

## Working Group on Comparative Ecosystem-based Analyses of Atlantic and Mediterranean marine systems (WGCOMEDA)

2019/FT/IEASG03 The Working Group on Comparative Ecosystem-based Analyses of Atlantic and Mediterranean marine systems (WGCOMEDA), chaired by Sofia Henriques, Portugal, Maria Cristina Mangano, Italy, Paris Vasilakopoulos, Italy and Romain Frelat, Netherlands, will work on ToRs and generate deliverables as listed in the Table below.

YEAR	MEETING DATES	VENUE	REPORTING DETAILS	COMMENTS (CHANGE IN CHAIR, ETC.)
Year 2020	21-25 September	By correspondence	No annual report	Four new co-chairs to pursue the development of WGCOMEDA activities
Year 2021	4-8 October	University of Palermo, Italy	No annual report	
Year 2022	TBD May	TBD	Final ICES Scientific report by TBD July 2022	

### Tor descriptors

ToR	Description	Background	<a href="#">Science plan codes</a>	Duration	Expected Deliverables
a	Assess the <b>functional biodiversity</b> of demersal and benthic assemblages across Mediterranean and Atlantic systems	<p>A) The topic is a follow up from the work in the previous cycles aiming to improve: (1) the use of functional traits to assess the structure and functioning of marine assemblages (integrating different taxonomic groups) and (2) the assessment of functional biodiversity patterns across Mediterranean and Atlantic systems</p> <p>B) The tor will provide better understanding of ecosystems functioning and improve our ability to predict the impact of environmental and human-induced changes.</p>	1.4; 1.9; 2.2	3 years	<p>1. Define the <b>core functional traits</b> across different taxonomic groups in order to integrate the current approaches</p> <p>2. <b>Compile trait data</b> for phytoplankton, zooplankton, fish and invertebrate species to standardize the use of traits</p> <p>3. Identify possible methods to deal with <b>dynamic traits on space and time</b>, i.e. Those which are demographic (e.g. Fecundity) or ontogenetic (e.g. Diet) dependent</p> <p>4. Understand spatio-temporal dynamics and patterns of <b>functional diversity and respective drivers</b> (trait biogeography; co-occurrence of traits)</p>

					5. Understand functional changes to different human pressures and <b>predict the vulnerability and stability of Mediterranean and Atlantic ecosystems</b> (resilience indicators).
b	Integrate the complexity of marine biota to understand how <b>ecosystem structure and connectivity</b> support the stability of communities	<p>A) The topic is a follow up from the work in the previous cycles and addresses issues on integrating multi-trophic interactions for IEA</p> <p>B) Ecosystem structure and connectivity is known to affect community stability, but empirical evidences are still weak. Embracing the complexity of marine ecosystems (e.g. By integrating trophic interactions) will strengthen the input and guidance for ecosystem-based management.</p>	1.4; 1.9; 5.2	3 years	<p>1. Review existing <b>food webs models</b> across Mediterranean and Atlantic systems</p> <p>2. Identify possible methods to <b>predict species interactions from traits</b> and extend multi-trophic interaction network in data-poor regions</p> <p>3. Understand spatio-temporal dynamics of food webs and identify the <b>link between structure and stability</b> across ecosystems</p> <p>4. Understand past and <b>predict future vulnerabilities</b> of communities to fishing disturbances or biological invasions.</p>
c	Investigate <b>resilience and mechanisms of change</b> in complex marine systems impacted by anthropogenic and environmental drivers	<p>A) The topic is a follow up from the work in the previous cycles and aims to study systems undergoing changes in the NE Atlantic and the Mediterranean to uncover synchronies and analogies across them.</p> <p>B) Several complex marine systems have been shown to respond to environmental and/or anthropogenic drivers with abrupt regime shifts. Comparative analysis of different systems will elucidate the exact role of different drivers in eroding or reinforcing the resilience of specific system states and help anticipate future tipping points. The impact to both ecosystems and fisheries can then be evaluated.</p>	1.3; 1.9; 6.5	3 years	<p>1. Review and update existing information on the <b>temporal development of ecosystems</b> in the NE Atlantic and the Mediterranean.</p> <p>2. Develop and test different types of <b>Integrated Assessments</b>: e.g. Ecosystem-based, traits-based, population-based etc.</p> <p>3. Quantify the <b>resilience of different system states</b> and elucidate the specific role of different stressors.</p> <p>4. Compare the system dynamics and <b>temporal occurrence of shifts</b> in different</p>

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ecosystems of the NE Atlantic and the Mediterranean Sea.

5. Improve our **prediction capability on future shifts** in complex marine systems through a better understanding of the past dynamics.

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d	Explore options to integrate ecological and socio-economic dimensions to support integrated fisheries advice and marine management	A) New topic incorporating social and cultural aspects in order to support the implementation of IEA in regional ecosystems.  B) The tor will be organised around 3 main activities and expected deliverables: scoping and systematic review, evidence mapping and synthesis, comparative analysis of case studies.	6.6; 7.1; 7.2;	3 years	<p>1. Scoping exercise mostly focused in the Mediterranean Sea to check for existing literature and to ensure coordination of activities with other international bodies and existing wgs within and outside ICES (e.g. ICES wgsocial, JRC, GFCM).</p> <p>2. Evidence mapping to highlight the current work and identify future needs and gaps for social science in Med.</p> <p>3. Case studies assessing and reporting the social and cultural significance of commercial fishing (coastal regions in both the Med and Atlantic). Selection and provision of relevant indicators and analysis with economic and ecological information.</p> <p>4. Framework for collective reporting (database) to support future potential data collection, data analysis and advice development in a context of integrated ecosystem assessments.</p> <p>5. Trade-off exploration to assess the socio-cultural and economic significance of commercial fishing (work with other relevant ICES wgs).</p>
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## Summary of the Work Plan

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**Year 1** 1.1 Definition of the core functional traits across different taxonomic groups. This activity will be developed in order to integrate the current approaches among trophic levels (i.e. What traits should we use to understand linkages between plankton, fish and benthic invertebrates) - Deliverable tor a1. Then, we will start the collection and compilation of standardized trait data for phytoplankton, zooplankton, fish and invertebrate species in order to create a common trait database – toward Deliverable tor a2.

1.2 Reviews and update databases of (i) existing food webs models, (ii) temporal development of ecosystems and (iii) socio ecological systems approaches across Mediterranean and Atlantic systems - Deliverables tor b1, tor c1 and tor d1. All the 3 tors (b, c and d) start with a revision activity of data from the scientific and grey literature as well as a survey of current work from participants of the working group. Temporal dynamics of ecosystems could be informed by time-series of the abundance of different taxa (e.g. From scientific surveys) and/or fisheries-related data (e.g. Fisheries landings) - Deliverables tor c1. The scoping exercise of socio-ecological systems is followed by an evidence mapping (data analysis from the systematic review - Deliverables tor d1) that will depict the current work and identify future needs and gaps for social science when dealing with ecosystem-based approach - Deliverable tor d2.

1.3 Networking activities to ensure coordination with other international bodies and existing wgs within and outside ICES.

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**Year 2** **2.1 Completion of the common trait database** - deliverable tor a2 - and identification of methods to deal with dynamic traits on space and time, i.e. Those which are demographic (e.g. Fecundity) or ontogenetic (e.g. Diet) dependent - deliverable tor a3 - and to predict species interactions from traits and extend multi-trophic interaction network in data-poor regions - deliverable tor b2.

**2.2 Development and testing of different types of Integrated Assessments** (e.g. Traits-based linking to tor a2, ecosystem-based, population-based) - deliverable tor c2, in order to quantify the resilience of different system states and elucidate the specific role of stressors - deliverable tor c3.

**2.3. Case studies assessing and selecting relevant indicators dealing with socio-ecological systems** - Deliverable tor d3, e.g. The social and cultural significance of commercial fishing (coastal regions in both the Mediterranean and the Atlantic).

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**Year 3** **3.1 Spatio-temporal analysis of functional diversity dynamics** - deliverables tor a4 - **and of food webs structure** - deliverables tor b3 – in order to understand past dynamics and identify drivers of change across ecosystems in NE Atlantic and the Mediterranean Sea.

**3.2 Assessment of future vulnerability and stability of Mediterranean and Atlantic ecosystems to different human pressures**, through looking at functional changes and developing resilience indicators - deliverables tor a5 – and by using food web structure to indicate the ecosystem resilience to disturbances (e.g. Fishing disturbances or biological invasions) - deliverables tor b4.

**3.3 Comparison of the temporal occurrence of shifts in different ecosystems of the NE Atlantic and the Mediterranean Sea** to improve our prediction capability on future shifts in complex marine systems through a better understanding of the past dynamics - Deliverables tor c4 and c5.

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**3.4 Collective reporting (database) to assess the socio-cultural and economic significance of commercial fisheries** and support future potential data collection, data analysis, trade-off elaboration and advice development in a context of integrated ecosystem assessments of commercial fishing - Deliverables tor d4 and 5.

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## Supporting information

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**Priority** The aim of this working group (WG) is to investigate both cross-systems and system-specific key questions to guide research and improve the ecosystem approach to management of living marine resources of the European Seas. To this end, we use existing data and analysis from regional systems of the North East Atlantic Ocean and Mediterranean Sea. A **comparative approach of marine ecosystems** is essential to learn how Mediterranean and Atlantic ecosystems are structured, how they function, and also to identify which are the more sensitive species or ecological processes to be managed within the ecosystem dynamics. Therefore, this WG aims at strengthening the scientific basis for regional and integrated ecosystem approach of coastal and marine living resources through a comparative platform of research.

During the previous two cycles, WG COMEDA established a strong network of collaboration that will continue contributing to the comparative knowledge of Atlantic and Mediterranean systems. The new tors build up on past research of the group and propose to use novel approaches to assess the **functional diversity, resilience, connectivity and complexity of marine assemblages**, both across biological groups and between Mediterranean and Atlantic systems. Additionally, a new topic (tor d), related with ecosystem services, aims to **integrate the socio-economic dimension** with the advanced biological knowledge in order to better understand the effects of both anthropogenic changes and management options in the ecosystems.

Close collaboration with other wgs of the SCICOM/ACOM Steering Group on Integrated Ecosystem Assessments (SSGIEA) such as WGIAB, WGEAWESS, WGSOCIAL and WGMARS will provide a solid basis to develop the research topics and tor d of this new COMEDA cycle. Furthermore, during this new cycle we will invite colleagues working on ecosystem services and on linking socio-economic and ecological dimensions to the meetings to develop and improve COMEDA's current knowledge. The new tor d shows the commitment of the group to develop applied research to support integrated fisheries advice and marine management.

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**Resource requirements** Information from ICES, GFCM, and JRC – STECF WG databases are the main input for this group. No additional resources are identified, although participation of some experts (especially early career scientists) to working group meetings depends on funding availability.

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**Participants** The Group is normally attended by some 20–25 members and guests.

The preliminary list of possible participants is the following:

- Romain Frelat (University of Hamburg, Germany) – Chair and expert on Atlantic ecosystems (North Sea and Baltic Sea).
  - Sofia Henriques (University of Lisbon, MARE, Portugal) – Chair and expert on Atlantic ecosystems, global meta-analysis and functional diversity.
  - Paris Vasilakopoulos (European Commission - JRC, Italy) – Chair and expert on Mediterranean ecosystems and resilience.
  - Maria Cristina Magano (distem,, University of Palermo, Italy) – Chair and expert on Mediterranean ecosystems.
  
  - Marta Coll (ICM-CSIC, Spain) – Expert on Mediterranean ecosystems and food webs.
  - Manuel Hidalgo (IEO, Spain) – Expert on Atlantic and Mediterranean ecosystems.
  - Hilmar Hinz (IMEDEA-CSIC, Spain) – Expert on Atlantic ecosystems and invertebrates' biodiversity and assemblages.
  - Christian Möllmann (Univ. Of Hamburg, Germany) – Expert on Atlantic ecosystems.
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- Evangelos Tzanatos (University of Patras, Greece) – expert on Mediterranean ecosystems.
  - Bastian Merigot (University of Montpellier, France) – expert on Atlantic and Mediterranean ecosystems.
  - Françoise Le Loch (IRD, France) – Expert on Atlantic and Mediterranean ecosystems.
  - Konstantinos Tsagarakis (Greece) – Expert on Mediterranean ecosystems (Aegean Sea).
  - Martin Lindegren (DYU-AQUA, Denmark) – Expert on Atlantic ecosystems (Baltic Sea).
  - Rita Vasconcelos (IPMA, MARE, Portugal) – Expert on Atlantic ecosystems, fisheries management and global meta-analysis.
  - Silvia de Juan (IMEDEA-CSIC, Spain) – Expert on Atlantic ecosystems and invertebrates’ biodiversity and assemblages.
  - Lucia López (IEO, Spain) – Expert on Mediterranean ecosystems and food webs.
  - Michele Casini (Swedish University of Agricultural Science, Sweden) – expert on Atlantic ecosystems (Baltic Sea).
  - Thorsten Bleckner (Stockholm Resilience Center, Stockholm University, Sweden) – expert on Atlantic ecosystems (Baltic Sea).
  - Henn Ojaveer (University of Tartu, Estonia) – expert on Atlantic ecosystems (Baltic Sea).
  - Sheila Heymans (SAMS, UK) – expert on Atlantic ecosystems (Western Scotland).
  - Marian Torres (University of Algarve, Portugal) – expert on Atlantic ecosystems.
  - Eider Andonegi (AZTI, Spain) – expert on Atlantic ecosystems (Cantabric Sea).
  - Joachim Claudet (CRIOBE, France) – expert on Pacific and Mediterranean ecosystems.
  - Heino Fock (Thuenen, Germany) - expert on Atlantic and Arctic ecosystems (Greenland).
  - Ignacio Catalàn (IMEDEA, Spain) – expert on Atlantic and Mediterranean ecosystems.
  - Jaime Otero (IIM, CSIC, Spain) – expert on Atlantic and Arctic ecosystems.
  - Laurène Pécuchet (DTU-AQUA, Denmark) – expert on Atlantic and Mediterranean ecosystems.
  - Mariano Koen-Alonso (DFO, Canada) – expert on Atlantic ecosystems (West Canada).
  - Raul Primicerio (University of Tromsø, Norway) – expert on Arctic ecosystems (Barents Sea).
  - Marcos Llope (IEO, Spain) – expert on Atlantic ecosystems
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**Secretariat facilities** None

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**Financial**

No financial implications for ICES.

To facilitate the participation of early-career scientists, WG chairs will apply to marine research consortiums to find financial support for early-career researchers who need travel funding.

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**Linkages to ACOM and groups under ACOM**

There are no obvious direct linkages.

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**Linkages to other committees or group**

There is a very close working relationship with all the groups IEASG, and especially

- Working Group on Integrated Assessments of the Baltic Sea (WGIAB)
- Working Group on Ecosystem Assessment of Western European Shelf Seas (WGEAWESS)
- Working Group on SOCIAL indicators (WGSOCIAL) (especially tor d)
- Working Group on Maritime Systems (WGMARS) (especially tor d)

It is also very relevant to the Working Groups:

- Working Group on the Integrated Assessments of the Barents Sea (WGIBAR)
  - Working Group on Integrated Assessments of the North Sea (WGINOSE)
  - Working Group on Integrated Ecosystem Assessment for the Central Arctic Ocean (WGICA)
  - Working Group on the Northwest Atlantic Regional Sea (WGNARS)
  - Working Group on Biodiversity Science (WGBIODIV) (especially tor b)
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**Linkages to other organizations**

None

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