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Researchers find North American grasslands likely to be more productive under future climate change

Grasslands in North America could well be more productive in future climate scenarios, a new research study shows.

Researchers from the United States and Canada, including University of Lethbridge biologist Dr. Larry Flanagan, used a new modelling method to predict how native grasslands could respond to climate change and their results are pointing to increased productivity, even under slightly drier environmental conditions.

“Overall, our projections indicate significant gains in grassland cover by 2100 across major areas of western North America that are dominated by grasslands at present,” says Flanagan. “This was particularly true in the northern grassland regions that are often limited by cool temperatures in the early growing season. Warmer temperatures can cause an earlier start to the growing season, by as much as a few weeks.”

Grassland growth occurs quickly and depends on precipitation and soil water content. To predict daily changes in grassland cover, the researchers developed a model that calculated plant growth and the soil water budget, and calibrated it using measurements made at a range of field sites. Once the model was successfully tested, it was run under a new set of environmental conditions that consisted of climate projections for the next century. These projections were provided by Coupled Model Intercomparison Project Phase 5 (CMIP5), a five-year climate change modelling research strategy that is co-ordinated by the World Climate Research Program.

“Our analysis indicates a likely future shift of vegetation growth towards both earlier spring emergence and delayed autumn senescence, which would compensate for drought-induced reductions in summer growth and productivity associated with climate change,” says Flanagan.

The model doesn’t include the effects of rising levels of atmospheric carbon dioxide on photosynthesis and water use efficiency, factors that could magnify the positive impact of climate change on the grasslands.

Grasslands cover more than 30 per cent of the world's land surface and are fundamental to the meat and dairy industries. This projected increase in productivity of grasslands has implications for agriculture, carbon cycling and vegetation feedbacks into the atmosphere.

“The stimulation of grassland plant growth by warmer temperatures is strongly dependent on adequate soil moisture being present in new climate change scenarios. The positive trends in native grassland cover we currently predict for the next 100 years could be stalled by lack of moisture or other environmental limitations. So climate change could also have significant additional demands on irrigation and nutrient management that influence agricultural productivity in the next century,” cautions Flanagan.

The research study by Flanagan and his colleagues can be found on the [Nature Climate Change](#) website under the 'Latest research' tab.

-- 30 --

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