

5. Xu, Z., van Kooten, G.C. "Climate and Money: A Spatial Regression Model for Planning Firefighting Budgets in British Columbia" Canadian Forest Economists Meeting, Pacific Forest Centre, Victoria, British Columbia, Canada. Feb. 2012 (oral)
6. Xu, Z., van Kooten, G.C. "Weather Index and Wildfire Incidence: A preliminary Attempt at Weather Insurance Accounting for BC Wildfires" Climate Change Adaption – Sustainable Forest Management Workshop, University of British Columbia, Vancouver, British Columbia, Canada. Feb. 2011 (poster)

Publications

1. van Kooten, G.C., Johnston, C., Xu, Z. 2014. "Economics of Forest Carbon Sequestration" In: *Handbook of Forest Resource Economics* **2014**, New York, USA: Routledge. (To be published)
2. Xu, Z., Li, H. "Positive Analysis of Inter-Local Comparative Predominance of Main Forest Products in China" *Journal of Beijing Forestry University (Social Sciences)* **2009**, 8 (2), 46-50.
3. Xu, Z. "The Viability of State Owned Forestry Enterprises" *Forestry Economics* **2007**, 184 (12), 61-63.



University
of Victoria

Graduate Studies

PROGRAMME

The Final Oral Examination
for the Degree of

DOCTOR OF PHILOSOPHY
(Department of Geography)

Zhen Xu

2009	Beijing Forestry University, China	MA
2006	Beijing Forestry University, China	BA

"Wildfire Occurrence Projection and Potential Impacts Estimation for British Columbia Interior"

Wednesday, April 23, 2014
2:00pm

David Turpin Building, room A144

Supervisory Committee:

Dr. G. Cornelis van Kooten, Departments of Geography, UVic
(Supervisor)

Dr. Kurt Niquidet, Department of Geography, UVic (Member)
Dr. Brad Stennes, Department of Economics (Outside Member)
Dr. Lili Sun, Pacific Forestry Centre, Canadian Forest Service
(Additional Member)

External Examiner:

Dr. Christopher Gaston, Faculty of Forestry, University of British
Columbia

Chair of Oral Examination:

Dr. Joan Wharf Higgins, School of Exercise Science, Physical and
Health Education, UVic

Abstract

As the most destructive forest disturbance in British Columbia, wildfire becomes more worrisome for getting more uncertain due to climate change. For decades, wildfire occurrence has never merely been a disturbance for only BC's forest management, but many other economic activities. During a severe fire season, firefighting expenditure could be dozens of times as much as that in a mild season; also, unexpectedly severe fires near municipalities are very likely to threaten residential properties and other human structures. The current study investigates the potential to predict wildfire occurrence using climate indexes and quantify its marginal prices for property values at the municipal level, so as to provide a quantitative indicator for decision making in regard to influences of wildfire occurrence in the near future.

In the interior areas of British Columbia, we believe that both spatial distributions and temporal trends of wildfire occurrence are greatly influenced by characteristics of the climate, which are mainly determined by the unique geographical condition of the province. A fundamental assumption is that global ocean oscillations measured by climate indexes exert periodical effects on regional weather conditions and thus wildfire occurrence with certain periods of delays. Significant correlations between monthly temperature and precipitation and large fire occurrence with distinctions in terms of distances to municipalities are proved by statistical analysis.

The relationships between monthly wildfire occurrence and monthly climate indexes are estimated by count models based on two different probability distributions. The results indicate that monthly wildfire occurrence can be statistically estimated with at least the four-month lags of historic climate indexes, especially the

El Niño index. Such relationships also differ in terms of different landscapes.

The estimation of fire impacts on property values is conducted using a hedonic pricing model with the spatial lag of dependent variables. The results show distance based positive impact of fire frequency and negative impact of fire size in neighboring areas on property values. Homes located within the wildland urban interface are worth roughly \$30,000 more than comparable homes outside this zone, even fire risks within such areas are expected to be higher.

Presentations

1. Xu, Z., van Kooten, G.C. "Estimating Wildfires in British Columbia using Count Models: Predicting Climate Change Impacts" Future Forestry Leaders Symposium, University of British Columbia, Vancouver, British Columbia, Canada. Feb. 2014 (oral)
2. Xu, Z., van Kooten, G.C. "Living with Wildfire: The Impact on Property Values in Kelowna, British Columbia" Future Forestry Leaders Symposium, University of British Columbia, Vancouver, British Columbia, Canada. Feb. 2014 (poster)
3. Xu, Z., van Kooten, G.C. "Planning Wildfire Budgets: Searching for a Simple Climate Based Index" Annual Meeting of Western Forest Economists, Best Western Agate Beach, Newport, Oregon, United States. June 2012 (oral)
4. Xu, Z., van Kooten, G.C. "Spatial Regression Analysis of Wildfire Occurrence and Climate Change" The 1st Canadian Ph.D. Workshop in Environmental Economics & Policy, University of Ottawa, Ottawa, Ontario, Canada. May. 2012 (oral)