

CLIMATE CHANGE IMPACT ON MIGRATORY BIRDS IN POLAND

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Main climatic changes predicted in Poland till 2030

- Increase of mean annual temperature (no more than 0,5°C)
- Changes in annual and seasonal precipitation patterns
- Increase of frequency of intense rainfalls
- Increase of the number of days without rainfall
- Decrease of the number of days with temperature below 0°C
- Increase of the number of days with temperature over 10°C and over 30°C
- Shortening of the period of duration of snow cover
- Increase of occurrence of strong winds and hurricanes
- Increase of occurrence of other extreme weather phenomena (storms, floods, intense snowfall, droughts)

Main climate change induced impacts on ecosystems predicted in Poland till 2030

- Increase of moisture deficit in soils and general decrease of national water resources
- Increase of inland waters eutrophication
- Changes in forest ecosystems caused by extreme winds
- Changes caused by other extreme weather phenomena (floods, droughts, lack of snow cover etc.)
- Increase of alien invasive species populations
- Increase of human and domestic animals penetration

Main effects of climate change on migratory birds in Poland

- Changes of breeding population numbers and/or ranges
- Shift of breeding area ranges (to the north and north-east)
- Changes of local bird community species composition
- Advanced arrival to breeding grounds and/or earlier egg-laying
- More frequent overwintering and wintering attempts within the country's borders
- Changes of migration distance and/or routes

Main factors determining bird species vulnerability to climate change

1. Dependence on climate change vulnerable and/or threatened habitats (wetlands, river valleys, seashore, high mountains etc.)
2. Nest exposure to unfavourable weather conditions (floods, strong winds etc.)
3. Narrow range of environmental conditions tolerated (stenotopic species)
4. Strong decreasing population trend
5. Small population
6. Low reproductive rate
7. Occurrence close to natural range border

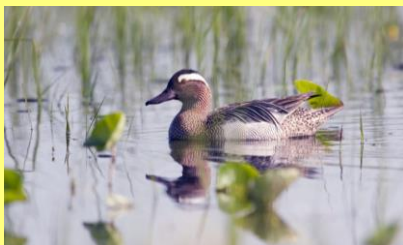
Migratory bird species most vulnerable to climate change



Anas acuta (vulnerable habitat, stenotopic species, decreasing population trend, small population)



Anas clypeata (vulnerable habitat, stenotopic species, decreasing population trend)



Anas querquedula (vulnerable habitat, decreasing population trend)

Migratory bird species most vulnerable to climate change



Chlidonias hybrida (vulnerable habitat, small population)



Chlidonias leucopterus (vulnerable habitat, stenotopic species)



Sternula albifrons (vulnerable habitat, nest exposure stenotopic species, small population)

Migratory bird species most vulnerable to climate change



Calidris alpina schinzii (stenotopic species, decreasing trend, small population, close to range border)



Tringa glareola (vulnerable habitat, stenotopic species, decreasing trend, small population, close to range border)



◀ **Haematopus ostralegus** (vulnerable habitat, nest exposure, stenotopic species, small population)

Charadrius hiaticula ▶ (vulnerable habitat, nest exposure, stenotopic species, decreasing trend, small population)



Migratory bird species most vulnerable to climate change



Limosa limosa (vulnerable habitat, decreasing trend)



Numenius arquata (vulnerable habitat, decreasing trend, small population)



Gallinago media (vulnerable habitat, stenotopic species, decreasing trend, small population)



Philomachus pugnax (vulnerable habitat, stenotopic species, decreasing trend, small population, close to range border)

Migratory bird species most vulnerable to climate change



Pandion haliaetus (nest exposure, decreasing trend, small population, low reproductive rate)



Aquila clanga (small population, low reproductive rate, close to range border)



Acrocephalus paludicola (vulnerable habitat, stenotopic species, close to range border)

Impact of climate change mitigation actions on migratory birds in Poland

- Impact of wind turbine farms on migratory birds
- Loss or degradation of birds habitats in river valleys connected with hydrotechnical engineering (construction of reservoirs and damms, clearing of river beds and banks) aimed for mitigation of increasing flood impact caused by climate change
- Decrease of birds diversity and number on areas where plants used as a source of green energy are cultivated (especially on rape fields and willow plantations)
- Loss and degradation of birds habitats as a result of afforestation of open areas (wetlands, meadows and abandoned fields)

Impact of wind turbine farms on migratory birds in Poland

- Direct mortality caused by collisions with objects on farms (mostly *Falconiformes*, *Charadriiformes* and *Passeriformes*)
- Change of migration routes - barrier effect
- Displacement caused by noise and disturbance
- Loss of habitats
- Fragmentation and/or transformation of habitats

Bird species mostly effected by direct collisions with wind turbines in Poland

- Falconiformes (*Haliaeetus albicilla*, *Milvus milvus*, *Milvus migrans*, *Buteo buteo*, *Circus aeruginosous*, *Circus pygargus*, *Falco tinnunculus*)
- Passeriformes (*Alauda arvensis*, *Emberiza calandra*, *Corvus corax*)
- Larinae (*Larus ridibundus*, *Larus canus*, *Larus argentatus*)
- Sterninae (*Sterna hirundo*, *Sternula albifrons*)
- *Ciconia ciconia*
- *Anas platyrhynchos*
- *Apus apus*

Main non-climate induced factors negatively effecting migratory birds in Poland

- General changes in land use
- Intensification of agriculture
- Increase of large areas monoculture crop fields
- Cessation of agricultural use of meadows and pastures resulting in degradation of birds habitats due to succesion
- Fragmentation and/or loss of bird habitats due to development of transportation network, electicity lines and urbanisation
- Development of tourism and tourist infrastructure on important birds habitats (esp. on coastal areas, along river valleys and on lake shores)

Measures taken in Poland to learn and mitigate climate change effect on migratory birds

- Implementation of wide national programme of bird monitoring (launched in 2000)
- Elaboration and implementation of projects and national action plans for conservation of two highly vulnerable CMS Appendix I species: *Acrocephalus paludicola* (since 2007) and *Aquila clanga* (since 2010)
- Elaboration of guidelines for assesment of wind turbine farms impact on birds (2011)
- Elaboration of national report on present and predicted climate change effect on biodiversity till 2030 (2012)
- Elaboration of the National Strategy of Adaptation to Climate Change (2013)

Recommendations for action to be addressed in CMS programme of work on climate change

- Launching a broad spectrum research and monitoring of climate change effects on migratory species and their habitats
- Determining migratory species and habitats most vulnerable to climate change on global, regional, national and local level
- Focussing efforts and available funds on protection of most climate change-vulnerable migratory species and their habitats
- Elaboration and implementation of international and national action plans for species and habitats most threatened by climate change
- Cross-sectoral approach to improve effectiveness of conservation strategies and/or mitigation actions
- Prevention the adverse effect of mitigation activities
- Elaboration and implementation of strategies of controll and management of alien invasive species
- Reduction of non-climate change induced impacts on migratory species and habitats
- Introduction of more flexible and dynamic model of management of protected areas designated for conservation of migratory aspecies (including Natura 2000 sites) in order to enable quick conservatory/mitigation action when appropriate including change of protected area borders
- Developing transboundary cooperation and exchange of best practices

