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PROJECT ACT

ADAPTING TO CLIMATE CHANGE IN TIME

Impacts of “global warming” on marine fisheries and aquaculture in the northern Mediterranean Sea

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ISPRA Institute for Environmental Protection and Research

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1A – In most marine areas food chains are mainly based on phytoplankton (floating unicellular algae);

1B – phytoplankton is eaten by “herbivorous” animals (mainly Copepods), these by larger ones (e.g. pilchards and jellies) and so on;

1C – food webs based on bottom marine algae and plants exist down to 30-50 m and are of lesser relevance for fishing resources.

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2A – Phytoplankton production is higher when marine waters not too warm and intermittently stirred to help cells to float; moreover, waters need to contain salts, such as nitrates and phopshates, used in the cell metabolism;

2C – in more frequently stirred marine waters larger cells prevail in the phytoplankton, and are more easily eaten by Copepods and other zooplankton.

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3A - In the Mediterranean Sea “global warming” will reduce river outflows and their load of mineral salts (out of which nitrates and phosphates are ecologically relevant) to coastal waters;

3B – in most of the year winds will be occasional, weak and of short duration;

3C – It is worth noticing that the most productive subareas of the Northern Mediterranean are touched by large rivers (e. g. Ebro and Po) and/or have strong winds in some months (e. g. the northern Adriatic and Aegean seas).

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4A – Changes induced by the “global warming” will cut phytoplankton production over the entire Mediterranean Sea;

4B – the structure of the marine fauna will be impacted in favour of species more adapted to warm waters;

4C – pH of marine waters could slightly decrease, negatively impacting the formation of shells in many animals (e.g. mussels).

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5A – Changes in marine food webs will cut the abundance of most Mediterranean commercial fish and shellfish;

5B – marine species mainly living in temperate cold waters (e.g. sprat and whiting) will disappear from commercial catches;

5C – the present-day poor state of almost all exploited marine biological resources will exacerbate negative trends.

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6A – In aquaculture higher water temperatures will increase the oxygen demand of the reared animals and ease physiological stress;

6B – higher water temperatures and stressed condition of animals will ease illness and additive mortality.

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7A – Fishing fleets of EU Mediterranean States will keep decreasing as in the last decade, in accordance with the long-term political goal of reaching sustainable exploitation of stocks;

7B – although appropriate estimates on the present-day exploitation levels are lacking for most Mediterranean marine stocks, a 30%-40% decrease of commercial catches may be guessed.

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8A – Fishermen's counter-measures to face the strong decrease of catches will be mainly economic, i.e. aiming at selling fish and shellfish at higher prices;

8B – special labelling of local marine products would be useful;

8C – expenses will be probably curbed by reducing, as nowadays, days at sea and eliminating less efficient boats and crews.

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9A – In aquaculture some shift of the reared marine species will probably happen, towards those more adapted to warm water;

9B – the worldwide spread of aquaculture suggests that the sector will be able to face “global warming” in the Mediterranean Sea;

9C – further introductions of exotic species are, however, not allowed by the EU legislation in force.

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10A – In Marche County (i. e area around Ancona) the combined economic output of marine fisheries and aquaculture was estimated at 190-140 mln Euros/year in 2001-2006 at first-sale prices;

10B – on Greek coast of NE Ionian Sea (i. e area near Patras) the economic output as above was probably close to 160 mln Euros/year in recent times;

10C – the value of the local fish and shellfish grow by 100% at the consumer's prices.

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11A – In Marche the marine fisheries subsector is much stronger than aquaculture, but has been experiencing a negative trend in the last 12 years;

11B – the negative trend of the local clam fishery has proven being related to phytoplankton reduction;

11C – mussel seems the most suitable species for mariculture development, but competition from nearby areas would be very strong.

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12A – Along the Greek coast of NE Ionian Sea mariculture is more relevant than local fisheries;

12B – in the area marine fisheries will keep going along their negative trend;

12C – rearing of marine fishes will keep growing, although at a much slower rate than during the last 20 years.

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