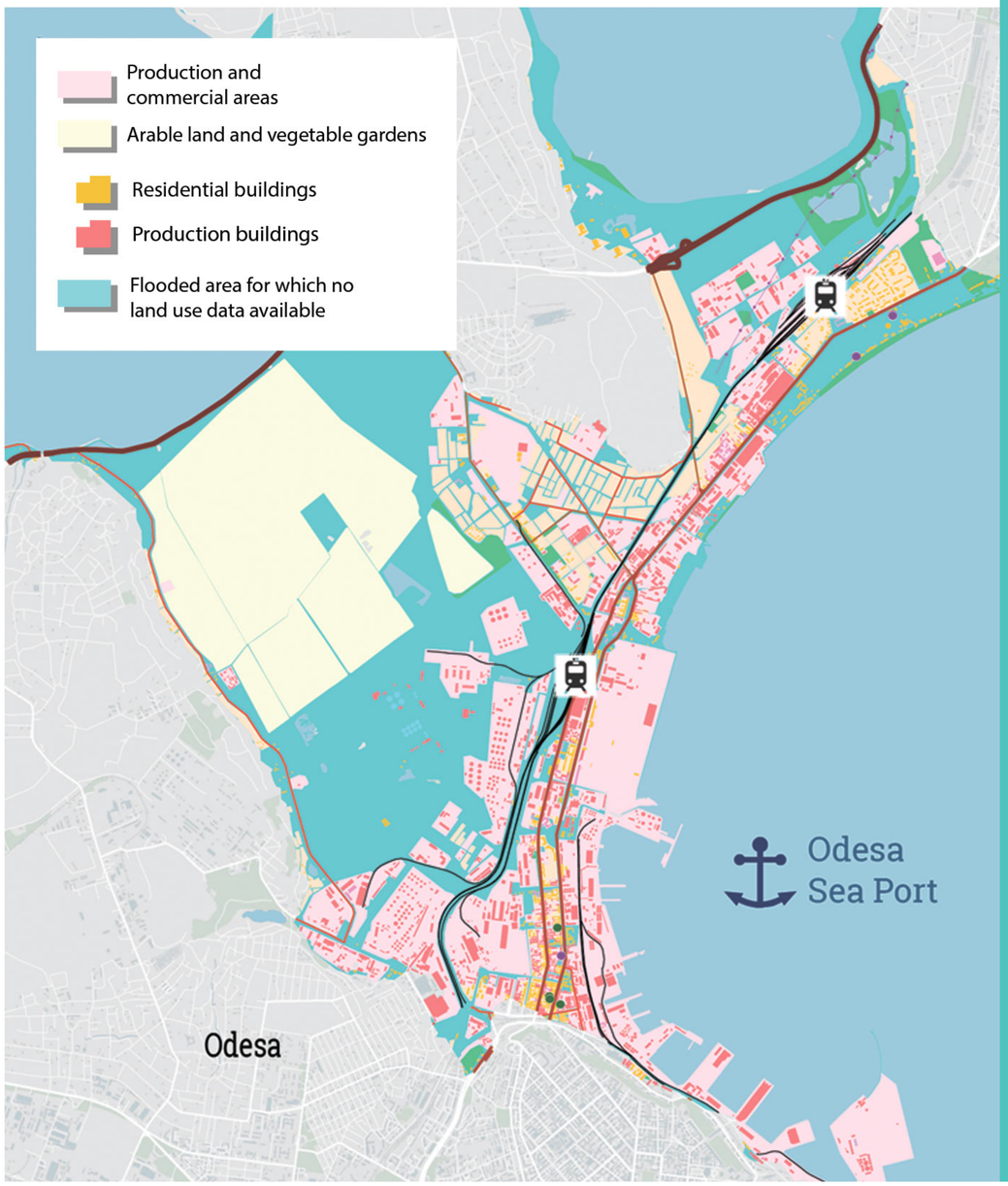
WATER
IS COMING

Impact of Sea Level Rise on Ukraine's Coastal Areas due to Climate Change



екодія
ecoaction.org.ua

RESEARCH SUMMARY

- The goal of the research is to draw attention to climate change consequences in Ukraine and stimulate the government and cities to combat climate change while adapting to the new realities of today.
- The results of the study and the interactive map show which towns, buildings, roads, factories and parts of the nature reserve fund may be flooded by the Black Sea and the Sea of Azov by the end of the century, if the humanity does not manage to limit global warming to 1.5 – 2 ˚C. The study also indicate how many associated climate refugees Ukraine may have: due to climate change and reluctance of governments around the world, including Ukraine, to reduce greenhouse gas emissions.
- The study was conducted for the coastal areas of Ukraine's southern regions. Modelling of potential flood zones is made for 2100 and the condition that the current greenhouse gas emission trend remains, with sea level rise reaching 0.82 meters by the end of the century. The analysis was carried out using open source data based on OpenStreetMap (OSM) and GIS technologies.

According to the results of the study, the consequences for Ukraine may be the following:

34 Ukrainian cities may be partially flooded partially flooded, including: Odesa, Kherson, Mykolaiv, Mariupol, Berdiansk, Kerch;

6 towns and 62 villages may be fully flooded, including: Hola Prystan, Zatoka, Lazurne;

75 thousand people are risking to become climate refugees, as their houses may appear in the flood zone;

660 environmentally hazardous sites appear located in the flood zone, including 13 landfills and 36 treatment facilities, "Azovstal" Iron and Steel Works in Mariupol and settling ponds of the Crimean "Titan" plant near Armyansk;

200 thousand ha of agricultural lands may be flooded and 10 thousand production territories, as well as 1917 buildings of commercial and production use;

Sea level rise may cause flooding of 98 nature reserve fund objects, including a part of territories of Black Sea and Danube biosphere reserves;
Objects of historical and cultural heritage in the flood zone include the archeological site Chersonesus founded more than two thousand years ago and included in the UNESCO World Heritage list.

SEA LEVEL RISE IN UKRAINE CAUSED BY CLIMATE CHANGE

FLOOD HAZARD AREA IN 2100

AREA I, persistent in its nature with a conditionally stable water level. The area is modelled based on the highest valid value of global sea level rise — +82 cm by 2100 in accordance with the highest greenhouse gas emissions scenario. This value is adjusted by and consistent with a map reflecting current crustal movements, surface up and down movements and stable surface areas.

AREA II, seasonal in its nature, results in short-term fluctuations (rising) in sea level. Values (both observed and estimated) of surge events vary between observation points on the Black and Azov Seas. The flood hazard area is calculated using maximum surge values: +91 cm at the Black Sea coast and +79 cm at the Azov Sea coast.

FLOOD HAZARD AREA IN 2100

Population in communities living within prospective flooded areas, No. persons

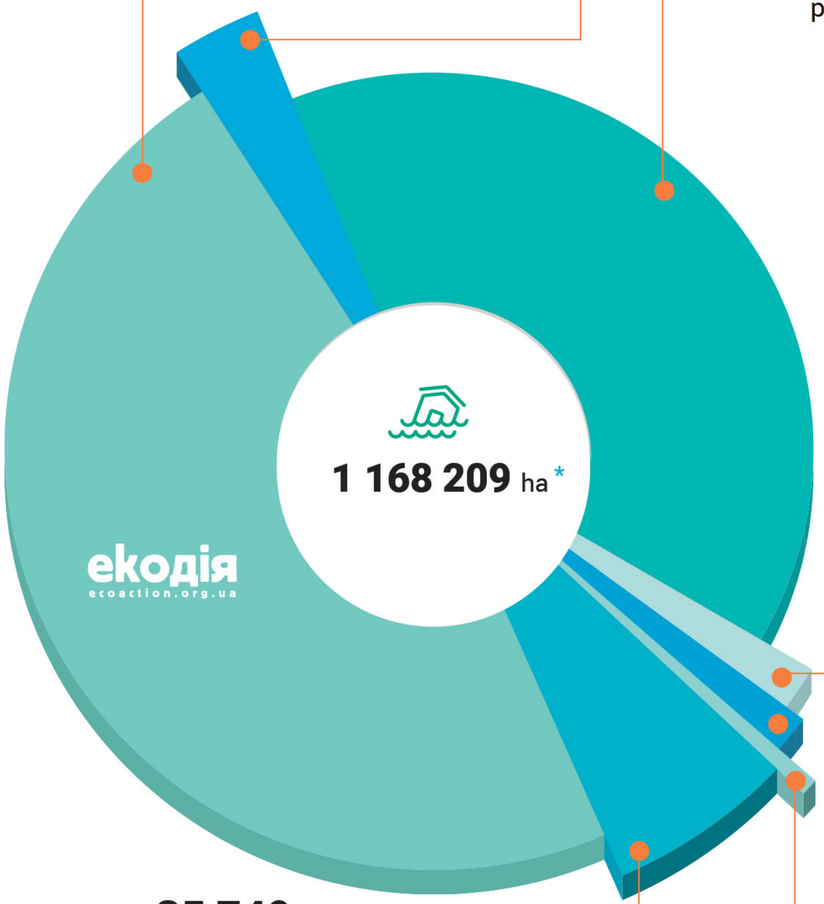
- less than 10 k
- 10 - 100 k
- 100 k - 1 mln

Settlements according to share of prospective flooded area, %

0 25 50 75 100

FLOODED AREA STRUCTURE

by type of land use



255 217 ha

Natural landscapes

Swamps	**166 069,3**
Forest plantations	**29 295,3**
Sandy surfaces	**25 786,1**

16 912 ha

Water reservoirs

Pools	**1 227,7**
Reservoirs	**15 684,7**

212 716 ha

Agriculture sector

Fields	**207 321,0**
Gardens	**2 391,1**
Hayfields and pastures	**2 331,1**

9 275 ha

Industry and business

Industrial development	**6 874,1**
Farms	**846,8**
Ports	**512,3**

8 237 ha

Recreation

Beaches	**207 321,0**
Landscaped areas for rest	**2 391,1**
Parks	**2 331,1**

35 749 ha

Development

Residential Buildings	**34 290,3**
Construction	**564,4**
Lands for reconstruction	**283,6**

693 ha

Military training grounds and bases

MAIN RECOMMENDATIONS

Setting a new ambitious greenhouse gas emissions reduction goal, and in particular, submitting a revised version of its Nationally Determined Contribution (NDC) under the Paris Agreement as soon as possible. The current climate target allows Ukraine to increase its emissions by nearly two-fold by 2030. There is, however, no economic rationale for such a weak commitment given that the government's Energy Strategy until 2035 provides for 20% reduction of emissions in the energy sector and decrease in the share of coal with simultaneous increase of renewable energy share up to 25% in 2035.

Adopting national and/or regional policies of transition to 100% renewable energy by 2050, which will allow for significant reduction in greenhouse gas emissions. The economic and technical feasibility of the transition was proven by a number of studies conducted by Ukrainian and international research and public organisations. In 2018, four Ukrainian cities — Zhytomyr, Chortkiv, Lviv, and Kamianets Podilskyi — announced their decisions to shift to 100% renewable energy by 2050.

To develop a national **Climate Change Adaptation Strategy for Coastal Areas** as a subject to forecasted sea level rise with resulting possible implications, and to develop a corresponding Action Plan for Adaptation of Coastal Territories of Ukraine to consequences of climate change. It is necessary to conduct further research of sea level changes based on more precise sea coast landscape maps; to ensure regular updates of such forecasts using updated international and local data, models and instruments; and to make forecasting deliverables easily and freely accessible.

This paper represents a short summary of the project "Water is coming". The **full text** with detailed research preconditions and assumptions, description of modelling techniques, results in terms of impacts of sea level rise on the Ukrainian coast, as well as our recommendations are available in ENG and UKR here:

https://en.ecoaction.org.ua/water-is-coming-ecoaction.html

The interactive map is available at:

http://ecoaction.org.ua/projects/sealevel/index.html

This document was prepared with the financial support of the Swedish agency SIDA through the Swedish Society for Nature Conservation, DRA and Brot für die Welt.

The views presented in the study and in this material do not necessarily reflect those of SSNS and its donors.

екодія
ecoaction.org.ua