Clim INVEST

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## **Dutch Climate Damage Atlas**

How can municipalities estimate climate related risk in monetary terms? How vulnerable are my assets for current and future climate damages due to drought? Should I start worrying about soil subsidence? Will flood damages impact the future value of my assets? The Climate Damage Atlas provides a starting point for answering these kinds of questions.



The Climate Damage Atlas for The Netherlands gives a first estimate of the financial losses cause by climate change until 2050. The estimates are based on the assumption of inaction, what would happen if we do not take additional climate adaptation measures. The Atlas focuses on urban areas. By monetizing the climate induced damages, the Climate Damage Atlas helps in creating awareness of climate effects. The Atlas assembles information on the costs of damage caused by climate change and provides an estimate of such damage per municipality.

The Atlas provides estimates related to heat, drought, urban flooding and coastal/river flooding. For the period 2018-2050, the tool has generated the following estimates: 1) An estimate of the damage in the event of the climate remaining stable up to 2050. This scenario is unlikely, but we are presenting this situation in order to provide a better picture of the impact of climate *change*; and 2) An estimate of the damage in the event of the climate changing substantially, the WH climate scenario, one of the four KNMI'14 scenarios developed for the Netherlands, with W = warm, a 2°C degrees (W scenarios) temperature rise, and H = high, a change in air flow patterns. See KNMI (2014) for more details.

The four themes are identified on the tabs at the top of the Atlas, see for an example Figure 1. Each tab includes a web viewer and story map detailing which damages have been calculated, what the map shows, links to the methods used to derived the damage costs, and the degree of uncertainty of the estimates. The maps provide a view of the estimated damage at the municipal level. Factsheets relating to the damage that is examined state the method(s) used and a step-by-step plan to calculate the damages. These step-by-step plans can be used to draw up a more exact estimate of the damage in an specific area you are interested in. The results are based on national open data, the factsheets aim to help municipalities to better estimate the financial losses with use of local or regional data. The factsheets are freely available in the Climate Damage Atlas under the header 'Method' of each theme (currently in Dutch only), at <u>www.climatedamageatlas.com</u>.



Figure 1. The Web viewer and Story map of the Climate Damage Atlas on urban flooding.

#### **Financial sector**

Dutch financial institutions are taking steps in assessing climate risk for their assets and portfolios and experimenting with this data to perform risk assessments. A growing number of Dutch financial actors have started using both the Climate Impact Atlas and Climate Damage Atlas as a basis for climate risk assessment gaining insight in future damages of climate change. Already seven different institutions have done such an analysis. Both atlases provide a free, open and transparent database which is regularly being updated by a wide consortium of research organizations in the Netherlands, such as Deltares, WUR, KNMI and many others. Through co-creating the climate risk assessments with financial institutions, using both atlases, there is a deeper understanding of the concept of 'climate risk', awareness raised about the uncertainties and limitations in the data, and a better understanding of the exact risk mechanisms. In addition, it provides input on the limitations of the current version and needs for the future developments of the atlases.

#### **Background and technical specifications**

The Climate Damage Atlas is a product of the Climate-proof City focus area of the National Water and Climate Knowledge and Innovation Programme (<u>NKWK</u>). This version of the Climate Damage Atlas (December 2019) has been developed, in concert, by the Deltares research institute, Wageningen Environmental Research, the Netherlands Organisation for Applied Scientific Research TNO, Amsterdam University of Applied Sciences, Tauw Consultants, the National Institute for Public Health and the Environment RIVM, Arcadis Consultants, Sweco urban planners, KCAF foundation issues knowledge centre, Aveco de Bondt Engineers, and the Climate Adaptation Services foundation.

The atlas is available online (<u>www.climatedamageatlas.com</u>) and contains clickable maps where users can select a municipality, select the type of hazards of interest and view the results in pop-up graphs. All reports and datasets are freely available. See Figure 2 for damages due to urban flooding for the municipality Rotterdam. For each climate impact theme, different damages are explored and/or calculated. Table 1 provides an overview of the calculated damage costs of urban flooding, heat and drought.

The tool provides an estimate of the damage costs entailed in climate change. Quantification of damages resulting from climate change is complex matter because of the uncertainties involved. The degree of uncertainty of the estimate is indicated in the Atlas, detailing if the climate scenarios point in the same direction, how great the certainty is that an area will be faced with urban flooding, heat or drought, and how great the certainty is that the damage assessments tie in with actual practice. The calculated damages are provided for every municipality in the Netherlands.

Urban flooding	Direct damages to buildings; Indirect damages to buildings; Hail damage
Heat	Mortality; Hospitalisations; Loss of labour productivity; Processionary caterpillar control
Drought	Damage to foundations; Damage to road and sewer systems; Damage to municipal greenery
*) Damages are calculated per municipality for the period 2018-2050 under the KNMI'14 WH climate scenario	



Figure 2. Details on urban flooding for the municipality of Rotterdam (<u>www.climatedamageatlas.com</u>). Ranges of direct and indirect damages to buildings and hail damage are provided for an unchanged climate and considerable change in climate, and the atlas provides the estimated damage per municipal resident for the period 2018-2050.

### References

- Website of the Dutch Climate Damage Atlas: www.climatedamageatlas.com
- Background reports (in Dutch) on the method and assumptions of the Climate Damage Atlas are available via the website of the Climate Damage Atlas, at www.climatedamageatlas.com
- KNMI, 2014. KNMI'14 climate scenarios for the Netherlands; A guide for professionals in climate adaptation, KNMI, De Bilt, The Netherlands, 34 pp

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# Tailored climate risk information for financial decision makers

ClimINVEST brings climate scientists and investors together to provide transparency on methodologies for physical climate risk assessment, and develop guidance tools that inform investors' risk management processes. Learn more at www.cicero.oslo.no/en/climinvest





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