



Belgium River Flood

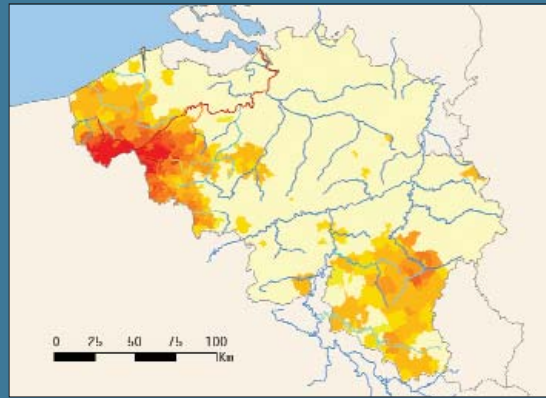
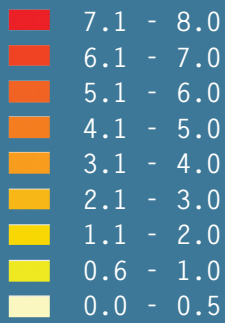
Major river flooding is a leading cause of insured loss in Belgium.

In the 1990s, river flooding resulted in estimated insured losses of approximately €1 billion, and the risk of future losses is likely to increase. The RMS®

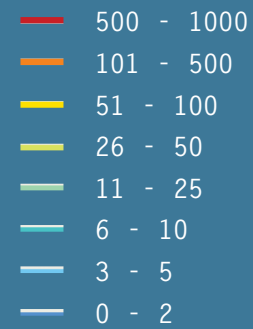
Belgium River Flood Model provides high-resolution capability to price and underwrite policies and effectively manage company-specific flood aggregates and exposure.



24-hour Rainfall (cm)



River Flow (Return Period)



Sample footprint of a stochastic river flood event

A COMPLETE STOCHASTIC EVENT SET

River floods in Belgium are categorized into winter and summer events. Winter floods frequently affect large areas as rain falls on saturated ground over a prolonged period, causing many rivers to inundate surrounding areas. These events can cause large losses on major flood plains.

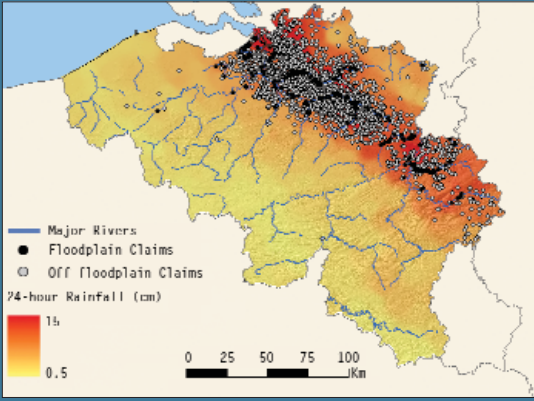
In contrast, summer flooding is characterized by intense rainfall over relatively short time periods, causing significant off-floodplain flooding in addition to flooding on major rivers. Sources of off-floodplain flooding include minor rivers, sheetflow, and drainage overflow.

The RMS stochastic event set contains a range of possible winter and summer river flood events that cause losses on and off the major floodplains, representing flood events sampled from the equivalent of 100,000 years of simulation. The event set is based on extensive analysis of hydrological data and research into the causes of historical events, and has been calibrated against historical records of extreme flows and precipitation.

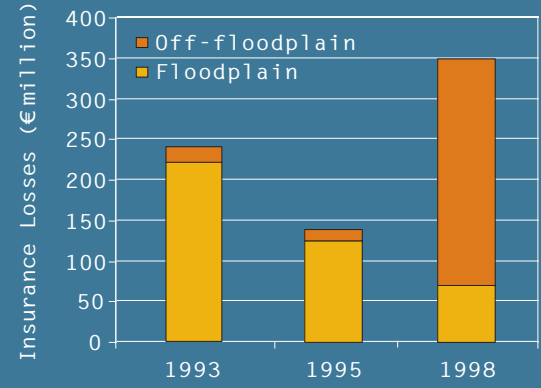
HIGH-RESOLUTION GEOCODING AND ANALYSIS CAPABILITIES

RMS has developed its high-resolution river flood model platform through extensive research over several years. The RMS® Belgium River Flood Model incorporates the latest techniques in river flood modeling. This includes the use of a 20-meter Digital Terrain Model (DTM) and a Variable Resolution Grid (VRG) of up to 50 meters for modeling street-level exposure information. The model also features a probabilistic approach to river defense failure.

With its high-resolution capabilities, this model provides users with the tools needed to price and underwrite new and existing risks, assess the impact of these risks on their portfolios, and effectively manage their exposure evolution over time. In addition, the model allows users to consider complex financial structures at the policy level. It can be used by insurers, reinsurers, and brokers to make decisions related to reinsurance pricing and purchasing, as well as capital allocation.



Reconstruction of 1998 river flood



Losses in the 1990s by flood source

VULNERABILITY LINKED TO FLOOD TYPE

The vulnerability functions in the Belgium river flood model are based on cost modeling methods that consider replacement and reinstatement costs for each component of loss. The model has been calibrated and validated using historical loss information and expert knowledge, supplemented by RMS' considerable experience with river flooding vulnerability, particularly in the U.K. The vulnerability functions produce mean damage ratios for buildings as well as contents coverage for a wide range of occupancies and construction types. Coverage for residential alternative living expense and commercial business interruption are also included.

While most of the damage from catastrophic floods occurs from inundation by large rivers, significant losses also occur due to sheetflow, the flooding of small streams, or backup of drainage systems. The vulnerability model reflects these different flood types, with specific relationships for river inundation and off-floodplain losses.

CONSIDERING FUTURE MARKET NEEDS

River flooding is a major source of loss in Belgium and has caused close to €1 billion in insurance losses since 1990. Flood risk in Belgium is likely to increase in the coming years. This increase is related to ongoing residential, commercial, and industrial development, particularly on the major flood plains and the potential increase in winter flooding that may occur as a result of climate change. At the same time, legislative changes in Belgium will provide insurers and reinsurers in the market with more opportunity to underwrite flood insurance across the country.

The combination of higher exposure, a potential increase in hazard, and change in insurance conditions makes consideration of sophisticated risk analysis techniques a necessity. The RMS® Belgium River Flood Model provides the market with the tools required to perform these analyses, and effectively manage their flood risk.

BELGIUM FLOOD MODEL HISTORY

- Released 2004
- Available in RiskLink®-ALM and RiskLink®-DLM

GEOGRAPHIC SCOPE

Belgium

EXPOSURE DATA RESOLUTION

Latitude/Longitude, Street Address, Four-figure Postcode, or CRESTA

PROBABILISTIC EVENT SET

- Approximately 3,200 stochastic events
- Event recurrence based on Poisson models

HAZARD MODELING

- Summer and winter floods modeled
- Flood propagation over 20-meter digital terrain model
- Probabilistic model of flood defense performance
- Includes off-floodplain flooding from small streams, sheetflow, and drainage overflow
- Calibrated using recent events and return period statistics

VULNERABILITY MODELING

- Buildings, contents, residential alternative living expenses, and business interruption
- Belgium-specific inundation and direct rain vulnerability functions
- 7 distinct residential building classes and 4 distinct commercial and industrial classes, with 3 height ranges
- General vulnerability classes where the occupancy or height is unknown
- 3 vulnerability regions for direct rain loss from urban flooding, surface runoff, and blocked drains

ALM® PROFILES

- Resolution: Four-figure Postcode and CRESTA
- Lines of business: Residential, Commercial, Industrial, and Agricultural

WORLDWIDE WEB
<http://www.rms.com>

E - M A I L
info@rms.com

RISK MANAGEMENT
SOLUTIONS, INC.

7015 Gateway Blvd.
Newark, CA 94560
USA

Tel 1.510.505.2500
Fax 1.510.505.2501
Tel 44.20.7256.3800 (Europe)