Study predicts effect of global warming on spring flowers

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An international study involving Monash University mathematician Dr Malcolm Clark has been used to demonstrate the impact of global warming and to predict the effect further warming will have on plant life.

The study, published in the *International Journal of Climatology*, predicts a difference in flowering times of certain plants in certain climates by as much as 50 days by the year 2080.

The study, by Dr Malcolm Clark, an Adjunct Research Fellow at Monash University's School of Mathematical Sciences and Professor Roy Thompson, a geophysicist at the University of Edinburgh in Scotland, investigated the possibilities of flowering spring plants blooming in the depths of winter as the plants respond to the effects of global warming.

The study is based on the facts that plants control the timing of flowering by adapting to the local weather and climate and that throughout the past century global warming, driven by ever rising atmospheric carbon dioxide concentrations, has resulted in local climate changes which are likely to steadily increase.

"Already there is a great deal of observational evidence of regional changes in climate associated with global warming," Dr Clark said. "We have not only seen an earlier break up of ice on rivers and melting glaciers, but earlier flowering of plants. This new model allows us to

refine predictions of the future impact of warming on plant and animal life across much of the world."

Dr Clark and Professor Thompson worked from a wealth of old records from the Royal Botanic Garden Edinburgh, which started in 1850. They also analysed records of Edinburgh's climate from records dating back to 1775. With this information they investigated the responses of 79 species of plant to air temperatures.

Using this data, they established the relationship between air temperature and first flowering date and have used their new statistical model to predict likely changes in spring flowering in Scotland based on three potential global warming scenarios. For every 1 o C that the climate warms they predict that spring flowering will begin approximately 11 days earlier. For an increasingly oceanic climate (greater winter than summer warming) their model predicts shifts in the botanical season ranging between 16 days at the start of spring and 12 days at the end of spring. For an increasingly continental climate predictions range between 7 days at the start of spring and 11 days at the end of spring.

Clark and Thompson checked the results of their statistical model with other data sets from across the world, indicating that their results are not limited to one country. "Although the study is based on plant life in Scotland, our phenological models apply across regions spanning hundreds of thousands of square kilometres," Dr Clark said.

Using their results Dr Clark and Professor Thompson have been able to construct a global map demonstrating 'desynchronisation' of plant and animal life in the year 2080. The map shows that maritime climates including Western Europe, the American Atlantic coast, New Zealand, Chile and North Africa will be the greatest effected as the botanical calendar will move strongly out of sync with the seasons with temperature-sensitive plants flowering up to 50 days earlier than now,

with significant ecological repercussions.

Source: Monash University (news : web)