

Dutch Climate Impact Atlas

How exposed is my real estate portfolio to flooding, drought or heat stress? Which physical climate risks are impacting my assets now and in the future? The Dutch Climate Impact Atlas provides information for answering these kinds of questions.



The Dutch Climate Impact Atlas for The Netherlands offers open and free climate information about the impacts of climate change in an online map viewer. The Atlas contains maps on urban pluvial flooding, heat stress in cities, river and coastal flooding and droughts. Users can zoom in to their asset, region or city of interest to explore the local vulnerability to climate change impacts. Two types of information are offered: 1) maps on the exposure to climate related extreme events; and 2) maps that indicate potential vulnerable or sensitive objects or groups. The Atlas discloses current climate impacts as well as future impacts under changing climatic conditions towards 2050.

The maps support users in analyzing and mapping climate risks. In the Atlas, users can overlay different maps to identify local hotspots. In addition to the online map viewer, users can request the underlying GIS data through the helpdesk. This allows users to perform their own analysis and combine the Atlas data with asset location information. All data sets are delivered free of charge, and maps are periodically updated by a network of research institutes, commissioned by the Dutch Ministry of Infrastructure and Water. Figure 1 provides the web viewer of the Atlas for river and coastal flooding.

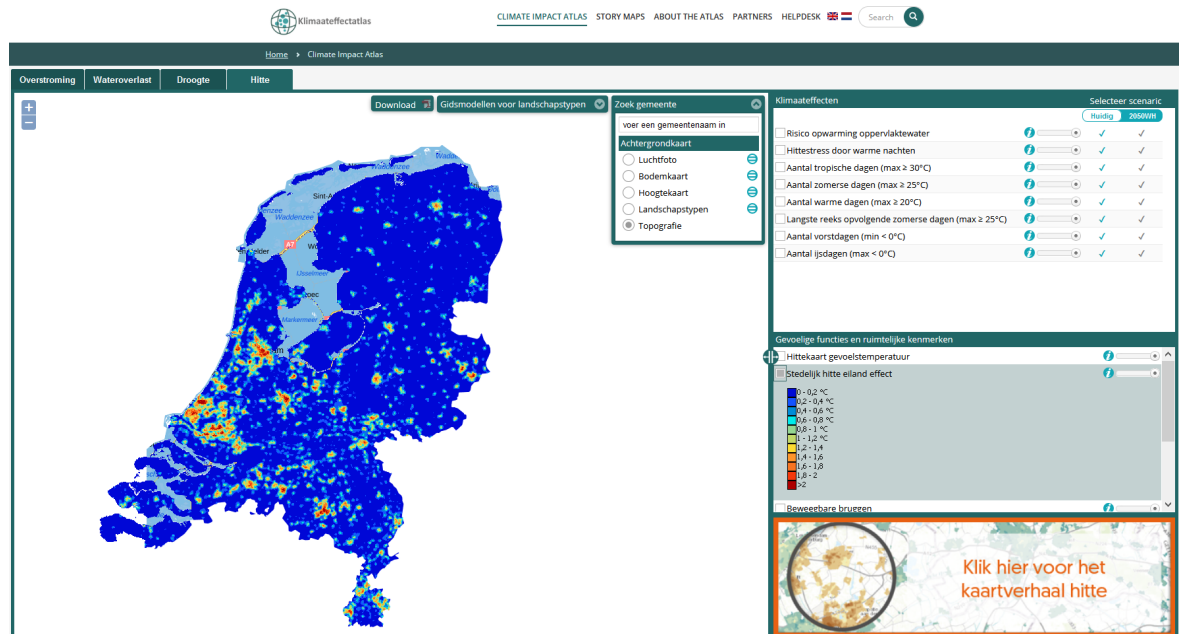


Figure 1. The web viewer of the Dutch Climate Impact Atlas (www.klimaat-effectatlas.nl). This map shows the urban heat island effect (UHI) in °C, this is the average air temperature difference between the urban and surrounding rural areas.

The Atlas is widely used by local and regional governments (municipalities, provinces and water authorities), and increasingly also by private companies (real estate, insurance sector), in education and by interested citizens.

Besides the web-based map viewer, the information in the atlas is also presented in 'story map' format. The story maps have been co-created together with users, and they explain how the information can be interpreted and used to support decision making. The story maps provide more explanation and guidance to the user, see Figure 2 for an example. The story maps cover questions like: what is the map telling me? And why is this map of importance and how can I interpret and use the information?

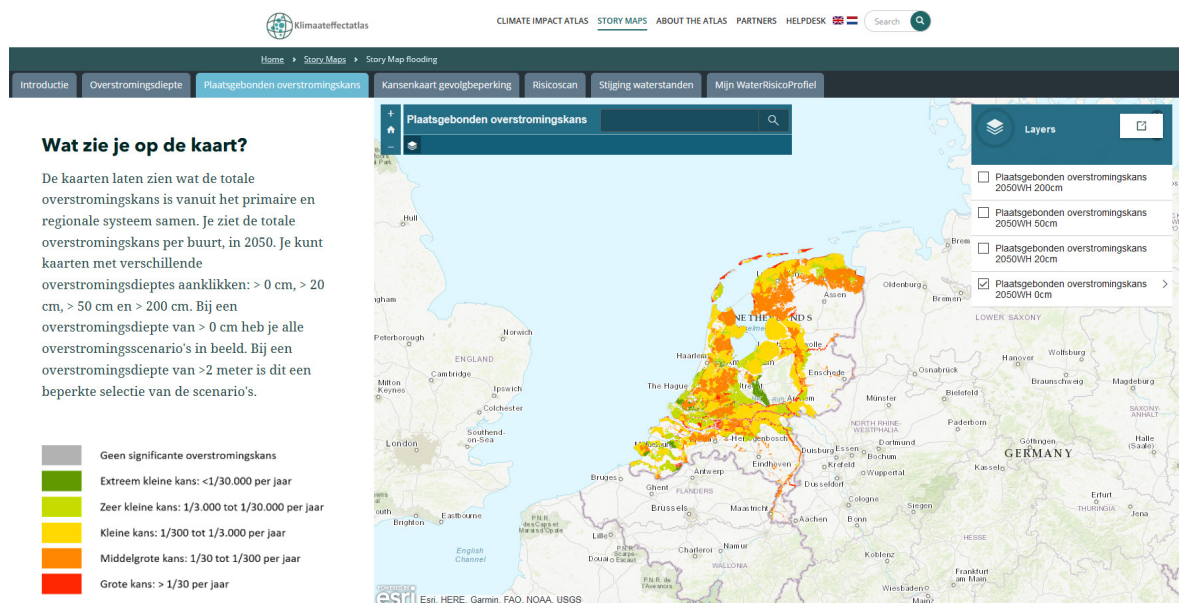


Figure 2. The Story Maps of the Dutch Climate Impact Atlas (www.klimaat-effectatlas.nl). This story map provides more details on location specific flood probabilities per neighborhood in 2050, linked to the primary and regional flood protection systems in the Netherlands.

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. Dutch financial actors who have used the Dutch Climate Impact Atlas for climate risk assessment, include investment and asset managers, real estate broker, the Central Government Real Estate Agency, and multiple banks. In this factsheet we present two examples where the atlas was used for climate risk assessment, 1) Individual location specific asset climate risk assessment and 2) - Portfolio climate risk assessment for real estate portfolio.

1) Individual asset climate risk assessment using the impact atlas



Figure 3. The Wall shopping centre in Utrecht, the Netherlands. Source: ClimINVEST (2019)

A Dutch real estate broker requested a climate risk assessment that includes risk indicators and an outlook for The Wall building, a shopping centre, in Utrecht. The individual location specific asset climate risk assessment was conducted for The Wall, which is a 65000m² shopping centre located in Utrecht, by the A2 highway, see Figure 3. The location of the shopping centre allows for easy access to major highways along the north-south connection in the Netherlands which links Amsterdam (the capital city) to other European markets. The case study aimed at assessing the risk of the shopping centre to floods (fluvial and pluvial flooding), droughts and heat stress.

The data used for this climate risk assessment draws on the Dutch Climate Impact Atlas. Since physical climate risks have a direct impact on assets at a local level, a tailor-made approach was considered to examine the specific geographic and climatic conditions of the area around The Wall. A digital story map was developed to present the results of the climate risk assessment including risk indicator. A GIS-based story map is an interactive map on which a story is told. It offers the possibility to provide the user with insight into the possible consequences of climate change using storylines. Such a storyline can, for example, focus on certain consequences, a specific area and/or a certain period. In this case study, the storyline focused on four climate hazards, The Wall location and the impacts of climate change for the period until 2050.

2) Portfolio climate risk assessment using the impact atlas

A Dutch investment manager wanted to carry out a climate risk assessment of their real estate portfolio, with the aim to increase their understanding of the potential risk of their assets to physical climate risk, incorporating climate risk into due diligence and other investment decision-making processes and the will to implement transparent climate reporting. They needed a transparent and uniform risk score that can be used by the market and were looking for a first assessment of gross risk. The risk assessment was carried out based on data from the Dutch Climate Impact Atlas.

By disclosing technical documentation that provided the organization with all relevant metadata, such as the source of the data, year of production, spatial resolution etc., full transparency about the methods and assumptions behind the risk assessments was pursued. The results of the risk assessments were used in the respective business plans, documents that describe the current business position and provide a vision for the upcoming years.

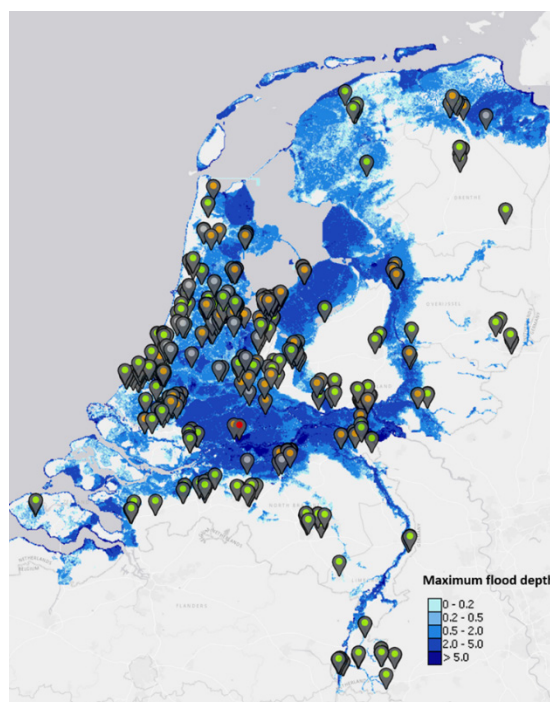


Figure 4. Example visualization of exposure of a real estate portfolio to flood risk. The map shows a 1:1000 year flood event, with the maximum flood depth in meters. The portfolio, of which the latitude and longitude are randomly shifted due to confidentiality reasons, has been mapped out using a red to green colour ramp. Green represents a low risk, while red represents a high risk. Source: HKV (2020)

The organization received quarterly updates of their portfolio risk assessment, in line with portfolio mutations. Whenever new content became available in the Dutch Climate Impact Atlas, such as improved maps depicting heat stress, this was discussed and processed in the algorithm behind the risk assessment, leading to updated scores. Transparency was established about the fact that knowledge on climate change evolves, and therefore risk scores may change when new data becomes available. Insight into physical climate risk led to the following steps: (1) the will of the organization to identify adaptation measures that may mitigate the risks described in the risk assessment; (2) a need for an inventory of building-specific features (e.g. roof type, building material) that affect an asset's vulnerability in light of climate risk; (3) engaging with municipalities on local resilience strategies.

In their reporting, the organization uses maps to communicate the exposure of their respective real estate portfolios to different hazards. Maps from the Dutch Climate Impact Atlas are combined with asset locations, resulting in visualizations as represented in Figure 4.

Background and technical specifications

The atlas presents different types of flood, drought and heat related maps for the Netherlands. With the zoom function you have the option to zoom into a specific region or municipality. Different map layers are available for each of the themes. The atlas is based on national data and provides an indication of the magnitude of the effects that may occur in an area. The Atlas uses the WH climate scenario, one of the four KNMI'14 scenarios developed for the Netherlands, with a 2°C degrees (W scenarios) temperature rise in 2050 and a change in air flow patterns, which, for example, makes the summers drier (H scenarios). See KNMI (2014) reference for more details.

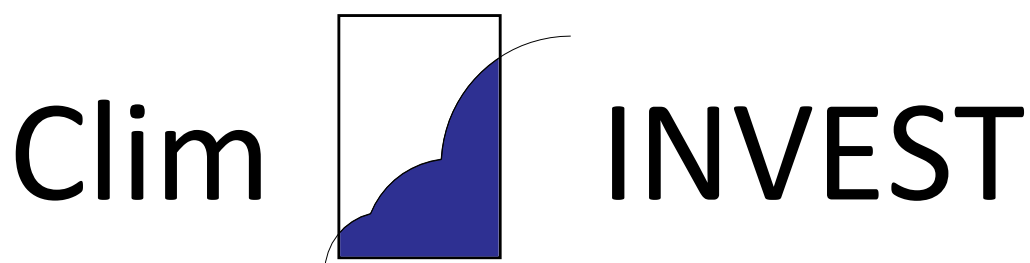
The Dutch Climate Impact Atlas is updated on regular basis by Climate Adaptation Services foundation (CAS) in close cooperation with a network of research institutes and consultancy firms. CAS also provides the helpdesk. The operation and further development of the atlas is commissioned by the Ministry of Infrastructure and Water Management. The Atlas emerged in 2008 within the scope of the Dutch research programme 'Climate Changes Spatial Planning', and developed from an atlas focused on several provinces towards a national atlas in 2011. The Atlas is an integrated part of the Dutch Knowledge Portal for Spatial Adaptation. Since 2018 the maps are also available on the ArcGIS Platform, which offers services that can be integrated with apps and business systems. The story maps that are part of the Dutch Climate Impact Atlas were developed using ArcGIS StoryMaps.

References

- Website of the Dutch Climate Impact Atlas: www.klimaateffectatlas.nl
- Background paper on the development of the Dutch knowledge portal for spatial adaptation and the Dutch Climate Impact Atlas – Laudien, R., Boon, E., Goosen, H., & van Nieuwaal, K. (2019). The Dutch adaptation web portal: seven lessons learnt from a co-production point of view. *Climatic Change*, 153(4), 509-521.
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- Photo first page by Ian on Unsplash

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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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