# Architectural impact of climate change mimicked in lab tests

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A computerised flood model showing the extent of flooding in Tewkesbury, 2007

(PhysOrg.com) -- The architectural and structural havoc wreaked by torrential rain, flooding and fluctuating temperatures could be prevented thanks to analysis based on laboratory simulations.

Through a series of tests using the combined talent of architects, scientists and engineers, experts hope to produce a clear picture of the anticipated effects of climate change on historic buildings throughout the UK, in some cases, over the next 100 years.

The initiative is part of a multi-million project aimed at preserving archaeological sites identified by the National Trust in Deer Hurst, Tewkesbury, York and Winchester, through a collaboration between the universities of Bath, Bristol and Southampton.

One of the key tests will be to assess the flooding risks using sophisticated flood and climate change modelling tools developed by the

University of Bristol's School of Geographical Sciences.

The models predict the depth, extent and velocity of flooding using computer simulations, which map a range of potential flood patterns onto detailed terrain data taken at high resolution by scanning lasers, fixed to aircraft or road vehicles to enable an exact level of precision.

"Risk assessments are valuable in ensuring that resources are concentrated towards sites that are most likely to need flood protection," said Professor Paul Bates. "What is unique about this project is the inter-disciplinary approach; working with architects and engineers will enable us to better calculate future potential damage and impact.

"We don't know exactly how much climate is going to change in the future but we do have a range of things that might happen. Our aim is to develop predictions that will take account of the full range of possible scenarios. It's a case of quantifying those uncertainties and identifying what action would need to be taken."

A series of mathematical models are also being developed by the University of Bristol's Civil Engineering department, working in conjunction with archaeologists from Southampton university to measure deterioration caused by freeze-thaw action, where cold weather causes water trapped in the pores of masonry to expand, exerting pressure on the surrounding material. These internal pressures crack the masonry, compromising the material's ability to carry the weight of the building.

Dr Wendel Sebastian, who leads the Civil Engineering input from Bristol University will participate in a study to define typologies of the buildings and their past levels of hazards and recorded damage, to identify which are the most vulnerable to freeze-thaw action damage. Samples of the materials will be taken from the sites or reproduced as closely as

possible in the lab, and subjected to scenarios to represent anticipated climate change effects over the next 100 years.

Provided by University of Bristol