FACTSHEET

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Climate change

Climate Proofing the Danube Delta through Integrated Land and Water Management

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EXECUTIVE SUMMARY

A unique ecosystem and home to more than half a million people, the fragile Danube Delta is already now experiencing the first impacts of climate change. Earlier spawning of herring, less snow in winter and higher water temperature in summer have been reported. In the future, unprecedented sea level rise, water scarcity, and more frequent and severe extreme weather events will be the major drivers of change. Policy-makers and civil society in the region must act now to take steps to adapt to the challenges posed by climate change.

This document lays out a foundation for transboundary action for adaptation in the region. Based on the outcomes of the vulnerability assessment, it focuses both on facilitating the adaptation of natural systems and reducing human pressures on ecosystems while improving quality of life. The list of measures suggested here is far from being exhaustive; rather, it highlights urgent needs and sets the overall strategic direction.

Sectors particularly vulnerable to climate change include water resources, agriculture, and human health. Reducing the vulnerabilities in each sector is possible though targeted policy interventions, developing and enforcing robust environmental protection legislation, and encouraging the involvement of civil society and the general public in working to mitigate the effects of climate change. Later we will give a short overview of the impact of climate change on water, biodiversity and various sectors of economy, as well as the highest priority adaptation measures; you can find a more comprehensive list of measures in the adaptation action plan.

CLIMATE CHANGE IMPACTS ON
WATER RESOURCES

Flood predictions are of high uncertainty, especially at the local level in small catchments, however, most studies point to an increase in flood events. Climate change will most likely exacerbate and prolong periods of water scarcity and drought in regions which already experience water stress. The minimum runoff will diminish as the temperature and evaporation rise. Average water temperature will significantly increase, up to 2°C by 2050, in all water bodies, especially in shallow lakes/reservoirs with regulated water regimes and poor water exchange. Due to rising water temperatures in all surface and ground waters, the water quality will decrease. By 2050 sea level could rise by 0.15 m (the most favorable scenario) and by 0.5m (the most unfavorable scenario) leading to erosion and the flooding of the coastal areas.

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The highest priority adaptation measures identified are related to the designation of water protection zones and the protection of river banks through afforestation along small rivers and lakes. Further adaptation measures include improving the water exchange processes in the lakes and restoring the natural hydrological regime on the former floodplain where possible, along with reinforcing flood protection structures at environmentally dangerous sites such as the oil extraction installations on Beleu lake, in Moldova.

CLIMATE CHANGE IMPACTS ON
ECOSYSTEMS

Higher water levels in the Black Sea will enhance wind-induced surges which will entail long-term water-logging of the terrestrial floodplain ecosystems of the secondary delta. In the northern part of the Delta, freshwater flora which has a low tolerance to salinity, will be substituted by vegetation more typical of brackish and saltwater environment. A higher frequency of fires will encourage a succession of marsh-and-grassland communities with a great share of miscellaneous meadow herbs (represented by species tolerant to fire) and low share of reeds. Wintering conditions for most mammal species will improve. Fewer days with snow will give competitive advantage to amphibians and reptiles but deteriorate the wintering conditions for rodents and insect-eating mammals. Changes in the life cycle and phenology of birds will result in a shift of migration timing (ducks, geese).

Long-term monitoring, studies of climate impacts on key species and trophic chains, as well as identification of climate refugia are priority adaptation measures presented in the action plan as they are crucial to further promote and facilitate adaptation based on the ecosystems.

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CLIMATE CHANGE IMPACTS ON SETTLEMENTS AND INFRASTRUCTURE

Torrential rains are expected to occur more frequently this pushing existing drainage systems to their limits. Flash floods may lead to infrastructure damages and high economic losses. Assuming the nutrient load stays the same, higher water temperature will lead to lower water quality and potential algae blooms, especially in shallow lakes/ reservoirs with regulated water regimes and poor water exchange, thereby endangering drinking water supply.

Priority adaptation measures linked to infrastructure are mainly focused on water-related infrastructure in settlements, for example: identifying infrastructure at risk of flooding and preventing further construction in flood-prone areas, developing collective water supplies for villages to adapt to droughts and water shortages in summer, reducing nutrient flow into water bodies from cities and villages through waste-water treatment, and constructing drainage systems to cope with flash floods in high risk settlements.

CLIMATE CHANGE IMPACTS ON AGRICULTURE

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As more than half the population in the region is employed in agriculture, this sector is highly important. Future decreases in the availability of water resources due to climate change may lead to an increase in production prices and drop of competitiveness of local produce on international markets. At the same time, climate change may bring some positive effects to agriculture by offering the possibility of cultivating secondary crops due to prolonged periods of vegetation, as well as the introduction of new warm-loving drought-resistant crops.

Priority adaptation measures for agriculture sector are those closest to nature practices: crop rotation to help to revitalize the soil and prevent pest infestations without reliance on chemical fertilizers and pesticides. Practices to help cope with drought include planting trees to provide shade, use of cover crops to enhance seedling survival, and “harrowing” of fields in early spring (which prevents evaporation).

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CLIMATE CHANGE IMPACTS ON FISHERY

The projections for how climate change will affect inter-species relations and for how individual species will respond to climate change are still highly uncertain. The growing period of the main commercial fish species and the number of days suitable for fishing may be prolonged which would increase pressure on the populations of the main industrial species. Future changes in climate will not trigger a considerable reduction in catches in the Danube, though their quality may deteriorate. At the same time fish production in the Danube lakes/reservoirs may decrease due to the worsening of water exchange and lower water quality. In summer, higher levels of fish mortality can be expected due to algae blooms.

Priority adaptation measures presented in the action plan include harmonising the timing of fishing bans and fishing quotas and norms. For Ukraine, a special measure has been identified: rice growers may provide fish nursery services for local fisheries in ponds or lake as rice fields are ideal nursery sites for young fish and may act as natural flooded meadows.

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CLIMATE CHANGE IMPACTS ON FORESTRY

There will be changes in forest structure and species composition. Species more adapted to droughts and heat will benefit and advance. Forest fires will play an important role in changing species composition.

Restoration and the protection of floodplain / riparian forests on small rivers and lakes is the main priority adaptation measure for the Danube Delta, which is a much less forested area.

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CLIMATE CHANGE IMPACTS ON THE ENERGY SECTOR

Higher air temperatures will drive up demand, leading to new challenges in balancing the power grid.

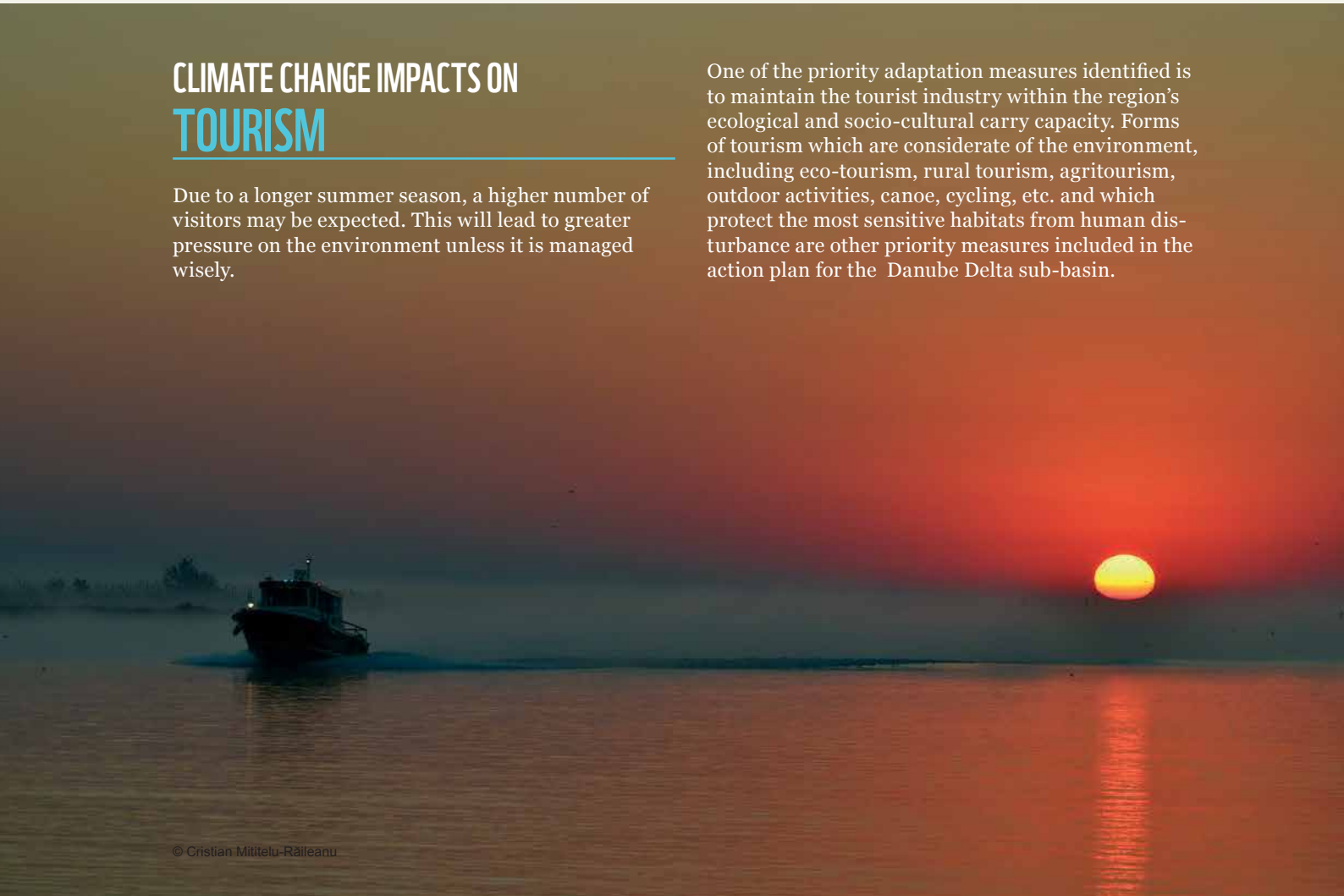
This can be quantified as 0.1% lower efficiency for every increase in temperature of 1ºC for natural gas and oil fired power plants. This translates into more expensive power generation due to higher fuel consumption on the order of a 2 ‰/oC loss in power generation. During heat waves operational costs may go up with more people in service (an increase of 50-100%) and more material in stock (an increase of 10-20%).

The priority adaptation measure for the energy sector is to adapt to climate change through enhanced energy efficiency and diversification of energy sources, especially those locally available.

CLIMATE CHANGE IMPACTS ON TOURISM

Due to a longer summer season, a higher number of visitors may be expected. This will lead to greater pressure on the environment unless it is managed wisely.

One of the priority adaptation measures identified is to maintain the tourist industry within the region's ecological and socio-cultural carry capacity. Forms of tourism which are considerate of the environment, including eco-tourism, rural tourism, agritourism, outdoor activities, canoe, cycling, etc. and which protect the most sensitive habitats from human disturbance are other priority measures included in the action plan for the Danube Delta sub-basin.



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CLIMATE CHANGE IMPACTS ON HEALTH

A warmer and wetter climate will open up new habitats for the local species of mosquitoes which transmit arboviruses (a group of viruses that are transmitted by arthropod vectors) thus leading to more hot spots of fevers and encephalitis. It can be expected that the northern borders of malaria mosquitoes will shift northwards and southern populations may substitute northern ones. Due to new, favorable conditions, the exotic vectors *Aedes albopictus* and *Ae.aegypti* which transmit dengue fever and yellow fever may appear on the Black Sea coast.

Heat waves are likely to be more frequent thus increasing the risk of heat strokes Rapid temperature changes may exacerbate cardiovascular diseases - hypertension, angina pectoris, and heart attacks. Elderly, chronically ill and disabled people are particularly at risk. Higher water temperatures will be favorable for the development of pathogenic bacteria. An increase in diseases caused by the consumption of low-quality drinking water (cholera, leptospirosis, rotavirus infections) may occur. The local situation may be complicated by toxic algae blooms in drinking water sources.

Two priority adaptation measures presented in the action plan are: raising awareness about the risks climate change poses to human health and developing effective early warning systems for health risks.

The impacts of climate change are diverse and will seriously influence all major sectors and natural assets. Proactively planning of adaptation measures and mainstreaming them into day-to-day decision making is thus necessary. Adaptation must become a systemic process which actors integrate into their work programs. The adaptation action plan lays out a strategic direction and basic guidance for each sector with the intention that the responsible stakeholders will follow up with more comprehensive adaptation programs.

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To stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature.

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