Regional geospatial workflows and potential applications to the Sustainable Development Goals of Arab countries: A case study on marine and coastal indicators in the Mediterranean Sea

Ameer Abdulla, PhD

Senior Scientist, European Topic Center, University of Malaga
Associate Professor, Global Change Institute, University Queensland

UNIVERSITAS MALACITANA

UNIVERSIDAD DE MÁLAGA

ETC UMA

Main contributors:

- Ameer Abdulla (ETC-UMA Senior Advisor; Assoc. Prof. GCI,UQ)
- Dania Abdul Malak (ETC-UMA; Director)
- Christoph Schröder (ETC-UMA; GIS and Data Expert)

Outline

I. Critical role for spatial and temporal information to systematically monitor biodiversity loss and human use

II. Clear workflows are essential to develop monitoring frameworks and useful spatial indicators that can pragmatically measure SDGs (land, coastal and marine related)

III. National workflows standardize data to develop indicators that allow regional comparability and prioritization of interventions

Outline

I. **Critical role for spatial and temporal information to systematically monitor biodiversity loss and human use**

II. Clear workflows are essential to develop monitoring frameworks and useful spatial indicators that can pragmatically measure SDGs (land, coastal and marine related)

III. National workflows standardize data to develop indicators that allow regional comparability and prioritization of interventions

Potential of spatial information to monitor biodiversity loss and human use

- Monitoring can be done through
  - data coming from observation (inventories, field sampling, field mapping, remote sensing, image interpretation) **=> precise and standardised**
  - modelled data **=> less precise, used for gap-filling**
- Independently of the source, any type of data generated needs to be validated
  - Stake holders
  - Ground truthing in the field

Types of spatial data used for SDG assessments

- NSDI fundamental layers
- Topographic reference layer
- Statistical data with geographic reference
- Sampling/survey data
- Modelled data
- Reporting data
- Remote sensing data

Sampled field data

Submerged Aquatic Vegetation

Grant F. Walton Center for Remote Sensing and Spatial Analysis (CRSSA), Rutgers University
GIS DATA DOWNLOAD: Submerged Aquatic Vegetation

Barnegat Bay

1968 data:
SAV was not mapped
in Little Egg Harbor

Little Egg Harbor

Submerged Aquatic Vegetation (SAV) of Barnegat Bay - Little Egg Harbor

bbleh_sav68.shp

SAV 1968

GIS data available for download:
http://crssa.rutgers.edu/projects/coastal/sav/
Please read all metadata documentation
CRSSA, 20110513

Sampled field data
Submerged Aquatic Vegetation

Grant F. Walton Center for Remote Sensing and Spatial Analysis (CRSSA), Rutgers University
GIS DATA DOWNLOAD: Submerged Aquatic Vegetation

Submerged Aquatic Vegetation (SAV)
of Barnegat Bay - Little Egg Harbor

bbleh_sav79.shp

SAV 1979

GIS data available for download:
http://crssa.rutgers.edu/projects/coastal/sav/
Please read all metadata documentation
CRSSA, 20110513

Sampled field data
Submerged Aquatic Vegetation

Grant F. Walton Center for Remote Sensing and Spatial Analysis (CRSSA), Rutgers University
GIS DATA DOWNLOAD: Submerged Aquatic Vegetation

no data area (not sampled)

Barnegat Bay

Little Egg Harbor

Submerged Aquatic Vegetation (SAV) of Barnegat Bay - Little Egg Harbor

bbleh_sav85_87.shp

SAV 1985-87

GIS data available for download:
http://crssa.rutgers.edu/projects/coastal/sav/
Please read all metadata documentation
CRSSA, 20110513

Sampled field data

Submerged Aquatic Vegetation

Grant F. Walton Center for Remote Sensing and Spatial Analysis (CRSSA), Rutgers University
GIS DATA DOWNLOAD: Submerged Aquatic Vegetation

Barnegat Bay

Little Egg Harbor

Submerged Aquatic Vegetation (SAV) of Barnegat Bay - Little Egg Harbor

bbleh_sav96_99.shp

SAV 1996-99

GIS data available for download:
http://crssa.rutgers.edu/projects/coastal/sav/
Please read all metadata documentation
CRSSA, 20110513

Sampled field data

Submerged Aquatic Vegetation

Grant F. Walton Center for Remote Sensing and Spatial Analysis (CRSSA), Rutgers University
GIS DATA DOWNLOAD: Submerged Aquatic Vegetation

Barnegat Bay

Little Egg Harbor

Submerged Aquatic Vegetation (SAV) of Barnegat Bay - Little Egg Harbor

bbleh_sav03_rev.shp

SAV 2003

GIS data available for download:
http://crssa.rutgers.edu/projects/coastal/sav/
Please read all metadata and report documentation
CRSSA, 20110513

Sampled field data

Submerged Aquatic Vegetation

Grant F. Walton Center for Remote Sensing and Spatial Analysis (CRSSA), Rutgers University
GIS DATA DOWNLOAD: Submerged Aquatic Vegetation

Submerged Aquatic Vegetation (SAV)
of Barnegat Bay - Little Egg Harbor

bbleh_sav09.shp

SAV 2009

GIS data available for download:
http://crssa.rutgers.edu/projects/coastal/sav/
Please read all metadata and report documentation
CRSSA, 20110513

Reporting data
Species of Conservation Importance

Species decreasing trend

- 1
- 2
- 3 - 5
- 5 - 10
- 10 - 15
- 15 - 20

MED cooperation area

Study regions

ETRS 1989 LAEA
52N-10E

0   500   1000 Km

© UMA

Number of species of European conservation importance with decreasing trend of change in population size.

Source: CEM Working Paper No 11

Disaggregating (sub)national statistics

Number of nights spent at hotels (2015) at categorical NUTS 2 level (left) and at 10km grid level (right)

Modelled data based on observed data

Pollution by maritime transport

Intensity of pollution by maritime transport

Pressure Index
High
Low

● Cetaceans sightings

MED cooperation area

Study regions

ETRS 1989 LAEA
52N-10E   0   100   200 Km

Effects of underwater noise on marine mammals and collision risk

© UMA

Intensity of pollution by maritime transport

Pressure Index
High
Low

Area influenced by lack of data

MED cooperation area   Study regions

ETRS 1989 LAEA
52N-10E   0   500   1000 Km

The map represents the degree of pressure based on the intensity of transport in the Mediterranean Sea. Three variables were taken into account: vessels traffic, port activity and oil spills.

Shipping data (Halpern et al., 2008) provide an estimate of the occurrence of ships at a particular location, and therefore an estimate of the amount of pollution they produce (via fuel leaks, oil discharge, waste disposal, etc.), under the assumption that traveling ships primarily affect their immediate waters. The dispersal of port-derived pollution was modeled as a diffusive plume based on data of transport of goods (thousand tonnes) and passengers (thousand passengers). Pressures generated by oil spills and other pollution releases are represented as a density layer based on data registered by the REMPEC, and also the oil spills map generated by Cinirella et al, 2012 (based on JRC 2009 data).

Source: Eurostat, 2012
Ocean-Based Pollution, NCEAS, 2008
REMPEC, 1977-2014; Cinirella et al, 2012

Combination of observed & modelled data

Invasive Alien Species (IAS) due to maritime transport

Alien species related to transport activity

Number of species

- 1 - 3
- 4 - 8
- 9 - 15
- 16 - 24
- 25 - 35

MED cooperation area

Study regions

© UMA

Introduction of alien species by transport is represented by the total number of species that have been introduced due to the activities of vessels and ports in the Mediterranean Sea, according to EASIN (JRC) data. Number of species is distrubed in a grid cell with a resolution of 10 km. Map classifications are based on EASIN criteria.

ETRS 1989 LAEA
52N-10E

0   500   1000 Km

Source: EASIN database, JRC, 2014

Modelled data based on national statistics

Nutrient Input

Degree of Nutrient inputs

Pressure Index
- High
- Low

MED cooperation area   Study regions

ETRS 1989 LAEA
52N-10E

0   500   1000 Km

© UMA

This maps shows the degree of nutrient inputs from inland sources along the Mediterranean coastal region. The layer is based on FAO national statistics on average annual use of fertilizers (nutrients) for the years 1993-2002, distributed across landscapes in agricultural lands with disagregation techniques.

Source: NCEAS, 2008

From local data to global assessment

Toulon : Completely disappeared
Marseille : -90 %

Alicante : -52 %

Ligurian Sea : -20 %

Gabes : Competely disappeared

Posidonia deterioration

Posidonia oceanica

Zostera spp.

Number of studies
1
10
40

no detectable change
increase
decrease

Human Pressure Indicator

Cumulative Pressure Indicator: pressure categories

$$P_T = \frac{(W_1 \cdot P_1) + (W_2 \cdot P_2) + (W_3 \cdot P_3) + (W_4 \cdot P_4) + (W_5 \cdot P_5) + (W_6 \cdot P_6)}{6}$$

Developing a Cumulative Impacts Indicator from composite data sets and models

Layer	Reference data
1. Climate change	Change in sea surface temperature (SST). NCEAS, 2008.
	Sea level rise (SLR) along the European coast. CNES/LEGOS/CNS, 1993-2013.
2. Aquaculture	Fish farms in the Mediterranean Sea. Trujillo et al., 2012.
	Shellfish production areas. EMODnet Human Activities, 2014.
3. Fishing	Fishing ports and fleet statistics. DG-MARE, 2014.
	Marine ecosystems on soft bottoms. NCEAS, 2008.
	Bathymetry. GEBCO, 2014.
	Biodiversity. EMODnet Biology Portal, 2014.
4. Marine litter	Numerical modelling of floating debris in the world's oceans. Lebreton et al., 2012.
	Fifteen-year average of total marine litter in the Mediterranean Sea. IFREMER, 2014.
5. Maritime transport	Marine exposure due to port activity. Eurostat, 2012.
	Ocean-based pollution. NCEAS, 2008.
	Oil spill density. REMPEC, 1977-2014; CNR-IIA, 2012.
6. Coastal tourism	Marinas: number of moorings. Plan Bleu, 2014; Spanish Federation of Associations of Tourist Marinas, 2014; Portbooker.com, 2014; EEA, 2014.

Cumulative Pressure Indicator map with inset maps for Strait of Gibraltar, Ligurian Sea, Gulf of Venice, and Sicilian Sea.

Cumulative Pressure Indicator: pressure categories

- Very Low
- Low
- Medium
- High
- Very High

- MED cooperation area
- Area influenced by lack of data
- Study regions

ETRS 1989 LAEA
52N-10E

0   500   1000 Km

The map represents the Cumulative Pressure Indicator. This indicator combines the effect of six socio-economic and environmental drivers of pressure: climate change, fishing, aquaculture, maritime transport, coastal tourism and marine litter.

© UMA

Source: ETC-UMA, 2015

Outline

A selection of SDG indicators that rely on spatial data

Goals and targets (from the 2030 Agenda)	Indicators
2.4 By 2030, ensure **sustainable food production** systems and implement **resilient agricultural practices** that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality	2.4.1 Proportion of **agricultural area** under productive and sustainable agriculture
6.6 By 2020, protect and restore **water-related ecosystems**, including mountains, forests, wetlands, rivers, aquifers and lakes	6.6.1 Change in the **extent of water-related ecosystems** over time
9.1 Develop **quality, reliable, sustainable and resilient infrastructure**, including regional and trans-border infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all	9.1.1 Proportion of the rural population who live within 2 **km of an all-season road**
11.7 By 2030, provide universal access to **safe, inclusive and accessible, green and public spaces**, in particular for women and children, older persons and persons with disabilities	11.7.1 Average s**hare of the built-up area of cities** that is open space for public use for all, by sex, age and persons with disabilities
14.5 By 2020, conserve at least 10 per cent of **coastal and marine areas**, consistent with national and international law and based on the best available scientific information	14.5.1 Coverage of **protected areas** in relation to marine areas

A selection of SDG indicators that rely on spatial data

Goals and targets (from the 2030 Agenda)	Indicators
2.4 By 2030, ensure **sustainable food production** systems and implement **resilient agricultural practices** that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality	2.4.1 Proportion of **agricultural area** under productive and sustainable agriculture
6.6 By 2020, protect and restore **water-related ecosystems**, including mountains, forests, wetlands, rivers, aquifers and lakes	6.6.1 Change in the **extent of water-related ecosystems** over time
9.1 Develop **quality, reliable, sustainable and resilient infrastructure**, including regional and trans-border infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all	9.1.1 Proportion of the rural population who live within 2 **km of an all-season road**
11.7 By 2030, provide universal access to **safe, inclusive and accessible, green and public spaces**, in particular for women and children, older persons and persons with disabilities	11.7.1 Average s**hare of the built-up area of cities** that is open space for public use for all, by sex, age and persons with disabilities
14.5 By 2020, conserve at least 10 per cent of **coastal and marine areas**, consistent with national and international law and based on the best available scientific information	14.5.1 Coverage of **protected areas** in relation to marine areas

SDG indicators will require:

1. **RELIABILITY of data sources (official sources, peer-reviewed methodologies, validation, ground truthing)**

2. **HARMONISATION of data (coming from different sources) and methods**

3. **REPEATABILITY of methodologies to ensure monitoring of indicators**

4. **AVAILIBILITY of time series**

Workflow to develop SDG indicators based on spatial data

```
┌─────────────────────────┐
│  Data are available at  │
│   national level and    │
│   with time series?     │
└─────────────────────────┘
            ┊
          ◇ Yes ◇
            ┊
┌─────────────────────────┐
│    Are data up-to-      │
│   date, complete &      │
│     comparable?         │
└─────────────────────────┘
            ┊
          ◇ Yes ◇
            ┊
┌─────────────────────────┐
│ Are data valid? (validate│
│   by stakeholders or    │
│     groundtruthing)     │
└─────────────────────────┘
            ┊
          ◇ Yes ◇
            ┊
┌─────────────────────────┐
│    SDG indicator        │
│   calculation and       │
│      mapping            │
└─────────────────────────┘
```

Workflow to develop SDG indicators based on spatial data

Workflow to develop SDG indicators based on spatial data

Workflow to develop SDG indicators based on spatial data

Outline

I. Critical role for spatial and temporal information to systematically monitor biodiversity loss and human use

II. Clear workflows are essential to develop monitoring frameworks and useful spatial indicators that can pragmatically measure SDGs (land, coastal and marine related)

III. **National workflows standardize data to develop indicators that allow regional comparability and prioritization of interventions**

SDG indicators

Goal 6. Ensure availability and sustainable management of water and sanitation for all	
6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all	6.1.1 Proportion of population using safely managed drinking water services
6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations	6.2.1 Proportion of population using safely managed sanitation services, including a hand-washing facility with soap and water
6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally	6.3.1 Proportion of wastewater safely treated
	6.3.2 Proportion of bodies of water with good ambient water quality
6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity	6.4.1 Change in water-use efficiency over time
	6.4.2 Level of water stress: freshwater withdrawal as a proportion of available freshwater resources
6.5 By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate	6.5.1 Degree of integrated water resources management implementation (0-100)
	6.5.2 Proportion of transboundary basin area with an operational arrangement for water cooperation
6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes	6.6.1 Change in the extent of water-related ecosystems over time
6.a By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies	6.a.1 Amount of water- and sanitation-related official development assistance that is part of a government-coordinated spending plan
6.b Support and strengthen the participation of local communities in improving water and sanitation management	6.b.1 Proportion of local administrative units with established and operational policies and procedures for participation of local communities in water and sanitation management

Workflow to develop SDG indicator based on spatial data

Satellite-based coastal wetland monitoring

Landsat TM 21-09-2005

Satellite-based wetland monitoring

Land Use Land Cover (LULC) Burullus (Egypt) 2005

SWOS LULC Azraq Jordan 1975

Legend

- CLC 2: Agricultural areas
- CLC 32: Shrub and/or herbaceous vegetation association
- CLC 33: Open spaces with little or no vegetation
- CLC 331: Beaches, dunes, and sand plains
- CLC 333: Sparsely vegetated areas
- CLC 411: Inland marshes
- CLC 4111: Reedbeds and high helophytes
- CLC 512: Inland water bodies

Background information

This map depicts the Land Use Land Cover in 1975 and is produced using a Landsat 2 satellite image.

Grid

Projection:	UTM 37 N
Spheroid:	WGS 84
Datum:	WGS 84

Satellite

Satellite:	Landsat 2
Pixel size:	60m
Acquisition dates:	28-06-1975
Background image:	28-06-1975
Data source:	© USGS / ESA

Copyrights

Creation:	22-08-2016
Producer:	info@rssgmbh.de

N

Scale   1:175,000

SWOS
Satellite-based Wetland Observation Service

Legend

- CLC 1: Artificial surfaces
- CLC 124: Airports
- CLC 2: Agricultural areas
- CLC 31: Forests
- CLC 32: Scrub and/or herbaceous vegetation association
- CLC 33: Open spaces with little or no vegetation
- CLC 331: Beaches, dunes, and sand plains
- CLC 333: Sparsely vegetated areas
- CLC 411: Inland marshes
- CLC 4111: Reedbeds and high helophytes
- CLC 512: Inland water bodies

Background information

This map depicts the Land Use Land Cover in 1991 and is produced using a Landsat 5 satellite image.

Grid

Projection:	UTM 37 N
Spheroid:	WGS 84
Datum:	WGS 84

Satellite

Satellite:	Landsat 5
Pixel size:	30m
Acquisition dates:	15-06-1991
Background image:	15-06-1991
Data source:	© USGS / ESA

Copyrights

Creation:	22-08-2016
Producer:	info@rssgmbh.de

N

Scale   1:175,000

0   5,000   10,000   15,000

SWOS
Satellite-based Wetland
Observation Service

SWOS LULC Azraq Jordan 2005

Legend

- CLC 1: Artificial surfaces
- CLC 124: Airports
- CLC 2: Agricultural areas
- CLC 31: Forests
- CLC 32: Shrub and/or herbaceous vegetation association
- CLC 33: Open spaces with little or no vegetation
- CLC 331: Beaches, dunes, and sand plains
- CLC 333: Sparsely vegetated areas
- CLC 411: Inland marshes
- CLC 4111: Reedbeds and high helophytes
- CLC 512: Inland water bodies

Background information

This map depicts the Land Use Land Cover in 2005 and is produced using a Landsat 5 satellite image.

Grid

Projection:	UTM 37 N
Spheroid:	WGS 84
Datum:	WGS 84

Satellite

Satellite:	Landsat 5
Pixel size:	30m
Acquisition dates:	20-05-2005
Background image:	20-05-2005
Data source:	© USGS / ESA

Copyrights

Creation:	22-08-2016
Producer:	info@rssgmbh.de

N

Scale   1:175,000

SWOS
Satellite-based Wetland Observation Service

SWOS LULC Azraq Jordan 2015

Legend

- CLC 11: Urban fabric
- CLC 122: Road and rail networks and associated land
- CLC 124: Airports
- CLC 2: Agricultural areas
- CLC 31: Forests
- CLC 32: Scrub and/or herbaceous vegetation association
- CLC 33: Open spaces with little or no vegetation
- CLC 331: Beaches, dunes, and sand plains
- CLC 333: Sparsely vegetated areas
- CLC 411: Inland marshes
- CLC 4111: Reedbeds and high helophytes
- CLC 512: Inland water bodies

Background information

This map depicts the Land Use Land Cover in 2015 and is produced using a Landsat 8 satellite image.

Grid

Projection:	UTM 37 N
Spheroid:	WGS 84
Datum:	WGS 84

Satellite

Satellite:	Landsat 8
Pixel size:	30m
Acquisition dates:	01-06-2015
Background image:	01-06-2015
Data source:	© USGS / ESA

Copyrights

Creation:	22-08-2016
Producer:	info@rssgmbh.de

N

Scale   1:175,000

0   5,000   10,000   15,000   Meters

SWOS
Satellite-based Wetland
Observation Service

Aggregation of site data to national extent data

1. 27 Mediterranean countries and the coverage of wetlands.

Wetlands coverage
- Less than 2%
- Between 2% and 4%
- Between 4% and 6%
- More than 6%
- No data

FRANCE (only Mediterranean basin) 5,3%

SLOVINIA 4,9%
BOSNIA & HERZEGOVINA
CROATIA 6,9%
MONTENEGRO
FYR of MACEDONIA
SERBIA 7,7%
4,9%
7,7%
ITALY 2,6%
MONACO
BULGARIA 0,9%
ALBANIA 3,7%
2,4%
GREECE 1,7%
TURKEY 2,6%

PORTUGAL 1,8%
SPAIN 1,0%

SYRIA 0,8%
CYPRUS 1,1%
LEBANON 0,1%
PALESTINIAN TERRITORIES 1,3%
ISRAEL 1,3%
JORDAN 0,5%

MOROCCO 0,7%
MALTA 0,1%
TUNISIA 8,2%
ALGERIA 0,6%

4

5

EGYPT 3,5%
LIBYA 0,2%

0   500 km

1ᵉ M.W.O. technical report

1ᵉ M.W.O. technical report

Source: MWO 2012

SDG indicators

Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development

14.1 By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution	14.1.1 Index of coastal eutrophication and floating plastic debris density
14.2 By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans	14.2.1 Proportion of national exclusive economic zones managed using ecosystem-based approaches
14.3 Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels	14.3.1 Average marine acidity (pH) measured at agreed suite of representative sampling stations
14.4 By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics	14.4.1 Proportion of fish stocks within biologically sustainable levels
14.5 By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information	14.5.1 Coverage of protected areas in relation to marine areas
14.6 By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation[b]	14.6.1 Progress by countries in the degree of implementation of international instruments aiming to combat illegal, unreported and unregulated fishing
14.7 By 2030, increase the economic benefits to small island developing States and least developed countries from the sustainable use of marine	14.7.1 Sustainable fisheries as a proportion of GDP in small island

Workflow to develop SDG indicator based on spatial data

Marine Protection 2007

Mediterranean Marine Protected Areas

Marine area protected (km²)

- > 1000
- 500 - 1000
- 200 - 500
- 100 - 200
- 20 - 100
- 0.01 - 20
- △ No data

● Albania	● France	● Lebanon	● Slovenia	● Turkey
● Algeria	● Greece	● Malta	● Spain	● United Kingdom - Gibraltar
● Croatia	● Italy	● Morocco	● Syria	▢ Pelagos Sanctuary
● Cyprus	● Israel	● Monaco	● Tunisia	

Marine Protection 2014

MAPAMed 2014 update (source: Rodriguez-Rodriguez et al., 2016)

Mediterranean Marine Protected Areas 2014

© UMA

Marine area protected (km²)

- ⬤ > 1000
- ⬤ 500 - 1000
- ● 200 - 500
- ● 100 - 200
- ● 20 - 100
- ∘ 0.01 - 20
- △ No data

⬤ Albania	⬤ France	⬤ Lebanon	⬤ Slovenia	⬤ Turkey
⬤ Algeria	⬤ Greece	⬤ Malta	⬤ Spain	⬤ United Kingdom - Gibraltar
⬤ Croatia	⬤ Italy	⬤ Morocco	⬤ Syria	▢ Pelagos Sanctuary
⬤ Cyprus	⬤ Israel	⬤ Monaco	⬤ Tunisia	

Legend: ■ Ecoregion protected in 2014 (%)   ■ Ecoregion protected in 2015 (%)

Rodríguez-Rodríguez et al. 2016. Marine protected areas and fishing reserves in the Mediterranean: assessing "actual" marine biodiversity protection at multiple scales.

Marine Protection in km²
MAPAMed 2014 update (source: Rodriguez-Rodriguez et al., 2016)

Marine Protection in km^2

MAPAMed 2014 update (source: Rodriguez-Rodriguez et al., 2016)

CBD Aichi Target 11 and SDG 14.5 of 10% EEZ Conservation

Monaco 100%
France 59.19%
Spain 11.82%

Turkey 10.29%
Italy 8.55%
Croatia 8.48%

km^2

Morocco 1.68%
Tunis 0.90%
Egypt 0.57%

Syria 0.61%, 0.10%
Libya 0.08%
Lebanon 0.02%

Marine Protection in km²

MAPAMed 2014 update (source: Rodriguez-Rodriguez et al., 2016)

Actual Management

Monaco 100% (100%)   Turkey 3% (10.29%)
France 55% (59.19%)   Italy 8% (8.55%)
Spain 2.3% (11.82%)   Croatia 0.8% (8.48%)

km²

Morocco 1.28 (1.68%) Syria 0.10% (0.10%)
Tunis 0.35% (0.90%)   Libya 0.08% (0.08%)
Egypt 0.57% (0.57%)   Lebanon 0.02% (0.02%)

Main Messages

I. Critical role for spatial and temporal information to systematically monitor biodiversity loss and human use

II. Clear workflows are essential to develop monitoring frameworks and useful spatial indicators that can pragmatically measure SDGs (land, coastal and marine related)

III. National workflows standardize data to develop indicators that allow regional comparability and prioritization of interventions

For more information:

www.etc.uma.es

http://www.medmaritimeprojects.eu/section/med-iamer
http://147.84.210.211:8080/geoexplorer/composer/ (map viewer with Med-IAMER data)

http://swos-service.eu/