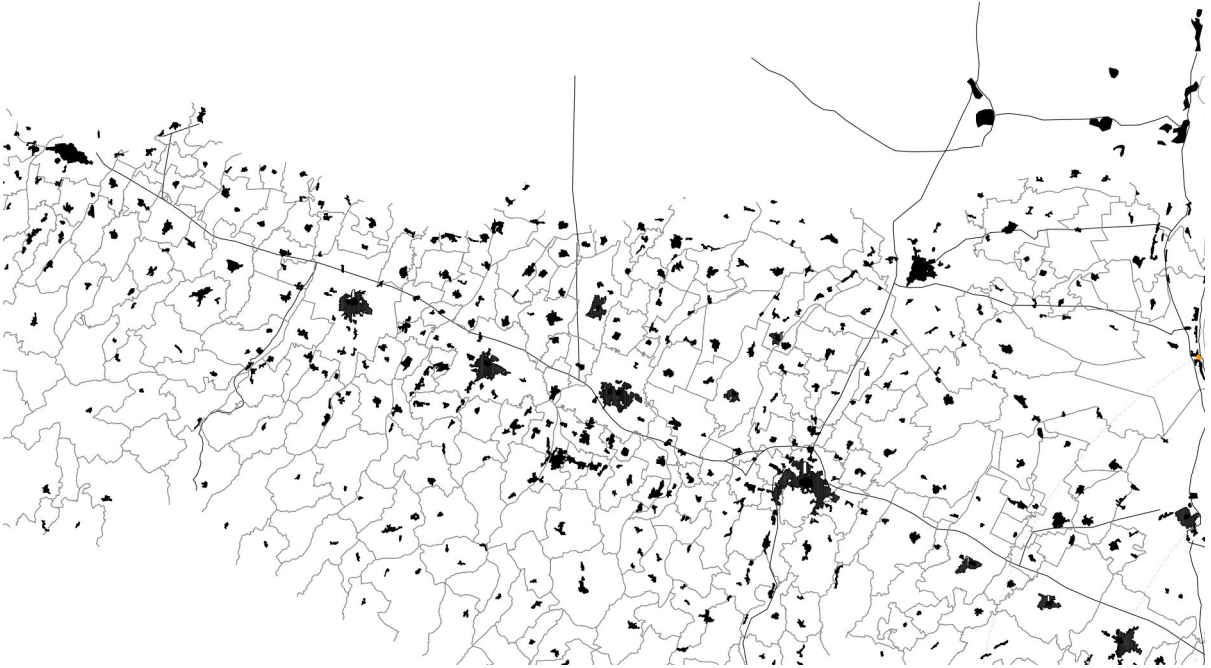
The PCW-B/C reuse project represents only the first step of a wider programme that could further involve up to other 50 platforms in the area in the underwater park development (Figure 11). According to the estimates released by the *Bureau of Safety and Environmental Enforcement* (BSEE), that since 2011 has been the leading U.S. federal agency charged with improving safety and ensuring environmental protection related to the offshore energy industry, a typical four-leg structure provides about one hectare of habitat for hundreds of marine species (BSEE, 2015). A simple projection of such data to our context would signify at least a 50ha offshore area to be devoted to the creation of a maritime cluster-district in front of the Emilia-Romagna Riviera, one of the most attractive, well organized and tourism-oriented territories in Europe. Such territory represents a *Gateway region*, whose hosting capacity, facilities and infrastructural equipment, as well as its entrepreneurial structure could effectively take advantage of a SPAMI's cluster, develop its touristic potential with new products, and properly manage the environmental impacts.

5. *Conclusion and perspectives*

As shown by the present contribution, new approaches and attempts for coupling maritime habitats conservation to the development of sustainable touristic and recreational products are emerging. Presenting the D-mLand proposal, we have shown a possible integrated strategy to be applied in this perspective at the AI macro-regional scale.

We grounded this article on two main aims related to the project: the disclosure of maritime landscapes, which could be

Figure 11. An hypothesis of underwater regional park in front of the Emilia-Romagna coast (Source: Sealine)



functional to the touristic enhancement of protected areas; and the ways such landscapes could be effectively clustered together to build a more sustainable and controlled systems supporting proactive polices and investments by both public and private actors.

From these assumptions, we have analysed the positive effects related to the development of a *Maritime Landscapes Atlas* as an instrument to read, represent and reveal the maritime environment potentials in terms of dynamic interactions between *natural* and *artificial*.

We considered the SPAMI protocol and its approach to the MPA management as the best regulatory framework in which to develop a strategy able to network among them coastal and offshore spots, building recognisable and performative landscapes.

Through the conception of *Cluster-district*, whose main components are the SPAMI and its Satellites, we aimed at providing an operative model able to balance touristic exploitation with the enhancement of marine biodiversity.

We stressed the importance to deepen the knowledge about the ecological impact and the functioning of the Satellites in this system, proposing a *SPAMIs' Satellites Taxonomy*. Then we better analysed such topics looking at the example coming from the so called "Paguro Experience" in the Adriatic.

We regarded the *Protected Destination System* (PDS) proposed by Miller *et al.* (2016) as a conceptual framework to develop the criteria according to which a SPAMI's Satellite can operate in favour of the cluster's accessibility, visibility, equipment of services and monitoring.

Finally, we have discussed how site-specific conditions and regulations can affect – but also inspire – the actual planning of the cluster-district model. In order to clarify such considerations, we briefly presented an operative case-study concerning alternative ways to extraction platforms decommissioning in front of the Emilia-Romagna coastline. The project concretely faces the challenge of creating new performative landscapes that should be able to boost specific types of maritime tourism, while promoting the constitution of a SPAMI. We highlighted

the benefits coming from such integrated approach for oil and gas companies, public authorities, tourism operators, and the environment.

Nevertheless, as stated in the first paragraphs, such kind of projects need to be supported by proper transnational policies and validated by real pilot-experiences. This is the reason why the research follow-up will focus on testing activities aimed at evaluating the effectiveness of the model and its operability. A feasible idea is to plan international scuba-diving-related events (as "Diving weeks" rich of contests, educative projects, divers lessons, etc.) in different spots of the Adriatic in order to measure and analyse their economic, environmental and social impacts.

Besides that, a more demanding cultural programme will be carried on concerning the *landscape perspective* according to which, we believe, the Maritime Spatial Planning procedures should be dealt with. Firstly, such perspective requires to abandon the zoning approach, and recognise the environmental and ecologic continuity between maritime habitats, whether protected or not.

Therefore, it is also important to find a new terminology to better describe those new landscapes. Our research in this field led to the definition of "*hyperNatural*" as an attempt to describe those landscapes generated by a high level of interaction between human and the environment, with the aim of explaining and asserting that no more borders between natural and artificial are possible, in the sea as well as on mainland.

The D-mLand research started from these assumptions to understand how the interplay of ecological and touristic factors may affect the evolution of the MPA concept, creating a stronger interdependence of spatial planning actions between protected areas and gateway regions.

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