IDAlert
Infectious Disease decision-support tools and Alert systems

Case study

Rotterdam

Modelling risks due to urban transformation and climate change scenarios

Climate change scenarios for Rotterdam show multiple future challenges. With rising temperatures, heat stress due to the urban heat island effect is increasing. With rising sea levels, the influx of saltwater into the river delta around Rotterdam is increasing. Peak weather events will lead to challenges for water storage both in the city of Rotterdam and its surrounding areas close to the Rhine and Meuse rivers. Urban transformation and other adaptation measures to overcome these challenges might affect mosquito, rodent, and bird populations.

Case Study Objectives

Emphasis will be on the effect of climate change and climate change mitigation measures on animal ecology and animal reservoirs.

1. **Measure changes in wild birds and subsequent West Nile Virus (WNV), Usutu virus (USUV) and Sindbis virus (SINV) transmission and spread**
2. **Study mosquitoes and urban rodent reservoirs of zoonotic viruses**

The Rotterdam case study site(s) are located in South-Holland in the municipality of Rotterdam, including in the city of Rotterdam. Potential suitable study site(s) within this region are being mapped by exploring plans for climate adaptation measures, available historical data, and site characteristics such as land use (green and blue areas), animal populations, and human density. Both climate adaptation measures focused at the city/neighborhood level as well as measures to create water storage areas in the rural environment around the city are being explored as potential study sites.

Rotterdam is the second largest city of the Netherlands with over 600,000 inhabitants.

The municipality of Rotterdam is located in the North Sea delta, with the Rhine and Meuse rivers discharging into the North Sea.

The Rotterdam area includes a large harbor and airport, and is home to large resident and migrant bird populations.

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Current Measures & Case Study Focus

Around Rotterdam, a number of case study sites have been identified as sample collection points. These include nearby coastal areas and natural water-rich areas that are home to large numbers of migratory and resident bird species, as well as the Rotterdam Zoo.

Detailed climate and weather data is being collected, as well as fine-scale climatological modeling. Existing, open-source data has been mapped and will be included for each of the case study sites.

- Sampling and monitoring will take place at field sites and the Rotterdam Zoo for birds and mosquitoes, where smart traps will be piloted.
- In collaboration with pest control agencies, rodent species presence and abundance will be tracked.
- Zoo animals will be sampled and tested for arboviruses to validate the possible use of the zoo as a sentinel site.

These findings will also be considered as possible indicators for the Lancet Countdown initiative later in the project.

Activities

Various methods and tools will be employed to collect data, including:

Citizen science, involving the collection of mosquito-related data through smartphones.

Weather stations.

Serological and molecular analyses conducted in the EMC lab, including Nanopore sequencing.

Animal census and movement data.

Weather and climate modeling using HARMONIE.

> *"Climate change and nature based solutions heavily affect animal populations and behavior. The subsequent effect on infectious disease transmission and public health risks is largely understudied. Increasing our knowledge on the complicated relationships between climate, landscape changes, animal reservoirs and public health will generate invaluable information for policy makers, responsible for urban and rural planning in the context of climate change."*

Research Aims & Outputs

The results on the effects of urban transformation on (i) mosquito, (ii) rodent, and (iii) bird populations, and associated risks of arboviruses will be collected for use by local decision makers to make informed policy decisions and provide a basis for upscaling in other areas. Data will be collected around the study sites to include birds, mosquitoes, rodents, zoo animals, viruses, and human movement, and will focus on arboviruses. The main viruses of interest are WNV, USUV, and SINV. Other zoonotic viruses are also included where possible, especially in rodents.

The data researchers will focus on include:

- Bird movement analyses in response to climate adaptation measures
- Evaluation of zoos as sentinel sites
- Rodent census and sampling scheme set up
- Lab and risk-based public health assessment, with a focus on arboviruses
- Validation of the regional weather and climate model HARMONIE