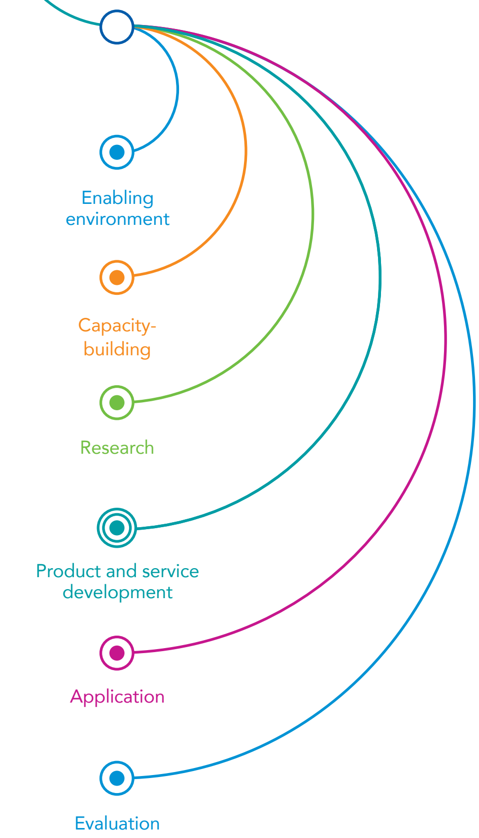
CASE STUDY 5E



CORE ANALYTICS

CLIMATE-SPECIFIC POLLEN INDICATORS AND POPULATION EXPOSURE MONITORING TOOLS TO BETTER MANAGE THE ALLERGY SEASON IN HUNGARY

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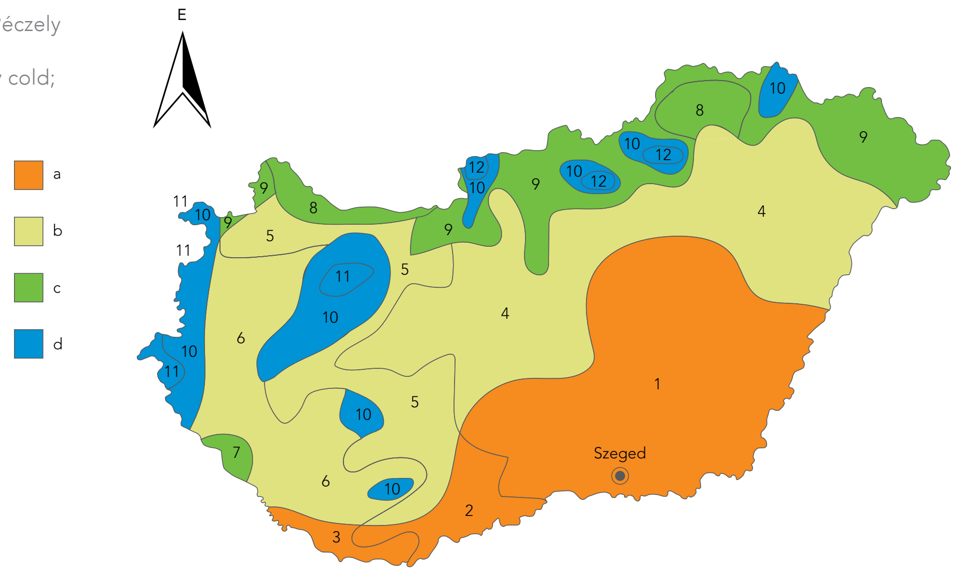
CONTEXT

The 4th Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) *(26)* states that climate change has caused an earlier onset of the spring pollen season in the northern hemisphere. It is reasonable to conclude that allergenic diseases caused by pollen, such as allergic rhinitis, have experienced some concomitant change in seasonality. There is limited evidence that the length of the pollen season has also increased for some species. Furthermore, the European Union strategy on adaptation to climate change *(27)* highlights that climate change might potentially increase the seasonality and duration of allergic disorders such as hay fever or asthma, with implications for direct costs in terms of care and medicines, as well as lost working hours. The 5th Assessment Report of IPCC *(28)* stated that warmer conditions generally favour the production and release of airborne allergens. Progressively increasing temperatures may modify the global pollen load *(29)*. Adaptation measures identified to date include aeroallergen monitoring and forecasting. Therefore, it is of high importance to evaluate the pollen exposure of populations living in different geographical and climatic regions in order to adjust information and adaptive measures.

NEW APPROACHES

The WHO European Centre for Environment and Health, with the contribution of Member States, has developed climate-related indicators as part of the Climate Change, Environment and Health Action Plan and Information System (CEHAPIS) project. Four allergen plants were selected as indicators: alder (*Alnus sp.*); birch (*Betula sp.*); grasses (*sp.*); ragweed (*Ambrosia sp.*). These provoke high sensitization rates, have fairly broad geographical and temporal coverage in the European flowering season (spring to autumn). The indicator set is based on daily airborne pollen emission measurements in continuous volumetric samplers (e.g. Hirst type, Burkard) with standard methods. Use of data from existing monitoring stations, located in different climatic regions of a given country, is recommended. Each climatic zone needs to be characterized with a sufficient number of stations placed in populated areas. The number of inhabitants living in a radius of 10–30 kilometres of the monitoring stations should be noted for weighting purposes.

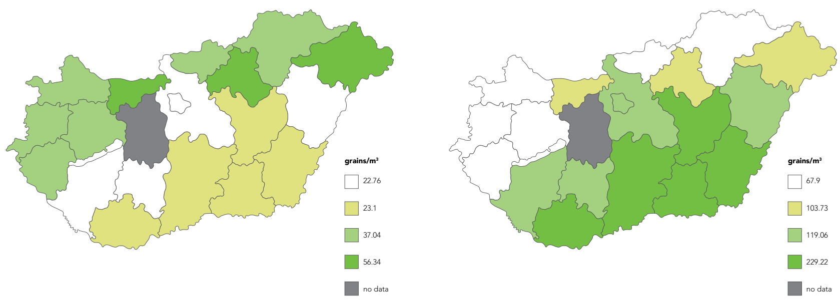
Figure 5.12 Climatic regions by Péczely *(23)* in Hungary: (a: warm and dry; b: moderately warm; c: moderately cold; d: cold and wet).



A software tool has been elaborated with the contribution of the National Public Health Institute (NPHI) *(30)*. The software enables calculation of the start and end, duration (days), and severity of the pollen period (annual sum and daily maximum of pollen grains (grains/m^3) of the current and previous pollen seasons). To characterize the exposure further, population-weighted indicators can be computed: (i) proportion of days (%) with allergenic concentration of pollen (≥30 grains/m^3); (ii) average exposure to the pollen (grains/m^3); (iii) duration of the pollen season (days).

The software was tested using ragweed pollen data for the period of 2000–2013 of the Hungarian Aerobiological Network run by the National Institute of Environmental Health. The meteorological data were provided by the Hungarian Meteorological Service. Figure 5.12 shows the climatic regions within Hungary *(31)*; Figure 5.13 displays the effect of weather variability on the population-weighted pollen exposure.

Figure 5.13 Ragweed: population-weighted average pollen concentration (grains per cubic meter). Left: extreme dry summer 2007. Right: extreme wet summer 2010.



ACKNOWLEDGEMENTS

BENEFITS AND LESSONS

NPHI uses this software to communicate results for the healthcare system, especially to the allergologists and general practitioners, to help adjust health care for allergenic patients in the short- and long-term. The results can be used by the agricultural sector to optimize summer weed (especially ragweed) eradication programmes to reduce exposure. The NPHI plans to disseminate the software at the international level, and to make it freely downloadable from its website.