



Dr. Keping CHEN

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Keping has been working at Risk Frontiers – Natural Hazards Research Centre since March 2000. He has developed research interests in hazards risk assessment, using GIS, remote sensing and applied mathematics. He is actively involved in various applied research and consulting projects on quantitative risk assessment and catastrophe loss modelling, such as quantifying bushfire penetration into urban areas, developing natural hazard risk ratings at multiple spatial units ranging from individual addresses to postcodes, and programming flood loss estimation modules of FloodAUS.

Geographical approaches are instrumental in examining and solving real world problems of modern society, such as environmental degradation, disaster mitigation and emergency management. Geographical approaches manifest two essential characteristics: (1) an integrative perspective to examine problems across human – environment systems; and (2) geographical (or spatial) thinking and reasoning in data integration, phenomenon modelling, and outcome communication to policy makers and the public.

Natural hazards risk assessment can be seen as a quintessential example of broader geographical enquiries. As risk assessment is multidisciplinary in nature, Keping's research largely reflects the duality between physical and human geography. In addition to his contributions to various applied projects at Risk Frontiers, Keping has a keen interest in the following research areas that contribute to spatially integrated risk science, including

- (1) the integration of physical environmental and socioeconomic data and their scale issues;
- (2) the importance of selecting appropriate spatial units of analysis for effective risk assessment;
- (3) the use of geostatistics for addressing spatial and temporal non-stationarities and associated uncertainties in risk modelling; and
- (4) the development of suitable decision support methods and tools for facilitating risk management in practice and promoting community safety.

Work

2003 – Risk Scientist, Risk Frontiers – NHRC, Macquarie University.
2000 – 2003 Research Fellow, Risk Frontiers – NHRC, Macquarie University.
1997 – 2000: Research Assistant (part-time), NHRC, Macquarie University.

Education

1997 – 2000: PhD (Conferred April 2001), Risk Frontiers – NHRC, Macquarie University, Sydney, Australia.
1993 – 1996: MSc, Institute of Environmental Sciences (State Key Lab for Water Environment and Simulation), Beijing Normal University, Beijing, China.
1989 – 1993: BSc, Department of Geography, Hangzhou University (now Zhejiang University, Xixi Campus), Hangzhou, China.

PhD thesis

Chen, K., 2000. *An Integrated Approach to Natural Hazards Risk Assessment*. Unpublished, Natural Hazards Research Centre, Macquarie University, Australia, 219 p.

Journal articles

- [1] Chen, K., and McAneney, J., 2006. High-resolution estimates of Australia's coastal population. *Geophysical Research Letters*, 33, L16601, doi:10.1029/2006GL026981.
- [2] Chen, K., and McAneney, J., 2005. The bushfire threat in urban areas. *Australasian Science*, 26(1), 14-16. (Research findings highlighted in 10+ newspapers, radio broadcasts, etc.)
- [3] Chen, K., and McAneney, J., 2004. Quantifying bushfire penetration into urban areas in Australia, *Geophysical Research Letters*, 31, L12212, June 2004 issue. (Research findings highlighted in *Nature*, 10+ newspapers, radio broadcasts, etc.)
- [4] Chen, K., McAneney, J., Blong, R., Leigh, R., Hunter, L., and Magill, C., 2004. Defining area at risk and its effect in catastrophe loss estimation: A dasymetric mapping approach. *Applied Geography*, 24(2), 97-117.
- [5] Chen, K., 2004. Catastrophe modelling and its major overseas developers. *Journal of Natural Disasters*, 13(2), 1-8.
- [6] Chen, K., Blong, R., and Jacobson, C., 2003. Towards an integrated approach to natural hazards risk assessment using GIS: With reference to bushfires. *Environmental Management*, 31(4), 546-560.
- [7] Chen, K., and Blong, R., 2003. Identifying the characteristic scale of scene variation in fine spatial resolution imagery with wavelet transform-based sub-image statistics. *International Journal of Remote Sensing*, 22(9), 1983-1989.
- [8] Chen, K., 2002. An approach to linking remotely sensed data and areal census data. *International Journal of Remote Sensing*, 23(1), 37-48.
- [9] Chen, K., Blong, R., and Jacobson, C., 2001. MCE-RISK: Integrating multicriteria evaluation and GIS for risk decision-making in natural hazards. *Environmental Modelling and Software*, 16(4), 387-397.
- [10] Chen, K., Jacobson, C., and Blong, R., 2004. Artificial neural networks for risk decision support in natural hazards: A case study of assessing the probability of house survival from bushfires. *Environmental Modeling & Assessment*, 9, 189-199.

Conference papers and presentations

- [1] Chen, K., 2005. Counting bushfire-prone addresses in the Greater Sydney region. *Proceedings of the Symposium on Planning for Natural Hazards – How Can We Mitigate the Impacts?* University of Wollongong, 2-5 February 2005, 10 pages.
- [2] Chen, K., 2003. Scale analysis for remotely sensed images and areal census data: Stressing objects. *Proceedings of the 30th International Symposium on Remote Sensing of Environment (CD-ROM) – Information for Risk Management and Sustainable Development*, 10-14 November 2003, Honolulu, Hawaii, 4 pages. [Poster]
- [3] Chen, K., McAneney, J., and Blong, R., 2003. Three statistics for quantifying bushfire penetration into urban areas. *Proceedings of the 30th International Symposium on Remote Sensing of Environment (CD-ROM) – Information for Risk Management and Sustainable Development*, 10-14 November 2003, Honolulu, Hawaii, 4 pages. [Poster]

- [4] Chen, K., Hunter, L., Leigh, R., Blong, R., and Yeo, S., 2003. Are the poor more at risk in flood-prone communities in eastern Australia? *Proceedings of the 2003 Australian Disaster Conference (CD-ROM) – Community Safety is Everyone's Business*, 10-12 September 2003, Canberra, Australia, 6 pages.
- [5] Chen, K., Jacobson, C., and Blong, R., 2002. Use of remotely sensed imagery for selecting spatial analysis units in natural hazards risk assessment: A case study. *Proceedings of the 11th Australasian Remote Sensing and Photogrammetry Association Conference (CD-ROM) – Images to Information*, 2-6 September 2002, Brisbane, Australia, 12 pages.
- [6] Chen, K., and Blong, R., 2002. Integrating remotely sensed images and areal census data for building new models across scales. *Proceedings of IEEE IGARSS'02 and 24th Canadian Symposium on Remote Sensing (CD-ROM) – Remote Sensing: Integrating Our View of the Planet*, 24-28 June 2002, Toronto, Canada, 3 pages. [Poster]
- [7] Chen, K., and Blong, R., 2002. Extracting building features from high resolution aerial imagery for natural hazards risk assessment. *Proceedings of IEEE IGARSS'02 and 24th Canadian Symposium on Remote Sensing (CD-ROM) – Remote Sensing: Integrating Our View of the Planet*, 24-28 June 2002, Toronto, Canada, 3 pages. [Poster]
- [8] Chen, K., Blong, R., Hunter, L., Andrews, K., and Siciliano, F., 2002. PerilAUS relative risk ratings in natural hazards, Australia. *Proceedings of Geoinformatics' 2002 (CD-ROM) – GIS and Remote Sensing for Global Change Studies and Sustainable Development*, 1-3 June 2002, Nanjing, China, 10 pages.
- [9] Chen, K., Jacobson, C., and Blong, R., 2001. Using NDVI image texture analysis for bushfire-prone landscape assessment. *Proceedings of the 22nd Asian Conference on Remote Sensing*, 5-9 November 2001, Singapore, Vol 1, 532-537.
- [10] Chen, K., 1998. Correlations between census dwelling data and remotely sensed data. In Firms, P. (ed.), *Proceedings of The 10th Annual Colloquium of the Spatial Information Research Centre – Towards the Next Decade of Spatial Information Research*, 16-19 November 1998, Dunedin, University of Otago, New Zealand, 53-62.

Other conference papers

- [11] Blong, R., Leigh, R., Hunter, L. and Chen, K., 2001, Hail and flood - Understanding the risks. In Britton, N.R. (ed.), *AON Re Hazards and Capital Risk Management Conference Series*, 23-25 September 2001, Gold Coast, Southwood Press, Sydney, 25-39.
- [12] Leigh, R., Chen, K., Hunter, L., and Blong, R., 2001. Flood risk modelling and approaches to Average Annual Damage (AAD) estimation. *Proceedings of the 41st Floodplain Management Authorities Conference*, 8-11 May 2001, Wentworth, NSW, 7 pages.
- [13] Hunter, L., Leigh, R., and Chen, K., 2006. Are the poor more at risk in flood-prone areas? New analysis. *Proceedings of the 46st Management Authorities Conference*, 28 February - 2 March 2006, Lismore, NSW, 12 pages.

Newsletters

- [1] Chen, K. 2005. Quantifying at-risk Australian addresses vulnerable to sea level rise and tsunamis. *Risk Frontiers Quarterly Newsletter*, 5 (special issue). (Abstract for Risk Frontiers' annual seminar series)
- [2] Chen, K., and McAneney, J., 2004. Natural hazard risk rating. *Risk Frontiers Quarterly Newsletter*, 4(2).
- [3] Chen, K., and McAneney, J., 2004. How many bushfire prone addresses are there in Australia? *Risk Frontiers Quarterly Newsletter*, 4(1).

- [4] Chen, K., and McAneney, J., 2004. FireAUS: Bushfire relative risk ratings. Risk Frontiers Quarterly Newsletter, 3(4). (Abstract for Risk Frontiers' annual seminar series)
- [5] Chen, K., 2004. Relative risk ratings for Local Government Areas. Risk Frontiers Quarterly Newsletter, 3(3).
- [6] McAneney, J., and Chen, K., 2003. 2003 Canberra bushfires: What can we learn? Risk Frontiers Quarterly Newsletter, 3(1). (Abstract for Risk Frontiers' annual seminar series)
- [7] Chen, K., McAneney, J., Blong, R., and Leigh, R., 2003. Defining area at risk and its effect on loss estimation. Risk Frontiers Quarterly Newsletter, 2(3).
- [8] Chen, K., 2001. Eye spy: the identification of building features using high-resolution imagery. Risk Frontiers Quarterly Newsletter, 1(1). (Abstract for Risk Frontiers' annual seminar series)
- [9] Chen, K., and Blong, R., 2001. Risk decision-making in natural hazards: bushfire as example. Natural Hazards Quarterly, 7(2).
- [10] Blong, R., and Chen, K., 2000. ICA zones – relative risk ratings. Natural Hazards Quarterly, 6(4).
- [11] Chen, K., and Blong, R., 2000. Risk rating for PerilAUS version 2. Natural Hazards Quarterly, 6(3). (Abstract for Risk Frontiers' annual seminar series)
- [12] Blong, R., and Chen, K., 2000. Natural perils in Australia - maps and risk rating (PerilAUS II). Natural Hazards Quarterly, 6(2).
- [13] Chen, K., 1999. A GIS-MCE approach to natural hazards risk assessment. Natural Hazards Quarterly, 5(1).
- [14] Chen, K., 1998. An integrated approach to bushfire risk assessment. Natural Hazards Quarterly, 4(1).

Recent community engagement & presentations at conferences, seminars, etc.

- [1] Chen, K., 2006. High-resolution estimates of coastal population vulnerable to significant sea level rise: A global and national impact assessment. 22 March 2006. CSIRO Marine and Atmospheric Research, Hobart.
- [2] Chen, K., 2006. A national coastal vulnerability study. Insurance Council of Australia Flood Seminar Series, 16 February 2006, University and Schools Club, Sydney. (Research findings highlighted in 5+ newspapers, radio broadcasts, etc.)
- [3] Chen, K., 2005. Decision support tools for managing rising disaster risk: A survey. The 5th Annual IIASA-DPRI Forum on Integrated Disaster Risk Management: Innovations in Science and Policy, 14-18 September 2005, Beijing, China.
- [4] Chen, K., 2005. Address-based coastal vulnerability database for Sydney. 3 December 2005. Sutherland Shire Council, Sydney.
- [5] Chen, K., 2005. Quantifying Australian addresses vulnerable to sea level rise and tsunamis – validation method for the world. Risk Frontiers' Annual Seminar Series for the Insurance Industry. 25 August, 2005, Museum of Sydney.

External reports (6)

Software developed (5)

Applied research projects (13, with principal investigator roles)

Briefing notes for sponsors (10)

Others (manuscripts reviews for international scientific journals, proposal reviews, etc.)

Applied Geography

Information Fusion (An International Journal on Multi-Sensor, Multi-Source Information Fusion)

Journal of Geographic Information and Decision Analysis

Journal of Hydrology

IEEE Transactions on Geoscience and Remote Sensing

Environmental Management

Journal of Environmental Management

Journal of Hazardous Materials

Natural Hazards and Earth System Sciences

Disasters

Environmental Monitoring and Assessment

Journal of Coastal Research

National-level Science Foundation proposals