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IVAN CHARLES HANIGAN.
Curriculum Vitae.
January 6, 2014.

Appointments ***Australian National University***

2008–Present. Data Manager and Analyst, National Centre for
Epidemiology and Population Health (NCEPH).

2008–2009. Data Analyst, Environment, Climate and Health (NCEPH).

2013–Present. Part-time Data Analyst, Fenner School of Environment
and Society. Long-Term Ecosystem Research Network and Australian
Supersite Network Analytical software developments.

CSIRO Adaptive Primary Industries

2013–Present. Part-time data analysis projects investigating
characteristics of transformational adaptation in a) Energy use and
b) Farm Enterprise Mix.

James Cook University

2013. Part-time Research Data Scientist assisting the Terrestrial
Ecosystem Research Network’s Australian Supersite Network online
data portal and Analytical software developments.

University of Canberra

2013–Present. Part-time Research Assistant to Professor Colin Butler,
Faculty of Health.

University of Tasmania

2008–2011. Data Manager and Analyst, Bushfire Smoke, Heatwaves and
Health Project, School of Plant Science.

Charles Darwin University

2006–2007. Data Manager and Analyst, Bushfire Smoke and Health
Project, School of Environmental Research.

Australian National University

2001–2006. Research Assistant Environmental Epidemiology Group (NCEPH).

Education ***Australian National University***

2009–Present: Part-time PhD entitled *Disentangling Health Effects of
Environmental Change from Social Factors*, NCEPH and CSIRO.

Panel: Colin Butler, Philip Kokic, Rohan Nelson, Steven McEachern.

1998–2005: Bachelor of Arts in Geography and Human Ecology, First
Class Honours, School of Resources, Environment and Society. ANU.

Papers

- A18. Wilson LA, Morgan GG, **Hanigan IC**, Johnston FH, Abu-Rayya H, Broome R, Gaskin C, Jalaludin, B. *The impact of heat on mortality and morbidity in the Greater Metropolitan Sydney Region: A case crossover analysis*. Environmental Health. 2013;12(98). doi: 10.1186/10.1186/1476-069X-12-98
- A17. Martin KL, **Hanigan, IC**, Morgan GG, Henderson SB, Johnston FH. *Air pollution from bushfires and their association with hospital admissions in Sydney, Newcastle and Wollongong, Australia 1994–2007*. Australian New Zealand Journal of Public Health. 2013;37(238-43). doi: 10.1111/1753-6405.12065.
- A16. Johnston FH, **Hanigan IC**, SB Henderson and Morgan GG. *Effect of air pollution control on death rates in Launceston, Australia, 1994–2007: an Intervention study*. BMJ 2013;345(e8446). doi: 10.1136/bmj.e8446
- A15. **Hanigan IC**, Butler CD, Kokic PN and Hutchinson MF. *Suicide and drought in New South Wales, Australia, 1970–2007*. Proceedings of the National Academy of Science USA 2012;109(35). doi: 10.1073/pnas.1112965109.
- A14. Vally H, Peel M, Dowse GK, Cameron S, Codde JP, **Hanigan IC** and Lindsay MD. *Geographic Information Systems used to describe the link between the risk of Ross River virus infection and proximity to the Leschenault estuary, WA*. Australian and New Zealand Journal of Public Health 2012;36(3). doi:10.1111/j.1753-6405.2012.00869.x
- A13. Johnston FH, **Hanigan IC**, Henderson SB, Morgan, GG and Bowman, DMJS. *Extreme air pollution events from bushfires and dust storms and their association with mortality in Sydney, Australia 1994–2007*. Environmental Research 2011;111(6). doi:10.1016/j.envres.2011.05.007
- A12. Johnston FH, **Hanigan IC**, Henderson SB, Morgan GG, Portner T, Williamson GJ and Bowman DMJS. *Creating an integrated historical record of extreme particulate air pollution events in Australian cities from 1994 to 2007*. Journal of the Air and Waste Management Association 2011;61(4). doi:10.3155/1047-3289.61.4.390
- A11. Hall GV, **Hanigan IC**, Dear KBG and Vally H. *The influence of weather on community gastroenteritis in Australia*. Epidemiology and Infection 2011;139(6). doi:10.1017/S0950268810001901
- A10. Edwards F, Dixon J, Friel S, Hall G, Larsen K, Lockie S, Wood B, Lawrence M, **Hanigan IC**, Hogan A and Hattersley L. *Climate change*

adaptation at the intersection of food and health. Asia-Pacific Journal of Public Health 2011;23(2). doi:10.1177/1010539510392361

- A9. Bambrick H, Woodruff R and **Hanigan IC**. *Climate change could threaten blood supply by altering the distribution of vector-borne disease: an Australian case-study.* Global Health Action 2009;2. doi:10.3402/gha.v2i0.2059
- A8. Johnston FH, **Hanigan IC** and Bowman DMJS. *Pollen loads and allergic rhinitis in Darwin, Australia: A potential health outcome of the grass-fire cycle.* Ecohealth 2009;6(1). doi: 10.1007/s10393-009-0225-1
- A7. **Hanigan IC**, Johnston FH and Morgan GG. *Vegetation fire smoke, indigenous status and cardio-respiratory hospital admissions in Darwin, Australia, 1996-2005.* Environmental Health 2008;7(42). doi:10.1186/1476-069X-7-42
- A6. **Hanigan IC** and Johnston FH. *Respiratory hospital admissions were associated with ambient airborne pollen in Darwin, Australia, 2004-2005.* Clinical and Experimental Allergy 2007;37(10). doi:10.1111/j.1365-2222.2007.02800.x
- A5. Johnston FH, Bailie RS, Pilotto LS and **Hanigan IC**. *Ambient biomass smoke and cardio-respiratory hospital admissions in Darwin, Australia.* BMC Public Health 2007;7(1). doi:10.1186/1471-2458-7-240
- A4. D'Souza RM, Bambrick H, Kjellstrom T, Kelsall L, Guest C and **Hanigan IC**. *Seasonal variation in acute hospital admissions and emergency room presentations among children in the ACT.* Journal of Paediatrics and Child Health 2007;43(5). doi:10.1111/j.1440-1754.2007.01080.x
- A3. Dear KBG, Ranmuthugala G, Kjellstrom T, Skinner C and **Hanigan IC**. *Effects of temperature and ozone on daily mortality experienced in France during the August 2003 heat wave.* Archives of Environmental and Occupational Health 2006;60(4). PMID:17214291
- A2. **Hanigan IC**, Hall GV and Dear KBG. *A comparison of methods for calculating population exposure estimates of daily weather for health research.* International Journal of Health Geographics 2006;5(1). doi:10.1186/1476-072X-5-38
- A1. Nicholls N, Butler C and **Hanigan IC**. *Inter-annual rainfall variations and suicide in New South Wales, Australia, 1964-2001.* International Journal of Biometeorology 2006;50(3). doi:10.1007/s00484-005-0002-y

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|--------------------------|--|
| Manuscripts
Submitted | <p>B1. O'Brien LV, Berry HL, Coleman C and Hanigan IC. <i>Drought as a mental health exposure</i>. Submitted to Environmental Research on 15th May 2013.</p> |
| Data Publi-
cations | <p>c3. http://researchdata.ands.org.au/meteorological-data-for-australian-postal-areas</p> <p>c2. http://researchdata.ands.org.au/weather-exposures-by-statistical-local-area-sla-2001-edition</p> <p>c1. http://researchdata.ands.org.au/monthly-drought-data-for-australia-1890-2008-using-the-hutchinson-drought-index</p> |
| Published
Abstracts | <p>D3. Hanigan IC, Johnston FH, Morgan GG, Dingle JK and Bowman DMJS. <i>Assessing the Relationship Between Exposure to Vegetation Fire Smoke and Hospital Admissions when Empirical Air Quality Measurements are Limited: Darwin, Australia, 1996-2005</i>. Epidemiology 2008;19(6) Supplement:S266 [ISEE 2008 Conference Abstracts Supplement]</p> <p>D2. D'Souza RM, Becker NG, Hall G, Kjellstrom T, Bambrick H, Kelsall L, Hanigan IC and Guest C. <i>Climatic factors associated with hospitalisations and emergency room presentations for diarrhoea in children</i>. Epidemiology 2005;16(5):S60 [ISEE 2005 Conference Abstracts Supplement].</p> <p>D1. D'Souza RM, Becker NG, Kjellstrom T, Bambrick H, Woodruff R, Kelsall L, Hanigan IC and Guest C. <i>Influence of climatic factors on hospitalisations and emergency room presentations for asthma and other (non-asthma) respiratory conditions in children</i>. Epidemiology 2005;16(5):S50 [ISEE 2005 Conference Abstracts Supplement].</p> |
| Reports Au-
thored | <p>E6. Bambrick H, Woodruff R and Hanigan IC. <i>Effective emissions targets needed to protect Australia's blood supply</i>. The Australia Institute Policy Brief No. 11 2010</p> <p>E5. McMichael AJ, Berry H, Butler C, Capon A, Dear KBG, Hanigan IC, Harley DO, Kjellstrom T, Lucas R and Strazdins L. 2009. <i>Assessing the scale and nature of health vulnerability to climate change</i>. Background report for Campbell-Lendrum D and Bertollini R, Protecting health from climate change: global research priorities. World Health Organisation, Geneva.</p> |

- E4. Bambrick H, Dear KBG, Woodruff R, **Hanigan IC** and McMichael AJ. *The impacts of climate change on three health outcomes: temperature-related mortality and hospitalisations, salmonellosis and other bacterial gastroenteritis, and population at risk from dengue*. Garnaut Climate Change Review, Commonwealth of Australia 2008.
- E3. Berry H, Kelly B, **Hanigan IC**, Coates J, McMichael AJ, Welsh J and Kjellstrom T. *Rural mental health impacts of climate change*. Garnaut Climate Change Review 2008.
- E2. D'Souza RM, Hennessy K, Cope M, McMichael AJ, Page C, Whetton P, Physick B and **Hanigan IC**. *A scoping study of the impact of climate change on air pollution over Sydney*. Consultancy for NSW Environmental Protection Agency. 2003.
- E1. **Hanigan IC**. *Hotspots of Pathogens in Drinking Water Catchments: Case Study of Googong Catchment*. ECOWISE Environmental Pty. Ltd. and ActewAGL, Canberra. 2003.

Reports As-
sisted

- F2. Woodruff R, Hales S, Butler CD, and McMichael AJ. *Climate Change Health Impacts In Australia: Effects of Dramatic CO2 Emission Reductions*. Report for the Australian Conservation Foundation and the Australian Medical Association. 2005.
- F1. McMichael AJ, Woodruff R, Whetton P, Hennessy KJ, Nicholls N, Hales S, Woodward A, and Kjellstrom T. *Human Health and Climate Change in Oceania: a Risk Assessment*. Commonwealth Department of Health and Aging Australia. 2003.

Conference
Posters and
Presenta-
tions

- G24. **Hanigan IC**. Climate Change Health Impact Assessments: Farmer Suicide and Drought Case Study. Presented to Staff of the Food Security Programme, MS Swaminathan Research Foundation. October 4, 2013, Chennai, India.
- G23. **Hanigan IC**. Disentangle Environmental from Social Factors: Suicide and Climate Case Study. Presented to Staff of SNEHA (WHO) Suicide Prevention Centre. October 3, 2013, Chennai, India.
- G22. Butler CD, Turner GM, **Hanigan IC** and Bowles DC. Climate Change Adaptation: A Mirage That Threatens To Trap Us In Dry Sand. GREENHOUSE 2013 The Science Of Climate Change. October 10, 2013, Adelaide.

- G21. Johnston FH, **Hanigan IC**, Henderson SB and Morgan GG. Biomass Smoke Pollution And Mortality Rates In Launceston, Australia, 1994-2007: Evaluation Of Coordinated Interventions To Improve Ambient Air Quality. The joint ISEE, ISES and ISIAQ Environmental Health Conference 2013 in Basel, Switzerland (19-23 August 2013).
- G20. Morgan GG, Martin KL, **Hanigan, IC**, Henderson SB, Johnston FH. Wood Smoke PM10 and Hospital Admissions in Seven Regional Australian Towns. The joint ISEE, ISES and ISIAQ Environmental Health Conference 2013 in Basel, Switzerland (19-23 August 2013).
- G19. **Hanigan IC**, Fisher D and McEachern S. Open Software for Restricted Data: a Climate/Suicide Health Impact Assessment Example. Speedtalk and Poster. National Climate Change Adaptation Research Facility Conference 'Climate Adaptation knowledge and partnership'. June 2013, Sydney.
- G18. Bennett CM, **Hanigan IC**, Dear KBG, Szarka I. A SWISH Way to Assess the Health Impacts of Climate Change. NCCARF Conference 'Climate Adaptation: Knowledge And Partnerships'. June 2013, Sydney.
- G17. Howden M, Bates B, Crimp S, **Hanigan IC**, Australian Drought Strategies: From Providence To Pigeon-Holing To Preparedness And People. High Level Meeting on National Drought Policy (HMNDP) organised by WMO, FAO, and UNCCD. Geneva, March 2013.
- G16. Harley DO, Dear KBG, Faddy H, **Hanigan IC**, Lindesay J, McMichael AJ, Ritchie S, Viennet E, Williams C. Dengue transmission under climate change in Northern Australia: linking ecological and population-based models to develop adaptive strategies. Communicable Diseases Control Conference and ASID Annual Scientific Meeting. Canberra, 19-23 March 2013. [Oral]
- G15. Johnston FH, **Hanigan IC**, Henderson SB, Morgan GG and Bowman, DMJS. *The association between mortality and air pollution events from bushfires and dust storms in Sydney, 1994-2007*. Royal College of Physicians Annual Scientific Meeting, Darwin, 2011. [Poster]
- G14. Morgan G, **Hanigan IC**, Wilson L, Abu-Rayya H, Gaskin C, Johnston F, Lloyd G, Broome R, and Jalaludin B. *The effects of heat waves on mortality and hospitalisation in Sydney, Australia 1994-2009*. 23th Congress of the International Society for Environmental Epidemiology, Barcelona, 2011. [Poster].
- G13. Johnston FH, **Hanigan IC**, Henderson SB, Morgan GG and Bowman DMJS. *Preliminary results from the Australian landscape fire smoke*

project. International Society for Environmental Epidemiology, Annual Scientific Meeting, Seoul Korea Sept 2010. [Poster]

- G12. Bambrick H, Dear KBG and **Hanigan IC**. *Deaths in a sunburnt country: Differential mortality responses to temperatures in a 'hot' country*. IOP Conference Series Earth and Environmental Science, 6 142013, 2009. [Poster]
- G11. Banwell C, Dixon J, Bambrick H, Hinde S, Kjellstrom T, Lucas R and **Hanigan IC**. *Socio-cultural reflections on comfort and heat in Australia with implications for climate change adaptation*. IOP Conference Series Earth and Environmental Science, 6 572023, 2009. [Poster]
- G10. Johnston FH and **Hanigan IC**. *Tropical plant pollens and allergic rhinitis*. The Thoracic Society of Australia and New Zealand Annual Scientific Meeting. Darwin, 6-7 April 2009. [Poster]
- G9. McMichael AJ and **Hanigan IC**. *Drought and drying: The human dimension. Risks to Wellbeing and Health. Drought – Past and Future*. ANU Water Initiative. ANU, Canberra. Nov 14, 2008. [Oral]
- G8. **Hanigan IC**, Johnston FH, Morgan GG, Dingle JK and Bowman DMJS. *Assessing the relationship between exposure to vegetation fire smoke and hospital admissions when empirical air quality measurements are limited: Darwin, Australia, 1996-2005*. Joint Annual Conference of the International Society for Environmental Epidemiology and International Society of Exposure Analysis. Pasadena, California, Oct 2008. [Oral]
- G7. **Hanigan IC** and Nicholls N. *Geo-coded Australian meteorological data: sources, content, uses*. Climate Change And Health Short Course: Research and policy issues in relation to health impacts and adaptations. Australian National University, Canberra. 4-6 December 2007. [Oral]
- G6. Johnston FH, **Hanigan IC** and Morgan GG. *Vegetation fire smoke, indigenous status and cardio-respiratory hospital admissions in Darwin, Australia, 1996-2005*. 14th International Union of Air Pollution Prevention and Environmental Protection Associations World Congress Brisbane 9 - 13 September 2007. [Oral]
- G5. Physick B, Cope M, Lee S, Hurley P, Dear KBG, D'Souza RM and **Hanigan IC**. *Optimum exposure fields for epidemiology and health forecasting*. 28th NATO/CCMS International Technical Meeting on Air Pollution Modelling and its Application. Leipzig, Germany. 15-19 May, 2006. [Poster]

- G4. **Hanigan IC.** *Integrating health, population and environmental data across long time-series.* The workshop on Environmental Stress and Impacts on Health. Australian National University, Canberra. November 24-25, 2005. [Oral]
- G3. **Hanigan IC.** *Applying Geographical Information Systems (GIS) to health and demographic data: A case study of Sydney.* The 2nd Innovations (Atmospheric Environment and Health Collaboration) Workshop: National and sub-national data sources in environmental health. The Australian National University, Canberra. May 5-6, 2003. [Oral]
- G2. **Hanigan IC,** Whiteway T, Balzer I, Wade A, Page D. *Identifying potential “hotspots” for pathogens in the Googong Catchment,* Australian Water Association 20th Convention, 6-10 April 2003, Perth. [Oral]
- G1. Page DW, **Hanigan IC,** van Leeuwen JA, Spark KM and Mulcahy DE. *Assessment of the treatability of dissolved organic matter (DOM) from terrestrial and freshwater sources, with alum,* Australian Water Association 20th Convention, 6-10 April 2003, Perth. [Poster]

Media

- H5. <http://news.anu.edu.au/?p=16631>
- H4. <http://www.abc.net.au/science/articles/2012/08/14/3567208.htm>
- H3. <http://www.livescience.com/22314-drought-may-increase-suicide-risk.html>
- H2. <http://www.welt.de/gesundheit/psychologie/article111328359/Heisses-und-extremes-Wetter-erhoeht-die-Suizidrate.html>
- H1. *Meet the Researcher* June-July 2012 edition of the National Climate Change Adaptation Research Network Human Health Newsletter.

Peer Reviewing

- I4. Willocks LJ, et al. (2012). Cardiovascular disease and air pollution in Scotland: no association or insufficient data and study design? BMC Public Health, 12(1), 227. doi:10.1186/1471-2458-12-227. (Nonblind review)
- I3. BMC Public Health November 2012 - (Blind review - Advised rejection).
- I2. Crisis: The Journal of Crisis Intervention and Suicide Prevention, November 2012 (Blind review - Advised rejection).
- I1. Australian and New Zealand Journal of Public Health, January 2013 (Blind review - Advised rejection).

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|----------------------------------|---|
| Programming
expertise | <p>J4. I have extensive skills with the R language for statistical computing and graphics.</p> <p>J3. I contribute to several R packages and open source code project sites via my GitHub pages (https://github.com/ivanhanigan) including (among others):</p> <p style="padding-left: 40px;"><i>opensoftware-restricteddata</i>: A Virtual Lab environment for analysing restricted data using open software.</p> <p style="padding-left: 40px;"><i>gisviz</i>: Medical Geography tools and visualisations.</p> <p style="padding-left: 40px;"><i>swishdbtools</i>: Postgres, Oracle and DDI helper functions.</p> <p style="padding-left: 40px;"><i>disentangle</i>: a toolbox for conceptual modelling; as well as multi-model and variable selection.</p> <p>J2. I also have experience with Statistical tools in Splus, Stata, Kepler-project and SPSS.</p> <p>J1. I am adept at generic programming and configuring Postgres, PostGIS, Geoserver, QGIS, ArcGIS, Oracle-XE, Linux (Ubuntu, Centos, RHEL).</p> |
| Technical
courses
attended | <p>K10. Optimize and Tune Your PostgreSQL Database Server Performance, 13 Mar 2013. EnterpriseDB http://www.enterprisedb.com.</p> <p>K9. Computing for Data Analysis, 24 Sep - 27 Oct 2012. Prof Roger Peng Johns Hopkins Bloomberg School of Public Health, Coursera.</p> <p>K8. Bayesian Hierarchical Modelling of Spatial and Temporal Data, 21-23 November 2011, CSIRO/ANU, Canberra, ACT.</p> <p>K7. Statistical Data and Metadata eXchange (SDMX) standard and tools. 24 March 2010, Australian Bureau of Statistics.</p> <p>K6. Australian Weather and Society Integrated Studies Workshop. 29th – 2nd February 2007. Emergency Management Australia, Mount Macedon, VIC.</p> <p>K5. Spatial Analysis in Environmental and Social Epidemiology. 5th - 8th September 2005. The Australian National University, Canberra.</p> <p>K4. Formatting long documents in Microsoft Word, 2004, The Australian National University Information Literacy.</p> |

- κ3. Endnote Referencing Software training, 2004, The Australian National University Information Literacy.
- κ2. Air Pollution Exposure: measurement, modelling and assessment. 2nd - 3rd December 2004, The Australian National University, Canberra.
- κ1. Climate Change and Health: Research Methods and Policy Issues. 29th September – 2nd October 2003, The Australian National University, Canberra.

Contribution
to Teaching
and Learning

- L5. I have sat on several selection panels for job interviews both at NCEPH and for other Centres at the University.
- L4. Training in software programming, data analysis and data management for staff and students.
- L3. I was one of the founding members of the ANU GIS Forum in 2009 and still organise weekly topics and speakers for the meetings.
- L2. I contribute to ANU wide data management meetings with the Australian Data Archives and the National Supercomputer facility.
- L1. I contributed Drought Severity data to several papers by members of the Collaboration on Drought, Drying and Rural Mental Health.

Grants

- M6. 2012, A Scientific Workflow System for Assessing and Projecting the Health Impacts of Extreme Weather Events. Australian National Data Service Applications project. PI Keith Dear, ANU.
- M5. 2011, Dengue Transmission under Climate Change in Northern Australia: Linking Ecological and Population Data. PI David Harley, ANU.
- M4. 2010, Suicide and Drought: Understanding Human Impacts of Environmental Change, PI Ivan Hanigan, ANU.
- M3. 2010, Climate Change and Rural Communities: Integrated study of physical and social impacts, health risks and adaptive options. PI Anthony McMichael, ANU.
- M2. 2009, I was named as Professional Staff on Understanding the Health Effects of Landscape Burning and Biomass Smoke. PI Prof David Bowman UTAS.
- M1. 2005, Health Forecasting System, PI Rennie D'Souza, ANU.

Awards

- N6. Honorable mention by NatStats 2013 Conference Awards judging panel (Brisbane Aust. March 2013):

“An outstanding piece of complex research combining powerful methods and linked with clear communication of the results. Well researched work.”

- N5. Nov 2012 Bhati Family India Travel Grant.
- N4. Oct 2012 Runner Up, Australian National Data Service eResearch tools for the National Cloud competition.
- N3. Oct 2006 NCEPH Director’s prize for best publication for the month.
- N2. June 2003 NCEPH Director’s prize for best presentation at annual student workshop.
- N1. Jan 2003 Cooperative Research Centre Water Quality and Treatment Summer Scholar.

Referees

- O3. Mr Marco Fahmi, Project Manager (Current Supervisor), Griffith University. Ph: 0408 139 258, Email: marco.fahmi@gmail.com
- O2. Dr Bruce Doran, Senior Lecturer in Geographic Information Systems, ANU College of Medicine, Biology and Environment. Ph: 02 61253663, Email: Bruce.Doran@anu.edu.au
- O1. Professor Colin Butler, Epidemiologist, University of Canberra. Ph: 02 6201 2194, Email: colin.butler@canberra.edu.au