Published on Bushfire & Natural Hazards CRC (https://www.bnhcrc.com.au)

Home > Research > Optimising post-disaster recovery interventions in Australia > Projects (menu position rule)



2011 Brisbane Floods. Photo: Angus Veitch Key Topics:

- economics [2]
- modelling [3]
- multi-hazard [4]

Optimising post-disaster recovery interventions in Australia [5] This project has estimated the impact of four natural hazards in recent Australian history on income of individuals residing in disaster-hit areas. By defining individuals' ability to return to their pre-disaster income levels as economic Inis project has estimated the impact of four natural nazaros in recent Australian history on income of individuals resiling in disaster-nit areas. By defining individuals ability to return to their pre-disaster income levers as economic resilience, the research team focused on the following case studies: the 2009 Victorian Black Saturday bushfires, the 2009 Toodyay bushfires, 2013's Tropical Cyclone Oswald in Queensland, and the 2010-11 Queensland floods. Through real-life case studies, this research helps illustrate how these events—of different types, localities, and scales—impact and ripple through communities and the broader economy over time. The research found that the extent of the economic impact of disasters on individuals' income depends on the type, intensity, and location of the disaster. The project has produced four research reports pertaining to each case study, along with four policy briefs that summarised each report. The project also produced demographic profiling analyses for each disaster analysed. The findings from these four case studies were disseminated to a national audience through a webinar in August 2020.

Project: detail Notabs

Research team

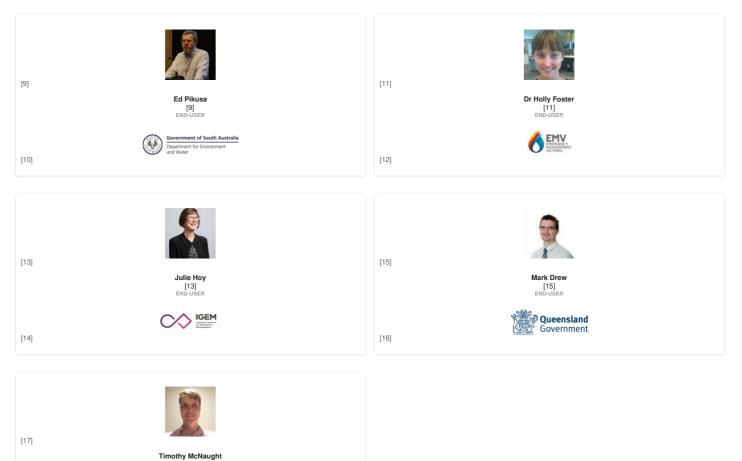
Research leader



Research team



End User representatives



Description

[18]

Australians are all too familiar with disasters arising from natural hazards, such as bushfires, cyclones, and floods. With climate change, we face the possibility of more frequent and intense natural hazards where they occur as in new and unexpected places.

This project has estimated the impact of four disasters in recent Australian history on income of individuals residing in disaster-hit areas. By defining individuals' ability to return to their pre-disaster income levels as economic resilience, the research team focused on the following case studies: The 2009 Victorian Black Saturday bushfires, the 2009 Toodyay bushfires, the 2013 Tropical Cyclone Oswald, and the 2010-11 Queensland floods. Through reallife case studies, this research helps illustrate how these events—of different types, localities, and scales—impact and ripple through communities and the broader economy over time.

The research has found that the extent of the economic impact of disasters on individuals' income depends on the type, intensity, and location of the disaster. This finding departs from most policy assumptions, which tend to put all the disasters into the same basket when designing relief and recovery programs.

An additional clear insight obtained in this research is that 'economic smallness' is a point of vulnerability. In particular, low income earners, small-business owners and part-time workers are more likely to lose income following a disaster. Middle and high-income earners, full-time workers and owners of larger businesses are far less likely to lose income; indeed, they might even earn more.

Overall, this research has revealed disaster costs that would not normally be identified by the direct damage estimates. This research has also demonstrated that the burden of lost income due to the disasters is not borne equally. That is, the income gap routinely increased after disasters. This research suggests that policymakers need to better understand the socioeconomics of disasters and formulate public policies to better distribute scarce budgets and resources towards vulnerable socioeconomic groups and employment sectors that are more sensitive to disasters.

Read the final report here. [19]



[17] END-USER

DFES

Download:

Pre-disaster multi-hazard damage and economic loss estimation model - project overview [21]

Related News



It can't all be insured: counting the hidden economic impact of floods and bushfires ECONOMICS, FIRE

18 MAY 2021



New online - March 2021 EMERGENCY MANAGEMENT, MULTI-HAZARD

[22]

25 MAR 2021



28 JAN 2021

New online - January 2021 COMMUNICATION, EMERGENCY MANAGEMENT

[24]



Latest AJEM edition features CRC research on post-disaster management EMERGENCY MANAGEMENT, MULTI-HAZARD

06 NOV 2020



Disasters and economic resilience – the effects of natural hazards on communities ${\tt ECONOMCS, MODELLING}$

12 AUG 2020

24 JUL 2020



Economics in disaster recovery ECONOMICS, MULTI-HAZARD



22 JUL 2020

New online - July 2020 COMMUNICATION, EMERGENCY MANAGEMENT

[28]



New online - June 2020 COMMUNICATION, EMERGENCY MANAGEMENT 25 JUN 2020



Calculating the losses this fire season ECONOMICS, FIRE IMPACTS

[30]



Economic paper making immediate impact ECONOMICS, FLOOD

01 JUN 2020

11 MAY 2020



Natural disasters increase inequality. Recovery funding may make things worse ECONOMICS, FIRE IMPACTS

02 MAR 2020



Special edition Monographs share AFAC19 science EMERGENCY MANAGEMENT, LAND MANAGEMENT

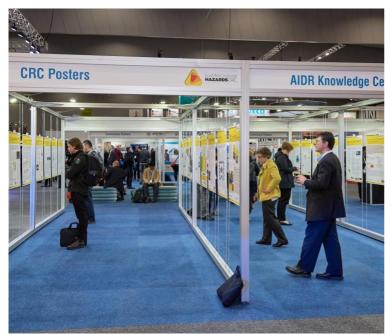
[32]

11 DEC 2019



CRC science making national impact FIRE, FIRE SEVERITY

[34]



New online - October 2019 EMERGENCY MANAGEMENT, ENGINEERING 19 NOV 2019

09 OCT 2019



New online - July 2019 EMERGENCY MANAGEMENT, FIRE

[36]



How to influence people with research

24 JUL 2019

25 JUN 2019



New online - May 2019 EMERGENCY MANAGEMENT, FIRE

[38]



Community and economic impact of Black Saturday investigated in Journal COMMUNITIES, DIVERSITY AND INCLUSION

15 MAY 2019

10 MAY 2019



New online - December 2018 EMERGENCY MANAGEMENT, MODELLING

[40]



Conference papers available online EMERGENCY MANAGEMENT, MULTI-HAZARD 18 DEC 2018

18 SEP 2018



New online - November 2017

[42]



Briefing to enhance policy EMERGENCY MANAGEMENT, POLICY

20 OCT 2017

17 NOV 2017



Outstanding achievements recognised EMERGENCY MANAGEMENT, MULTI-HAZARD

[44]



Watch our science EMERGENCY MANAGEMENT, LAND MANAGEMENT 18 SEP 2017

16 NOV 2016



New online - September 2016

[46]



Important research insights ECONOMICS, FLOOD

[47]

Publications

14 SEP 2016

24 JUN 2016

Year	Туре	Citation
2021	Report	Ulubasoglu, M. [6] Optimising post-disaster recovery interventions in Australia - final project report [19]. (Bushfire and Natural Hazards CRC, 2021). Google Scholar [48] BibTeX [49] EndNote XM
2021	Report	Ulubasoglu, M. [6] Guidance note for replication of case studies - Black Saturday, Tropical Cyclone Oswald, Queensland floods and Toodyay bushfire [51]. (Bushfire and Natural Hazards CRC
2020	Report	Ulubasoglu, M. [6] Disasters and economic resilience: the income effects of the Cyclone Oswald 2013 on small business owners [55]. (Bushfire and Natural Hazards CRC, 2020). Google Schola
2020	Report	Ulubasoglu, M. [6] & Onder, Y. [59] Disasters and economic resilience: the effects of the Black Saturday bushfires on individual income [60]. (Bushfire and Natural Hazards CRC, 2020). Google 5
2020	Report	Ulubasoglu, M. [6] & Beaini, F. [8] Disasters and economic resilience: the effects of the Queensland Floods 2010-11 on individual income: a case study on the Brisbane River catchment area
2020	Report	Ulubasoglu, M. [6] Disasters and economic resilience in small regional communities: the case of Toodyay [68]. (Bushfire and Natural Hazards CRC, 2020). Google Scholar [69] BibTeX [70] EndN
2019	Conference Paper	Ulubasoglu, M. [6] & Beaini, F. [8] Disasters and economic resilience in small regional communities: the case of Toodyay [72]. AFAC19 powered by INTERSCHUTZ - Bushfire and Natural Hazard
2019	Report	Beaini, F. [8] & Ulubasoglu, M. [6] Demographic profiling: Western Australia Toodyay bushfires 2009 case study [76]. (Bushfire and Natural Hazards CRC, 2019). Google Scholar [77] BibTeX [78]
2019	Report	Ulubasoglu, M. [6] Optimising post-disaster recovery interventions in Australia: annual project report 2018-19 [80]. (Bushfire and Natural Hazards CRC , 2019). Google Scholar [81] BibTeX [82] E
2019	Report	Ulubasoglu, M. [6] Optimising post-disaster recovery interventions in Australia Annual Report 2017-18 [84]. (Bushfire and Natural Hazards CRC, 2019). Google Scholar [85] BibTeX [86] EndNote
2019	Report	Beaini, F. [8] & Ulubasoglu, M. [6] Demographic profiling: Queensland floods 2010-11 Brisbane River catchment area case study [88]. (Bushfire and Natural Hazards CRC, 2019). Google Scholar
2018	Conference Paper	Ulubasoglu, M. [6] Disasters and economic resilience: income effects of the Black Saturday bushfires on disaster-hit individuals [92]. AFAC18 (Bushfire and Natural Hazards CRC, 2018). Google
2018	Conference Paper	Bates, J. [96] Research proceedings from the 2018 Bushfire and Natural Hazards CRC and AFAC Conference [97]. Bushfire and Natural Hazards CRC & AFAC annual conference 2017 (Bushfire and AFAC Conference)
2018	Journal Article	Ulubasoglu, M. [6], Rahman, M. [101], Onder, Y. [59], Chen, Y. [102] & Rajabifard, A. [103] Floods, bushfires and sectoral economic output in Australia, 1978-2014 [104]. Economic Record 95, 58-4
2018	Journal Article	Rahman, H. [109] Earthquakes don't kill, built environment does: evidence from cross-country data [110]. Economic Modelling 70, 458-468 (2018). DOI [111] Google Scholar [112] BibTeX [113] E
2018	Report	Beaini, F. [8] & Ulubasoglu, M. [6] Demographic profiling: Victorian bushfires 2009 case study [115]. (Bushfire and Natural Hazards CRC, 2018). Google Scholar [116] BibTeX [117] EndNote XML [
2017	Conference Paper	Rumsewicz, M. [119] Research proceedings from the 2017 Bushfire and Natural Hazards CRC and AFAC Conference [120]. Bushfire and Natural Hazards CRC & AFAC annual conference 2017 [6]
2017	Conference Paper	Ulubasoglu, M. [6] & Rahman, M. [101] Unpacking the sectoral income effects of natural disasters: evidence from the 2010-11 Queensland floods [124]. AFAC17 (Bushfire and Natural Hazards of the sectoral income effects of natural disasters: evidence from the 2010-11 Queensland floods [124].
2017	Report	Ulubasoglu, M. [6] Pre-disaster multi-hazard damage and economic loss estimation model: annual project report 2016-17 [128]. (Bushfire and Natural Hazards CRC, 2017). Google Scholar [129]
2016	Report	Ulubasoglu, M. [6] & Rajabifard, A. [103] Pre-disaster multi-hazard damage and economic loss estimation model: Annual project report 2015-2016 [132]. (Bushfire and Natural Hazards CRC, 201
2015	Conference Paper	Rumsewicz, M. [119] Research proceedings from the 2015 Bushfire and Natural Hazards CRC & AFAC conference [136]. Bushfire and Natural Hazards CRC & AFAC annual conference 2015 (Bushfire and Natural Hazards CRC & AFAC annual conference 2015).
2015	Conference Paper	Rahman, M. [101] et al. Bringing hazard and economic modellers together: a spatial platform for damage and losses visualisation - peer viewed [140]. Adelaide Conference 2015 (2015). Google
2015	Conference Paper	Rajabifard, A. [103] et al. A Pre-Disaster Multi-Hazard Damage and Economic Loss Estimation Model Conference Paper 2014 [144]. Bushfire and Natural Hazards CRC and AFAC Wellington Con-
2015	Report	Rajabifard, A. [103] Pre-Disaster Multi-Hazard and Economic Loss Estimation Model Annual Report 2014 [148]. (2015). Google Scholar [149] BibTeX [150] EndNote XML [151]
2015	Report	Rajabifard, A. [103] Pre-disaster multihazard damage and economic loss estimation model: Annual project report 2014-2015 [152]. (Bushfire and Natural Hazards CRC, 2015). Google Scholar [15]
•		[c [

Presentations & Resources

DATE [156]	TITLE [157]	DOWNLOAD	KEY TOPICS
19 Mar 2014	Pre-disaster damage and economic loss estimation model [158]	🗃 319.22 KB	[159)(សាសខេ (៥ឝ្វ)emergency manageme
08 Sep 2014	Pre-disaster multi-hazard damage and economic loss estimation model [161]	🛃 1.7 MB	[162b(107nMB[2], modelling [3], multi-ha
27 Oct 2014	A pre-disaster multi-hazard damage and economic loss estimation model [163]		economics [2], multi-hazard [4]
10 Apr 2015	Damage and Economic Loss Estimation Model 2015 NSW RAF Presentation [164]	🛃 2.54 MB	[165)(2554d/192], modelling [3], multi-ha
11 Sep 2015	Bringing hazard and economic modellers together: A spatial platform for damage and losses visualisation [166]	🗃 1.28 MB	[1@Zo(1028dd/# £ 2]
31 Aug 2016	Natural disasters and sectoral economic development: evidence from Australia - Muhammad Habibur Rahman [168]	🗃 6.52 MB	[162)(6553d/4[2], multi-hazard [4], recov
27 Oct 2016	Economics and strategic decisions - cluster overview [171]	0 bytes	[172]c(0ibytes)king [173], economics [2],
27 Oct 2016	Pre-disaster multi-hazard damage and economic loss estimation model - project overview [175]	0 bytes	[1260)(00byites)[2], flood [177], policy [174
15 Dec 2016	What can economics offer emergency services? [178]	🛃 891.78 KB	[179]c(80/h76dKA)g [173], economics [2],
05 Apr 2017	Optimising Post-Disaster Recovery Interventions in Australia [180]		[1&건)(5573d如段], modelling [3], multi-ha
07 Jul 2017	Understanding the value and challenges of risk mitigation [182]	🛃 4.17 MB	[1&ଥିp/ቀ୦1ភୀdv/ୟ], mitigation [184], resilie
07 Sep 2017	Unpacking the sectoral income effects of natural disasters: evidence from the 2010-11 Queensland floods [186]	3.54 MB	[1&2)(3)54dy[9], flood [177], modelling
16 Apr 2018	Utilising Census Data to Inform Public Policy [188]	🛃 1016.35 KB	[1&9])(#)(160]5nt/(ED)agement [160], recov
18 Sep 2018	Disasters and economic resilience: Income effects of the Black Saturday bushfires on disaster-hit individuals [191]	闭 1.94 MB	[192]p/1094dy/[9], fire impacts [193]
15 May 2019	Black Saturday bushfires: counting the cost [194]		communities [195], economics [2], fire
18 Jun 2019	Optimising post disaster - recovery interventions in Australia [197]	🚽 408.22 KB	[1980)(北口名i22 [2]])recovery [170]
09 Jul 2019	Disaster and economic resilience in Small Regional Communities: The case of Toodyay [199]	🗃 607.65 KB	[2000/(607i65 [2])planning [201], policy
27 Aug 2019	Disaster and economic resilience in Small Regional Communities: The case of Toodyay [202]	🛃 387.39 KB	[203)(337i39 (2))recovery [170]
11 Aug 2020	Disasters and economic resilience: the effects of the Black Saturday bushfires on individual income [204]	🛃 5.21 MB	[205] (5.21 MB)
11 Aug 2020	Disasters and economic resilience: the income effects of 2013 Tropical Cyclone Oswald on small business owners [206]	🚽 2.3 MB	[207] (2.3 MB)
11 Aug 2020	Disasters and economic resilience: the effects of the 2010-11 Queensland floods on individual income [208]	🛃 2.26 MB	[209] (2.26 MB)
11 Aug 2020	Disasters and economic resilience in small regional communities: the case of Toodyay [210]	🛃 1.22 MB	[211] (1.22 MB)
11 Aug 2020	Economics in disaster recovery: Optimising post-disaster recovery interventions in Australia [212]	🛃 3.09 MB	[2ta]/(augitide)[195], recovery [170], ris
11 Aug 2020	Download key case study research reports and policy briefs [20]		economics [2], modelling [3], multi-ha
12 Aug 2020	Economics in disaster recovery - webinar [215]	0 bytes	[2160b)(10bb)(tes)[2], modelling [3], multi-ha
01 Nov 2020	The unequal burden of disasters in Australia [217]		communities [195], economics [2], mu

Posters

Many poor to the serve chief data and in the serve chief of the serve has a probability of the serve of the serve has a probability of the serve of the serve data and the serve of the serve of the serve chief of the serve to the serve of the serve of the serve of the serve of the serve of the serve of t	CONTROL AND ALC 10 ARE MINIST JOINT OF A CONTROL OF A MINIST JOINT OF A CONTROL OF A MINIST JOINT OF A CONTROL OF A MINIST AND A MINIST AND A CONTROL OF A MINIST AND A	HE TOP TO A Default the Market M
Advances and that dies also are well-backer to conserve a strength of the tilter services the backback, when the services the backback, when the services are strength of the backback the service services are strength of the service services are strength of the backback the service services are strength of the service services are strength of the backback the service service of the strength of the service services are strength of the backback the service service of the strength of the service services are strength of the service service services are strength of the service services	 Offen - Assekata betweeke production of the assessment that betweeke production of the assessment that betweekee production of the assessment of the assessment of the assessment of the assessment o	20 AUG 2014

A pre-disaster multi-hazard damage and economic loss estimation model for Australia

[218]

[

Australia has experienced a number of natural disasters throughout history that have significantly impacted...



Seismic Vulnerability Assessment of Buildings in Australia

[219]

EARTHQUAKE [220], MITIGATION [184]

This poster present research activities undertaken in the University of Melbourne and Swinburne University of...

Activity of a state of the stat	ndiction be PRCP	integ og bræcke oncog ber rechere Kinter Jækkere	mentary. 1. NU2: R42A65 NO36UNG ADDRTICTURE 2. NU2: R42A65 NO36UNG ADDRTICTURE 3. NU2: R42A65 NO36UNG ADDRTICTURE
COMPRESS.		T	montais quests on that discontaging montain, building propagation, monotais question is implementarily and well be design in the ENE conclusion output compared with standard models. They can not an impaction, against compared with standard models. They can not an impaction, against their should be control to see 20 when not dependent montaneous guidelines.
	Distant.		. PETER INFLEMENTATION
fire of the bry baie trady added inform	NUT Conceptable ELATES OATA AD to Adapter designs to Adapter designs to Adapter designs to Adapter designs to Adapter designs to Adapter designs to Adapter designs to Adapter designs to Adapter des		biologic description consequencing is the main produced in the contention of the supported by the temportune of each product contention (10% distributed (11% to transport the distributed distribu- ent temportune) and the support of the temportune of the supercontent of the distributed and the support and the temportune of parameters of the distributed and the support and the temportune of the support of a submatch temportune of the A temportune of the supercontent of the temportune of the temportune of the temportune of parameters of the submatch temportune of the A temportune of the temportune matched and the submatch temportune of the A temportune of the temportune matched and the submatch temportune of the A temportune of the temportune of the temportune of the temportune of the A temportune of the temportune matched and the temportune of the A temportune of the A temportune of the temportune of the temportune of the A temportune of the A temportune of the temportune of the temportune of the A temportune of tempo
CESI	JM @ea	5	
211		10.0	11 SEP 2013

Design & Implementation of pre-disaster hazard loss estimation platform

[221]

ECONOMICS [2], MODELLING [3]

The platform developed and utilised for this work is the Pre-disaster Hazard Loss Estimation Platform (PHiLEP...

1. an appendix to a	Pik to a che Med ha secondariad and minut beinge	A RESULTS AREAD
And Accelerate a post-thy and the Model is not as an autor. If you will be dy of man and backable is not use for a post-	 Advanturging Attack place, of pase country adlegate country and there at a given 	5 We use a difference to difference (2-2) estimates uppeared with continuous doctor During weighter Wy field autority to all her weighter Wy
 (a) & choin a furchmental device how. An example of the deviced serve heatened on the Parry of their devices heatened on the Parry of the device devices. 	 Appropriate standard stocky doubter the gradient and standard ban be study between g 	martie disade accounted corp on Base off the proof of the data
engrikfikarfikasi konsideen kehd serijed of an a somering hakanqentriky an ko'reaasi koosfira of aglandear	¹⁷ Jacobed with Nauka an Ind. and Rake Rollins to 160 Michiga	acatomy
unpited and execute its conjudgement to the state in the president and		1.451.451.871
 Alternatively, capital fundaments alternative in a suscentry in application methods and provide and alternative flat can susce have all the code of the prior beyond the productional. Non-alternative devices the toroided. 	5 ant Attack 5 ant Apple and Apple Apple 5 and a set of the set of the set of the first and the set of the set of the first and the set of the set of the set of the set of the set of the set of the set of the desider on the provider of the set of the set of the set of	 The effect of volved disactive entrol application is tracking from the set and a final set is given by a status in the flat has also as any of the set of the flat has also as a status to the particle. A subject any effect of the set flat
dis Ar gerte theirs such sub-	1 Westing will all second subsymbols when endings the Ballow Is address	and capation affective boolean Gan New
of her unservice processing to an inclusion terms of her unservice processing to account processing to	Tabangana wandibilanacioa nativa, Natiging Pastalia consume Nation	 Al date local decide effective to an effective and accuration building official or decide active conflictive for the decide active conflictive to the second active to the conflictive to the second active to the second active to the second active to the second active to the conflictive to the second active to the secon
	· Annual Optimizing States in a	
The incident Best Concern the tensor is already on Conf Accils and reasoning is already on the track and reasoning to the	my site a shift and all total at the result that of bright the . No	attalgedarkenashinapatisty
221		INSTEP 201

Effects of natural disasters on sectoral economic development: Evidence from Australia

[222] ECONOMICS [2], MODELLING [3]

Using a unique dataset observed over 1990-2014, we estimate the impact of natural disasters on sector-..



Bringing hazard and economic modellers together

[223] ECONOMICS [2], MODELLING [3]

A paper on the use of a spatial platform for damage and loss visualization to bring together hazard and...



Reviewing past hazard events in Australia and Victoria

[224]

ECONOMICS [2], MODELLING [3] In order to better understand the history of natural disasters in Australia as a whole, and also solely in...



Pre-disaster multi-hazard damage and economic loss estimation model [225]

DECISION MAKING [173], ECONOMICS [2]

This project is investigating, at the national level, the economic impact of natural disasters on sectoral...



Seismic vulnerability assessment of irregular reinforced concrete buildings in Australia

[226] INFRASTRUCTURE [227], RESILIENCE [185] This poster introduces a rapid seismic assessment method for reinforced concrete buildings in regions of low...

RESEARCH QUESTIONS	METHODOLOGY	PRELIMINARY FINDINGS
An individual's income theory represents an important message of their economic	Advanced georeterating	Reindspher, we have agrificant applicant and the house of manifester
resiliance to exhertor shocks. Our receiption and a fix underformed.	ting op-orced reaping and end-use materials, on combool has defined	weiding in buildies hit great by 115. Los musime exchest were the word hit
 What's the impact of the Back bitwater Buddees on Indextaulor Insume? 	when the builter offected ones toffected program and the respiration profile and ones, which are chosen as they exertise the fit program.	among income propings, shis how who mgroted out to undificited ones uses among officient.
 What one the numerical proves that one performents to the abouter according to the individuant' 	economicals and demographicals from providing an ideal companion group.	Receil Inspect on Indebbed Income for demographic groups (1)
demographic, socia-according basing municipation and any program manifest	Agen 1 (w) does allowed one and supplicating (H):	4
RESEARCH CONTINUESTION	The second second second	The sector ware and
The receiptch to a promeeting effort that combines confidential still complication	A DECEMBER OF	** **** ****
Canadi Bole on display official oraci, advanced display mapping and amplied acaronic modeling to travite action process with a result.	6	11 <u>12</u> 11
entitience based entitication of the processic impacts of angled the world	and the second s	Diffee 11 economic sectors, do une perforante and marts repartings
recent varuar dischers in Authorit, By besuchs an Individuals, 7 can hale		
herubg an indulation, if can halp dealer and distribution of the second se		Individuals employed in what channel the most desting (185), incomes in the

Disasters and economic resilience: Income effects of the Black Saturday Bushfires on disaster-hit individuals

[228] ECONOMICS [2], RECOVERY [170]

We explore the impact of the most destructive bushfire disaster ever to hit Australia on the disaster-hit...

27 AUG 2019

Disaster and economic resilience in small regional communities: the case of Toodyay

[229] FIRE [196], OPTIMISATION [230]

We explore the effects of a small bushfire on the income trajectory of employed residents of Toodyay, a...

Linked Projects

Mapping and understanding bushfire and natural hazard vulnerability and risks at the institutional scale [231]			
ECONOMICS AND STRATEGIC DECISIONS [232]			
Prof Roger Jones Victoria University [233]			
		[233]	
Economics of natural hazards [234]			
ECONOMICS AND STRATEGIC DECISIONS [232]			
Dr Veronique Florec University of Western Australia [235]			
	THE UNIVERSITY OF	[235]	
	WESTERN AUSTRALIA		
Improved decision support for natural hazard risk reduction	n		
[236] ECONOMICS AND STRATEGIC DECISIONS [232]			
Prof Holger Maier			
University of Adelaide [237]			
nn Ab	UNVERSITY DELAIDE	[237]	
	tural hazard impacts and emergency management requireme	ents	
[238] SCENARIOS AND LOSS ANALYSIS [239]			
Dr Matthew Mason			
University of Queensland [240]			
	The University OF QUEENSLAND	[240]	
	W ARTIGUS		
An analysis of building losses and human fatalities from n [241]	atural disasters		
SCENARIOS AND LOSS ANALYSIS [239]			
Dr Katharine Haynes University of Wollongong [242]			
	1000 UNIVERSITY	[242]	
	UNDERSTY AUSTRALIA ALSTRALIA		

Source URL:https://www.bnhcrc.com.au/node/231/generate-pdf Links

[1] https://www.bnhcrc.com.au/files/2011brisfloodsnashstrosalievillageangusveitchccby-nc20jpg-0 [2] https://www.bnhcrc.com.au/research/topics/economics [3] https://www.bnhcrc.com.au/research/topics/modelling [4] https://www.bnhcrc.com.au/research/topics/multi-hazard [5] https

https://www.bnhcrc.com.au/people/fbeaini [9] https://www.bnhcrc.com.au/people/peikusa [10] https://www.bnhcrc.com.au/organisations/dewnr [11] https://www.bnhcrc.com.au/people/hoster [12]

https://www.bnhcrc.com.au/organisations/emv [13] https://www.bnhcrc.com.au/people/ihoy [14] https://www.bnhcrc.com.au/organisations/igem-0 [15] https://www.bnhcrc.com.au/people/imcnaught [18] https://www.bnhcrc.com.au/organisations/des [19] https://www.bnhcrc.com.au/organisations/des [19] https://www.bnhcrc.com.au/people/imcnaught [18] https://www.bnhcrc.com.au/people/imcnaught [18] https://www.bnhcrc.com.au/organisations/des [19] https://www.bnhcrc.com.au/people/imcnaught [18] https://www

https://www.bnhcrc.com.au/resources/casestudies [21] https://www.youtube.com/watch?v=RlgFTzR_rnE [22] https://www.bnhcrc.com.au/news/blogpost/mulubasoglu/2021/il-can-t-all-be-insured-counting-hidden-economic-impact-floods-and [23] https://www.bnhcrc.com.au/news/2021/new-online-march-2021 [24] https://www.bnhcrc.com.au/news/2021/new-online-january-2021 [25] https://www.bnhcrc.com.au/news/2021/new-online-march-2021 [24] https://www.bnhcrc.com.au/news/2021/new-online-insured-counting-hidden-economic-impact-floods-and [23] https://www.bnhcrc.com.au/news/2021/new-online-march-2021 [24] https://www.bnhcrc.com.au/news/2021/new-online-march-2021 [24] https://www.bnhcrc.com.au/news/2021/new-online-insured-counting-hidden-economic-impact-floods-and [23] https://www.bnhcrc.com.au/news/2021/new-online-march-2021 [24] https://www.bnhcrc.com.au/news/2021/new-online-insured-counting-hidden-economic-impact-floods-and [23] https://www.bnhcrc.com.au/news/2021/new-online-march-2021 [24] https://www.bnhcrc.com.au/news/2021/new-online-insured-counting-hidden-economic-impact-floods-and [23] https://www.bnhcrc.com.au/news/2021/new-online-march-2021 [24] https://www.bnhcrc.com.au/news/2021/new-online-insured-counting-hidden-economic-impact-floods-and [23] https://www.bnhcrc.com.au/news/2021/new-online-insured-counting-hidden-economic-impact-floods-and [24] https://www.bnhcrc.com.au/news/2021/new-online-insured-counting-hidden-ec

research-post-disaster-management [26] https://www.bnhcrc.com.au/news/2020/disasters-and-economic-resilience-effects-natural-hazards-communities [27] https://www.bnhcrc.com.au/news/2020/economics-disaster-recovery [28] https://www.bnhcrc.com.au/news/2020/new-online-july-2020 [29] https://www.bnhcrc.com.au/news/2020/new-online-july-2020 [30] https://www.bnhcrc.com.au/news/2020/calculating-losses-fire-season [31] https://www.bnhcrc.com.au/news/2020/economic-paper-making-immediate-impact [32] https://www.bnhcrc.com.au/news/blogpost/mulubasoglu/2020/natural-disasters-increase-inequality-recovery-funding-may-make [33]

https://www.bnhcrc.com.au/news/2019/special-edition-monographs-share-afac19-science-0 [34] https://www.bnhcrc.com.au/news/2019/crc-science-making-national-impact [35] https://www.bnhcrc.com.au/news/2019/new-online-integraphical-edition-monographs-share-afac19-science-0 [34] https://www.bnhcrc.com.au/news/2019/new-online-integraphical-edition-monographs-share-afac19-science-0 [34] https://www.bnhcrc.com.au/news/2019/new-online-integraphical-edition-monographs-share-afac19-science-0 [34] https://www.bnhcrc.com.au/news/2019/new-online-integraphical-edition-monographs-share-afac19-science-0 [34] https://www.bnhcrc.com.au/news/2019/new-online-integraphical-edition-monographical-

https://www.bnhcrc.com.au/news/2019/community-and-economic-impact-black-saturday-investigated-journal [40] https://www.bnhcrc.com.au/news/2018/new-online-december-2018 [41] https://www.bnhcrc.com.au/news/2017/new-online-november-2017 [43] https://www.bnhcrc.com.au/news/2017/briefing-enhance-policy [44] https://www.bnhcrc.com.au/news/2017/outstanding-achievements-recognised [45] https://www.bnhcrc.com.au/news/2016/www.bnhcrc.com.au/news/2016/www.bnhcrc.com.au/news/2016/mportant-research-insights [48] https://www.bnhcrc.com.au/news/2BScholar&:as_q=%22Optimising%2Bpost-

disaster%2Brecovery%2Binterventions%2Bin%2BAustralia%2B-%2Bfinal%2Bproject%2Breport%22&:as sauthors=Ulubasoglu&:as occt=any&:as eq=&:as oq=&:as publication=&:as ylo=&:as yhi=&:as sdtAAP=1&:as sdtp=1 [49]

 //actimate/actiputed/active/publications/biblio/export/biblex/7809 [50] https://www.bnhcrc.com.au/publications/biblio/export/sbitex/7809 [51] https://www.bnhcrc.com.au/publications/biblio/export/sbitex/7809 [52] https://www.bnhcrc.com.au/publications/biblio/export/sbitex/7809 [52] https://www.bnhcrc.com.au/publications/biblio/export/sbitex/7809 [52] https://www.bnhcrc.com.au/publications/biblio/export/sbitex/7809 [52] https://www.bnhcrc.com.au/publications/biblio/export/sbitex/7809 [52] https://www.bnhcrc.com.au/publications/biblio/export/sbitex/7809 [52] https://www.bnhcrc.com.au/publications/biblio/export/sbitex/7809 [54] https://www.bnhcrc.com.au/publications/biblio/export/sbitex/7808 [54] https://www.bnhcrc.com.au/publications/biblio/export/sbitex/7808 [55] https://www.bnhcrc.com.au/publications/biblio/export/sbitex/7808 [54] https://www.bnhcrc.com.au/publications/biblio/export/sbitex/7808 [55] https://www.bnhcrc.com.au/publications/biblio/export/sbitex/7808 [56]

http://scholar.google.com/scholar?

bing=Search%2BScholar&.as_g=%22Disasters%2Band%2Beconomic%2Bresilience%3A%2Bthe%2Bincome%2Beffects%2Bof%2Bthe%2BCyclone%2BOswald%2B2013%2Bon%2Bsmall%2Bbusiness%2Bowners%22&.as 57] https://www.bnhcrc.com.au/publications/biblio/export/biblex/7006 [58] https://www.bnhcrc.com.au/publications/biblio/export/xml/7006 [59] https://www.bnhcrc.com.au/publications/biblio/export/xml/7006 [50] https://www.bnhcrc.com.au/publications/biblio/export/xml/7000 [50] https://www.bnhcrc.com.au/publications/biblio/export/xml/7000 [50] https://www.bnhcrc.com.au/pub

https://www.bnhcrc.com.au/publications/biblio/bnh-6994 [61] http://scholar.google.com/scholar? btnG=Search%2BScholar&:as_q=%22Disasters%2Band%2Beconomic%2Bresilience%3A%2Bthe%2Beffects%2Bof%2Bthe%2BBlack%2BSaturday%2Bbushfires%2Bon%2Bindividual%2Bincome%22&:as_sauthors=Ulubas [62] https://www.bnhcrc.com.au/publications/biblio/export/biblex/6994 [63] https://www.bnhcrc.com.au/publications/biblio/export/xml/6994 [64] https://www.bnhcrc.com.au/publications/biblio/export/xml/6994 [65] https://scholar.google.com/scholar?btnG=Search%2BScholar&:as_q=%22Disasters%2Band%2Beconomic%2Bresilience%3A%2Bthe%2Bof%2Bthe%2Bof%2BFloods%2BFloods%2BFloods%2B2010-

11%2Bon%2Bindividual%2Bincome%3A%2Ba%2Bcase%2Bstudy%2Bon%2Bthe%2BBrisbane%2BRiver%2Bcatchment%2Barea%22&:as sauthors=Ulubasoglu&:as oct=any&:as oq=&:as o

[66] https://www.bnhcrc.com.au/publications/biblio/export/biblex/6989 [67] https://www.bnhcrc.com.au/publications/biblio/export/xml/6989 [68] https://www.bnhcrc.com.au/publications/biblio/export/xml/6989 [67] https://www.bnhcrc.com.au/pu http://scholar.google.com/scholar? btnG=Search%2BScholar&as_q=%22Disasters%2Band%2Beconomic%2Bresilience%2Bin%2Bsmall%2Bregional%2Bcommunities%3A%2Bthe%2Bcase%2Bof%2BToodyay%22&as_sauthors=Ulubasoglu&as_occt=a

[70] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/7089 [71] https://www.bnhcrc.com.au/publications/biblio/export/xml/7089 [72] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/7089 [73] https://knowledge.aidr.org.au/resources/australian-journal-of-emergency-management-monograph-series/ [74] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/6409 [75]

https://www.bnhcrc.com.au/publications/biblio/export/xml/6409 [76] https://www.bnhcrc.com.au/publications/biblio/bnh-6293 [77] http://scholar.google.com/scholar?

btnG=Search%2BScholar&as_q=%22Demographic%2Bprofiling%3A%2BWestern%2BAustralia%2BToodyay%2Bbushfires%2B2009%2Bcase%2Bstudy%22&as_sauthors=Beaini&as_epq=&as_ep

http://scholar.google.com/scholar?btnG=Search%2BScholar&as_q=%22Optimising%2Bpost-disaster%2Brecovery%2Binterventions%2Bin%2BAustralia%3A%2Banual%2Bproject%2Breport%2B2018-19%22&as_sauthors=Ulubasoglu&as_occt=any&as_epq=&as_eq=&as_publication=&as_ylo=&as_sdtAAP=1&as_sdtAP=1[82]

https://www.bnhcrc.com.au/publications/biblio/export/biblex/5698 [83] https://www.bnhcrc.com.au/publications/biblio/export/xml/5698 [84] https://www.bnhcrc.com.au/publica

18%22&as sauthors=Ulubasoglu&as occt=any&as epq=&as oq=&as epq=&as publication=&as yho=&as yho=&as sdtAP=1&as sdtP=1 [86] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/5421 [87] https://www.bnhcrc.com.au/publications/biblio/export/sml/5421 [88] https://www.bnhcrc.com.au/publications/biblio/export/sml/5421 [87] https://www.bnhcrc.com.au/publications/biblio/export/sml/5421 [87] https://www.bnhcrc.com.au/publications/biblio/export/sml/5421 [88] https://www.bnhcrc.com.au/publications/biblio/export/sml/5421 [87] https://www.bnhcrc.com.au/publications/biblio/export/sml/5421 [87] https://www.bnhcrc.com.au/publications/biblio/export/sml/5421 [88] https://www.bnhcrc.com.au/publications/biblio/export/sml/5421 [87] https://www.bnhcrc.com.au/publications/biblio/export/sml/5421 [88] https://www.bnhcrc.com.au/publications/biblio/export/sml/542

http://scholar.google.com/scholar?btnG=Search%2BScholar&:as_q=%22Demographic%2Bprofiling%3A%2BQueensland%2Bfloods%2B2010-11%2BBrisbane%2BRiver%2Bcatchment%2Barea%2Bcase%2Bstudy%22&:as_sauthors=Beaini&:as_occl=any&:as_eq=&:as_oq=&:as_eq=&:as_publication=&:as_ylo=&:as_sdtAAI 1901 http://www.bnhcrc.com.au/publications/biblio/export/bibtex/6307 [91] https://www.bnhcrc.com.au/publications/biblio/export/xml/6307 [92] https://www.bnhcrc.com.au/publications/biblio/b

https://www.bnhcrc.com.au/publications/biblio/export/biblex/4770 [95] https://www.bnhcrc.com.au/publications/biblio/export/xml/4770 [96] https://www.bnhcrc.com.au/publications/biblio/export/xml/4770 [95] https://www.bnhcrc.com.au/publications/biblio/export/xml/4770 [96] https://www.bnhcrc.com.au/publications/biblio/export/xml/4770 [96] https://www.bnhcrc.com.au/publications/biblio/export/xml/4770 [96] https://www.bnhcrc.com.au/publications/biblio/export/xml/4770 [96] https://www.bnhcrc.com.au/publications/biblio/export/xml/4770 [97] https://www.bnhcrc.com.au/publications/biblio/export/xml/4770 [97] https://www.bnhcrc.com.au/publica

https://www.bnhcrc.com.au/publications/researchproceedings2018 [98] http://scholar.google.com/scholar?

bind=Search%2BScholar&:as_q=%22Research%2Bproceedings%2Bfrom%2Bihe%2B2018%2BBushfire%2Band%2BNatural%2BHazards%2BCRC%2Band%2BAFAC%2BConference%22&:as_sauthors=Bates&:as_or [99] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/4739 [100] https://www.bnhcrc.com.au/publications/biblio/export/xml/4739 [101] https://www.bnhcrc.com.au/publications/biblio/export/xml/4739 [101] https://www.bnhcrc.com.au/publications/biblio/export/xml/4739 [102]

https://www.bnhcrc.com.au/people/ychen [103] https://www.bnhcrc.com.au/people/arajabifard [104] https://www.bnhcrc.com.au/publications/biblio/bnh-6056 [105] https://dx.doi.org/10.1111/1475-4932.12446 [106] http://scholar.google.com/scholar?btnG=Search%2BScholar&:as_g=%22Floods%2C%2Bbushfires%2Band%2Bsectoral%2Beconomic%2Boutput%2Bin%2BAustralia%2C%2B1978-

2014%228amp:as sauthors=Ulubasoglu8amp:as occt=any8amp:as epq=8amp:as oq=8amp:as eq=8amp:as publication=8amp:as ylo=8amp:as ylo=8amp:as ylo=8amp:as sdtAAP=18amp:as sdtP=1 [107] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/6056 [108] https://www.bnhcrc.com.au/publications/biblio/export/xml/6056 [109] https://www.bnhcrc.com.au/publications/biblio/export/xml/6056 [100] https://www.bnhcrc.com.au/publications/biblio/export/xml/6056 [100] https://www.bnhcrc.com.au/publications/biblio/export/xml/6056 [100] https://www

https://www.bnhcrc.com.au/publications/biblio/bnh-5151 [111] http://dx.doi.org/10.1016/j.econmod.2017.08.027 [112] http://scholar.google.com/scholar? btnG=Search%2BScholar&as_q=%22Earthquakes%2Bdon%E2%80%99f%2Bkill%2C%2Bbuilt%2Benvironment%2Bdoes%3A%2Bevidence%2Bfrom%2Bcross-

country%2Bdata%22&as sauthors=Rahman&as occt=any&as oq=&as oq=&as eq=&as publication=&as ylo=&as ylo=& http://scholar.google.com/scholar?

btnG=Search%2BScholar&as_q=%22Demographic%2Bprofiling%3A%2BVictorian%2Bbushfires%2B2009%2Bcase%2Bstudy%22&as_sauthors=Beaini&as_occt=any&as_oq=&as_eq=&as_eq=&as_extended and the second and

[117] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/5214 [118] https://www.bnhcrc.com.au/publications/biblio/export/xml/5214 [119] https://www.bnhcrc.com.au/publications/biblio/export/xml/5214 [118] https://www.bnhcrc.com.au/publications/biblio/export/xml/5214 [117] https://www.bnhcrc.com.au/publications/biblio/export/xml/5214 [11 https://www.bnhcrc.com.au/publications/researchproceedings2017 [121] http://scholar.google.com/scholar?

binG=Search%2BScholar&.as_g=%22Research%2Bproceedings%2Bfrom%2Bthe%2B2017%2BBushfire%2Band%2BNatural%2BHazards%2BCRC%2Band%2BAFAC%2BConference%22&.as_sauthors=Rumsewicz& [122] https://www.bnhcrc.com.au/publications/biblio/export/biblio/export/biblio/export/sml/3946 [123] https://www.bnhcrc.com.au/publications/biblio/export/sml/3946 [124] https://www.bnhcrc.com.au/publications/biblio/export/sml/3946 [123] https://scholar.google.com/scholar?btnG=Search%2BScholar&:as_g=%22Unpacking%2Bthe%2Bsectoral%2Bifcome%2Beffects%2Bof%2Bnatural%2Bdisasters%3A%2Bevidence%2Bfrom%2Bthe%2B2010-

11%2BQueensland%2Bfloods%22&as_sauthors=Ulubasoglu&as_occt=any&as_oq=&as_oq=&as_publication=&as_ylo=&a

http://scholar.google.com/scholar?btnG=Search%2BScholar&as_q=%22Pre-disaster%2Butli-hazard%2Bdamage%2Band%2Beconomic%2Bloss%2Bestimation%2Bmodel%3A%2Bannual%2Bproject%2Breport%2B2016-17%22&as_sauthors=Ulubasoglu&as_occt=any&as_oq=&as_oq=&as_publication=&as_ylo=&as_ylo=&as_sdtAP=1&as_sdtP=1[130]

https://www.bnhcrc.com.au/publications/biblio/export/bibtex/4208 [131] https://www.bnhcrc.com.au/publications/biblio/export/xml/4208 [132] htt

http://scholar.google.com/scholar?btnG=Search%2BScholar&as_q=%22Pre-disaster%2Butli-hazard%2Bdamage%2Band%2Beconomic%2Bloss%2Bestimation%2Bmodel%3A%2BAnnual%2Bproject%2Breport%2B2015-2016%22&as_sauthors=Ulubasoglu&as_occt=any&as_epq=&as_eq=&as_epd=&as_yhi=&as_sdtAP=1&a

https://www.bnhcrc.com.au/publications/biblio/export/biblex/3036 [135] https://www.bnhcrc.com.au/publications/biblio/export/xml/3036 [136] https://www.bnhcrc.com.au/publications/biblio/export/xml/3036 [137] http://scholar.google.com/scholar?

Ind=Search%28Bcholar&.as_______ blnG=Search%28Bcholar&.as__g=%22Research%28proceedings%28trom%28the%282015%28Bushfire%28and%28Natural%28Hazards%28CRC%28&26%28AFAC%28conference%22&.as__sauthors=Rumsewicz&. [138] https://www.bnhcrc.com.au/publications/biblio/export/biblex/2169 [139] https://www.bnhcrc.com.au/publications/biblio/export/xml/2169 [140] https://www.bnhcrc.com.au/publications/biblio/export/whcle? http://scholar.google.com/scholar?

bInG=Search%2BScholar&as_q=%22Bringing%2Bhazard%2Beconomic%2Bmodellers%2Btogether%3A%2Bagatal%2Bpatial%2Bplatform%2Bfor%2Bdamage%2Band%2Blosses%2Bvisualisation%2B-%2Bpeer%2Bviewed%22&as_sauthors=Rahman&as_occt=any&as_oq=&as_oq=&as_publication=&as_ylo=&a

http://scholar.google.com/scholar?btnG=Search%2BScholar&as_q=%22A%2BPre-Disaster%2BMulti-Hazard%2BDamage%2Band%2BEconomic%2BLoss%2BEstimation%2BModel%2BConference%2BPaper%2B2014%22&as_sauthors=Rajabifard&as_occt=any&as_oq=&as_oq=&as_publication [146] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/1561 [147] https://www.bnhcrc.com.au/publications/biblio/export/xml/1561 [148] https://www.bnhcrc.com.au/publications/biblio/export/xml/1561 [147] https://www.bnhcrc.com.au/publications/biblio/export/xml/1561 [148] https://www.bnhcrc.com.au/publications/biblio/export/xml/1561 [147] https://www.bnhcrc.com.au/publications/biblio/export/xml/1561 [148] https://www.bnhcrc.com.au/publications/biblio/export/xml/1561 [147] https://www.bnhcrc.com.au/publications/biblio/export/xml/1561 [147] https://www.bnhcrc.com.au/publications/biblio/export/xml/1561 [147] https://www.bnhcrc.com.au/publications/biblio/export/xml/1561 [148] https://www.bnhcrc.com.au/publications/biblio/export/xml/1561 [14 http://scholar.google.com/scholar?btnG=Search%2BScholar&as_q=%22Pre-Disaster%2BMulti-

Hazard%2Band%2BEconomic%2BLoss%2BEstimation%2BModel%2BAnnual%2BReport%2B2014%22&:as_sauthors=Rajabifard&:as_oct=any&:as_oq=&:as_oq=&:as_opublication=&:as_ylc [150] https://www.bnhcrc.com.au/publications/biblio/export/biblex/1544 [151] https://www.bnhcrc.com.au/publications/biblio/export/xml/1544 [152] https://www.bnhcrc.com.au/publications/biblio/bnh-2343 [153] http://scholar.google.com/scholar?btnG=Search%2BScholar&:as_q=%22Pre-disaster%2Bdamage%2Band%2Beconomic%2Bloss%2Bestimation%2Bmodel%3A%2BAnnual%2Bproject%2Breport%2B2014-2015%22&:as_sauthors=Rajabifard&:as_occt=any&:as_oq=&:as_oq=&:as_ouplication=&:as_ylo=&:as_ylo=&:as_sdtAAP=1&:as_sdtP=1 [154] https://www.bnhcrc.com.au/publications/biblio/export/biblex/2343 [155] https://www.bnhcrc.com.au/publications/biblio/export/xml/2343 [156] https://www.bnhcrc.com.au/publications/biblio/export/xml/2343 [157] https://www.bnhcrc.com.au/node/231/generate-pdf?order=ltite&.sort=asc [158] https://www.bnhcrc.com.au/resources/presentation-slideshow/420 [159] https://www.bnhcrc.com.au/file/497/download?token=NGpfb6gr [160] https://www.bnhcrc.com.au/resources/presentation-slideshow/1285 [162] https://www.bnhcrc.com.au/file/3772/download?token=CbVpnl2V [163] https://www.bnhcrc.com.au/resources/presentation-slideshow/1710 [165] https://www.bnhcrc.com.au/file/5181/download?token=KRD4Kpxh [166] https://www.bnhcrc.com.au/file/5181/download?token=KRD4Kpxh [166] https://www.bnhcrc.com.au/resources/presentation-slideshow/1710 [165] https://www.bnhcrc.com.au/file/5181/download?token=KRD4Kpxh [166] https://www.bnhcrc.com.au/file/5181/download?token=KRD4Kpxh [166] https://www.bnhcrc.com.au/resources/presentation-slideshow/1710 [165] https://www.bnhcrc.com.au/file/5181/download?token=KRD4Kpxh [166] https://www.bnhcrc.com.au/resources/presentation-slideshow/1710 [165] https://www.bnhcrc.com.au/file/5181/download?token=KRD4Kpxh [166] https://www.bnhcrc.com.au/file/5181/download?token https://www.bnhcrc.com.au/file/6515/download?token=9GgKIF9i [170] https://www.bnhcrc.com.au/research/topics/recovery [171] https://www.bnhcrc.com.au/research/topics/ https://www.bnhcrc.com.au/resources/presentation-audio-video/3177 [176] https://www.bnhcrc.com.au/file/6665/download?token=FEN4oYoj [177] https://www.bnhcrc.com.au/research/topics/flood [178] https://www.bnhcrc.com.au/hazardnotes/25 [179] https://www.bnhcrc.com.au/file/7005/download?token=c5r5Yamk [180] https://www.bnhcrc.com.au/resources/presentation-slideshow/3484 [181] https://www.bnhcrc.com.au/file/7285/download?token=o42Xg79E [182] https://www.bnhcrc.com.au/file/7284/download?token=o42Xg79E [182] https://www.bnh https://www.bnhcrc.com.au/research/topics/mitigation [185] https://www.bnhcrc.com.au/research/topics/resilience [186] https://www.bnhcrc.com.au/research/topics/presentation-slideshow/3981 [187] https://www.bnhcrc.com.au/research/topics/presentation-slideshow/4529 [189] https://www.bnhcrc.com.au/research/topics/presentation-slideshow/4529 [180] https://www.bnhcrc.com.au/re https://www.bnhcrc.com.au/research/topics/response [191] https://www.bnhcrc.com.au/resources/presentation-slideshow/4840 [192] https://www.bnhcrc.com.au/file/8758/download?token=20DmozTl [193] https://www.bnhcrc.com.au/research/topics/fire-impacts [194] https://www.bnhcrc.com.au/resources/external-resource/7806 [195] https://www.bnhcrc.com.au/research/topics/fire-impacts [194] https://www.bnhcrc.com.au/resources/external-resource/7806 [195] https://www.bnhcrc.com.au/research/topics/fire-impacts [194] https://www.bnhcrc.com.au/resources/external-resource/7806 [195] https://www.bnhcrc.com.au/research/topics/fire-impacts [194] https://www.bnhcrc.com.au/resources/external-r https://www.bnhcrc.com.au/research/topics/fire [197] https://www.bnhcrc.com.au/resources/presentation-slideshow/5634 [198] https://www.bnhcrc.com.au/rile/10040/download?token=DXEWZdzJ [199] https://www.bnhcrc.com.au/resources/presentation-slideshow/5704 [200] https://www.bnhcrc.com.au/rile/10140/download?token=k3LCTe5b [201] https://www.bnhcrc.com.au/research/topics/planning [202] https://www.bnhcrc.com.au/resources/presentation-slideshow/5988 [203] https://www.bnhcrc.com.au/file/10401/download?token=piYlek0c [204] https://www.bnhcrc.com.au/resources/guide-fact-sheet/7172 [205] https://www.bnhcrc.com.au/file/11614/download?token=EdB38E0r [206] https://www.bnhcrc.com.au/resources/guide-fact-sheet/7173 [207] https://www.bnhcrc.com.au/file/11615/download?token=UFng1XeJ [208] https://www.bnhcrc.com.au/resources/guide-fact-sheet/7174 [20] https://www.bnhcrc.com.au/resources/guide-fact-sheet/7174 [21] https://www.bnhcrc.com.au/reso

https://www.bnhcrc.com.au/research/topics/earthquake [221] https://www.bnhcrc.com.au/resources/poster/1200 [219] https://www.bnhcrc.com.au/resources/poster/1997 [220] https://www.bnhcrc.com.au/resources/poster/2199 [221] https://www.bnhcrc.com.au/resources/poster/2196 [222] https://www.bnhcrc.com.au/resources/poster/2197 [223] https://www.bnhcrc.com.au/resources/poster/2198 [224] https://www.bnhcrc.com.au/resources/poster/2199 [225] https://www.bnhcrc.com.au/resources/poster/2198 [226] https://www.bnhcrc.com.au/resources/poster/2199 [225] https://www.bnhcrc.com.au/resources/poster/2198 [226] https://www.bnhcrc.com.au/resources/poster/2198 [226] https://www.bnhcrc.com.au/resources/poster/2198 [226] https://www.bnhcrc.com.au/resources/poster/2199 [225] https://www.bnhcrc.com.au/resources/poster/2198 [226] https://www.bnhcrc.com.au/resources/poster/2198 [226] https://www.bnhcrc.com.au/resources/poster/2198 [226] https://www.bnhcrc.com.au/resources/poster/2198 [226] https://www.bnhcrc.com.au/resources/poster/2198 [226] https://www.bnhcrc.com.au/resources/poster/2198 [226] https://www.bnhcrc.com.au/research/topics/potimisation [231] https://www.bnhcrc.com.au/research/idastrescentriconals/sis [235] https://www.bnhcrc.com.au/research/idastrescentriconals/sis [236] https://www.bnhcrc.com.au/research/idastre