

## Panel C- *INVASIVE SPECIES*

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### Conclusions and recommendations from the Panel discussions

Introduction of invasive species (IS) strongly impacts the conservation of biodiversity, structure and function of ecosystems, sustainable exploitation of natural resources, and negatively impacts industries, posing threats to human health in both the Black Sea and the Mediterranean. These impacts, both in ecological and economic-societal terms, are of great importance to legislators, managers, policy makers and conservationists.

Many marine IS, particularly smaller sized taxa, remain unrecognized and undetected, in part due to the continuing erosion of taxonomic expertise. Even for the larger, more conspicuous marine IS, our understanding of their impacts is extremely limited. In fact, impacts for the vast majority of marine IS remain unknown and have not been quantitatively or experimentally studied over sufficiently long temporal and spatial scales, and their cumulative and synergetic connections with other drivers of change affecting the marine environment are largely unknown. Unless impacts are conspicuous, induce direct economic cost, or impinge on human welfare, they fail to arouse public awareness or scientific analysis (e. g., *Mnemiopsis leidyi*).

In the late 1990s CIESM - the 'Mediterranean Science Commission' undertook the challenge of assembling and validating many thousands of records of 'exotic' species in the Mediterranean Sea, presenting them in a standardized, scientifically robust and user-friendly format. This pioneering endeavour resulted in the publication of the first 'Atlas' of 'exotic' species in the Mediterranean (<http://www.ciesm.org/online/atlas/>) – in fact, the first of its kind worldwide. The volumes of the 'Atlas' galvanized attention and garnered recognition for the unique situation concerning bioinvasions in the Mediterranean Sea, promoted

documentation of the full extent of the diversity of 'exotic' species, and provided information for management and conservation policies. Since the volumes appeared in press and on CIESM website (<http://www.ciesm.org>), changes have occurred not only in the tally of species and their spread, but in our own understanding of the phenomenon. Over this period electronic resources on IS have proliferated: worldwide more than 260 websites have been recently listed, yet, the 'Atlas' is singular in serving as a tool for identification of the 'exotic' species recorded in the Mediterranean Sea.

The Pnael presentations, followed by lively discussions, highlighted some common issues:

Though both the Black Sea and the Mediterranean have been notoriously impacted by IS, no region-wide targeted efforts to survey the presence and abundance of IS have taken place. A distinct size bias is apparent in the lists of IS, with data nearly absent for many of the small-sized invertebrate taxa. The scientists present agreed that the numbers of recorded IS are likely to be grossly underestimated. The magnitude of this gap is difficult to assess and it is inconsistent amongst different taxa, habitats and regions. Increasingly used molecular tools have revealed cryptic species and erroneous identifications, even among large and presumably well known taxa such as fish and decapod crustaceans. The scientists agreed on the paucity of experimental studies on demonstrable or inferred impacts of IS.

Collecting, validating and timely provision of accurate information underlies management actions. Due to the fragmented nature or lack of IS monitoring programmes in most Black Sea and Mediterranean countries, reliable information on the spread and abundance of IS is rarely available.

Alongside routine monitoring activities, 'participatory citizen surveys' serve as effective tool for early detection of IS. The 'Mediterranean Science Commission' already has in place the 'Jellywatch' and 'Tropical signals' monitoring programmes, which assist in tracing IS data. Considering the need for standardization and amalgamation of IS observations, these initiatives may prove efficient in the Black Sea as well.

Over 700 multicellular IS have been recorded in the Mediterranean Sea, with many establishing viable populations and dispersing along its coastline. Some of these species have been recently recorded in the Black Sea. Particular attention is paid to signal harmful IS such as *Lagocephalus sceleratus*. Introduction of propagules through the Suez Canal drives the establishment and spread of IS in the eastern and central Mediterranean – the implications of the enlargement of the Canal and global warming were discussed.

**Recommendations:**

- A. Integration of the Black Sea IS data within the ‘CIESM Atlas’.
- B. Consolidating and enhancing the integration of the Black Sea within the CIESM ‘Tropical signals’ Program (as was accomplished for the JellyWatch Program).
- C. Building on the expertise in the Black Sea scientific community in research of IS gelatinous plankton to build joint research in the Mediterranean.
- D. Joint study on the ecosystem impact as well as socio-economical impacts of a signal harmful IS such as *Lagocephalus sceleratus*.