Case Study

Ambiental

Pioneering flood modelling & flood
risk using satellite data

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Ambiental – at the forefront of the flood risk industry.

Over 5 million people in the UK live and work in areas that are at risk of flooding.

The Company

Company Name	Ambiental
Managing Director	Dr. Justin Butler
No. of employees	20
Launched	September 2002
Location	Sussex Innovation Centre, Brighton
Sector	Environmental Risk Mapping and Modelling

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Overview

Ambiental is an international flood modelling and flood risk consultancy considered to be at the forefront of the flood risk industry. Key to Ambiental's innovation Flowroute™, their proprietary flood model that enables clients from the finance, commercial and public sector to improve their flood planning and decision making.

- Flowroute™ is Ambiental's industry-leading software platform that models how and where water will travel over different terrains based on the likely amount of inundation ie. fluvial (rivers and streams), tidal (sea, estuary or coastal and storm surge) and pluvial (surface water). Flowroute™ models the probable depth of water, and how fast it will be moving to calculate the risk of flooding.

- Flowroute™ is capable of processing multiple data sets including complex, high resolution Digital Terrain Models (DTM). Land use data to build the model comes from satellite and LiDAR imagery and is combined with soil type, rainfall gauge, tidal and other data.

- Accurate data enables clients to be more agile, responsive and better positioned to understand flood risk. It aids the insurance industry to set targeted and competitive premiums, helps government bodies prepare for flood events and set appropriate planning policy, feeds into business continuity planning and helps developers in the property design and approval process.

- Ambiental is a member of the Willis Research Network, led and sponsored by global insurance broker, Willis. It is the world's largest collaboration between public science and the financial sector. Fifty organisations from a range of disciplines and regions share data, models, applications and methods that feed into Willis' global insurance and reinsurance decision making.

The Cost of Flooding

Incidences of serious flood events are increasing, due to a variety of factors, some global (climate change), some local (deforestation, urbanisation, development on flood plains). As news reports make all too clear, the societal and economic impact of floods is considerable.

Over five million people in the UK live and work in 2.4 million properties that are at risk of flooding from rivers or the sea, with a further 2.8 million properties susceptible to surface water flooding[1].

In 2012, the UK insurance industry paid out £1.9bn to those affected by flood and storm damage, the highest annual figure since the catastrophic flooding of summer 2007, when the insurance sector paid £3bn in claims[2, 3].

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Scientists suggest that, as a result of climate change and urban growth, increased flooding of major coastal cities, including New York, Miami and Guangzhou in China, could cost the world economy more than £600bn a year by 2050[4].

Put simply, fast flowing water poses a considerable risk to life and property, whilst deep water will cause considerable damage to property. Knowing how water will behave or flow under different conditions, and over different terrains, is of huge value to the insurance industry, government bodies, business owners, town planners and homeowners. They all need more accurate data, but predicting outcomes from highly complex, variable systems is a formidable challenge.

Scientist suggest that climate change and urban growth will cost the global economy more than £600bn a year by 2050.

Case Study:

2011 Brisbane Flood Validation

The Brisbane flooding of 2011 caused damages in the region of US$2.38 billion and an impact on the Australian economy of around US$30 billion.

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Brisbane Flood 2011 – aerial view of homes under water

Ambiental conducted a validation test using actual inundation data to compare Flowroute™ modelling with the dataset used by insurers, planners and flood evaluators at the time of the flood.

The results of the test showed Flowroute™ to be considerably more accurate. Flowroute™ achieved 95% accuracy, which means that Ambiental's data missed only 1 in 20 damaged properties.

FlowrouteTM modelling prediction achieved 95% accuracy, missing only 1 in 20 damaged properties.

Ambiental's Innovation

Ambiental's team includes experts in the fields of flood modelling, insurance, rainfall simulation, climate change, geomorphology, computer programming, civil engineering, Geographical Information Systems and applied mathematics.

Located at the Sussex Innovation Centre, near Brighton, with offices in Singapore and Australia, the company is a global authority on flood risk.

Key to Ambiental's innovation is their world-class proprietary flood risk model Flowroute™. Originally developed in partnership with scientists at Cambridge University, Flowroute™ is a complex software platform that simulates the movement of water over different surfaces and under different inundation conditions. The model calculates detailed risk information on the depth, duration and extent of predicted flood events as well as the speed of water flow and its direction.

Flowroute™ is a powerful and flexible model capable of simulating flood events across whole countries, regions or cities and down to the level of individual buildings.

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Flowroute™ data is used by the global insurance industry to set more accurate and competitive premiums.

Flowroute™ allows homeowners to instantly access flood maps, helping them negotiate lower insurances premiums.

Natural hazard modelling particularly over large scales requires a huge variety of input data sets.

The topographic data to build the DTM has to come from satellite or airborne sources. Ambiental uses high resolution LiDAR imagery with satellite imagery from a variety of sources including NASA's Shuttle Radar Topography Mission (SRTM) and Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) instrument on the Terra satellite.

By modelling all sources of flood risk (rivers, tidal, surface water, tsunami, defence or dam breach) more quickly, accurately and cost effectively, Flowroute™ data is used by the global insurance industry to set more accurate and competitive premiums.

Flowroute™ helps government bodies to better support and protect communities through accurate scenario modelling, data to inform decision-making on large infrastructure projects and the development of effective response plans to major flood events. Models can also be deployed 'on-demand' to understand the dynamics of a real-time event so that emergency services can deploy resources effectively.

For the property industry, Flowroute™ data helps developers with the property design and planning approval process, whilst homeowners and buyers can instantly access flood maps and data generated by Flowroute™ in the form of a detailed flood report from Ambiental's RiskCentral service, helping them to negotiate lower insurance premiums and excesses.

Case Study:
Setting best practice for UK flood modelling

In response to a request from the Association of British Insurers to the UK Environment Agency to increase the robustness and extent of pluvial (rainfall) flood modelling, Ambiental undertook a comprehensive pluvial modelling test to set a best practice standard on modelling inputs.

The test was designed to determine which set of inputs gave the highest level of predictive accuracy for urban pluvial flood modelling. Data sets analysed included topographic surface representations, various topographic resolutions, and different approaches to employing building information within the models.

A variety of Digital Terrain Models (DTM) and Digital Surface Models (DSM) were created and reconfigured for different grid resolutions. Hydrological data was based on gauge data from the University of Hull from the 2007 floods, which were considered a UK major flood event. Hull's data showed over 110mm of sustained rainfall with rates of over 6mm per hour – an event estimated to be in excess of a 150 year return period.

As a result of the test using their Flowroute™ modelling platform, Ambiental were able to identify the optimum data inputs to ensure the most accurate predictions of the likelihood of individual buildings flooding in urban pluvial situations.

To date, Ambiental's clients include AON Benfield, Aspen RE, Willis RE, BP, Chubb Personal Insurance, the European Space Agency, World Bank, Inter-American Development Bank, the European Commission and international construction consultancy Currie and Brown.

Sources

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2. The Daily Telegraph, 15 February 2013 – "Flooding costs insurers £1.2bn." http://www.telegraph.co.uk/finance/newsbysector/banksandfinance/insurance/9873588/Flooding-costs-insurers-1.2bn.html

3. "Learning the Lessons", November 2007, Association of British Insurers http://www.ambiental.co.uk/FRA-legislation/ABI%20(2007)%20Summer%20Floods%20review.pdf

4. The Independent, 19 August 2013 - http://www.independent.co.uk/news/science/coastal-city-flooding-could-cost-more-than-600bn-a-year-8773359.html

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