PANEL REPORT BY THE MODERATOR

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Keywords : Black Sea, Fisheries, Food Webs, Pollution.

Panel 2, which was held on Tuesday 10 April, discussed recent advances in Black Sea research. The forum placed particular emphasis on the following subjects:

1. ecosystem functioning and food web structure;
2. biogeochemical cycles;
3. pollution and biodiversity;
4. climate-induced changes;
5. prediction and future scenarios of the Black Sea ecosystem functioning.

Particular attention was given to the current status of the ecosystem, its possible state within the next few decades, and missing critical research information.

The panel started with presentations by five Black Sea experts.

Nicolae Panin presented an overview of the current state of Black Sea coastal areas and of the threats arising from global change and regional variability. Antje Boetius described the latest findings on the biogeochemistry and microbiology of the anoxic Black Sea environment, which is recognized worldwide as a natural laboratory for such research activities that were made thanks to the recent German cruises in the region. The major motivations behind this research project were to understand the characteristics and driving forces of the geological structures that harbour anoxic microbial ecosystems, to define the unique key microorganims, diversity of fauna and biogeochemical pathways present in anoxic habitats, to discover how these ecosystems interact with geological structures that host them, and how they are affected by environmental change, and to carry out long term observations of gas vents, mud volcanoes and hydrate systems in the Black Sea. Iolanda Osvath touched another interesting issue, i.e. the existence of links between radiotracer observations and fate of contaminants within the basin. The major focus of her presentation was the capacity building in the region to measure, monitor and assess marine radioactivity and apply tracer techniques. An overview on the status of radioactive contamination as identified by various radiotracers was also given.

Andrei Zatsepin presented an overview of high-resolution, interdisciplinary field surveys carried out along the eastern coast of the Black Sea during the last five years, in relation to the basin mesoscale dynamics and its impact on plankton, fish eggs and larvae communities. An important finding of these studies is that intense Rim Current can restrict cross-slope exchange and cause the uneven plankton distribution identified for different species on both sides of the shelf-break front, whereas the weakening of the Rim Current gives rise to more even plankton distribution and intense cross-slope transport. Finally, Ahmet Kideys summarized existing knowledge regarding the role of models for ecosystem-based fishery management. His presentation was centered on the description of different factors that, at different degrees, have the potential of affecting ecosystems and fisheries and are subject to both spatial and temporal variability.

Approximately, 50 scientists from the region and beyond actively participated in the panel discussion after the individual presentations. The debate was on a) the major factors controlling the re-organization of the ecosystem during the past several decades, b) whether or not the present status of the Black Sea shows signs of recovery, and c) what could be the fate of gelatinous carnivores and anchovy populations within the next ten years. It was agreed by the audience that anthropogenic perturbations are decaying and the ecosystem is now more strongly regulated by natural climatic variations. Some robust features of the Black Sea ecosystem were identified:

- decrease of nutrient content in the water column and shift of the system towards oligotrophy;
- apparent reduction in the biological production as compared to the 1980s due to the persistence of warming since the mid-1990s;
- comparable level of present day anchovy catch with that of the mid-1970s;
- domination of gelatinous carnivore population by *Beroe ovata*, which suppressed the *Mnemiopsis* population and helped sustain greater anchovy stocks.

It was however agreed by the audience that it is still too soon to talk about ecosystem recovery, as the system continues to be in transient post-eutrophication state. The Black Sea ecosystem fate is expected to critically depend on future environmental conditions, most importantly the degree of exploitation of fishery stocks. In this respect, a careful fishery management may help shifting of the system to a healthy state, which otherwise would regress to the conditions that prevailed in the 1980s and early 1990s.

Two additional issues discussed in the panel were related to the current efforts devoted to operational oceanography and end-to-end, holistic modelling approaches, to enhance the understanding of ecosystem functioning and sustainable management of resources.