Post-Disaster Legislation for Building Back Better[1]

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Construction projects; Disasters; Legislation; Redevelopment; Victoria

Introduction

Reconstruction and recovery following disasters requires careful consideration and successful implementation. Recovery activities should minimise further disruption to the lives of the disaster-affected and enable the development of resilient communities. The term "build back better" (BBB) is commonly used to represent an ideal recovery process where physical, social and economic aspects of a community are simultaneously developed to a state of new normalcy which is more resilient than the pre-disaster setting.[2]BBB also requires efficient and effective implementation of recovery activities to avoid excessive delays and ensure proper adoption of BBB-based approaches.[3] The United Nations[4] and authors such as James Lee Witt Associates,[5] Mora and Keipi[6] and Ozcevik et al.[7] reiterate that the use of disaster management-based legislation is necessary to build back better.

The first section of this article introduces the principles required to build back better and legislative and regulatory policies recommended in existing literature to aid this. The 2009 Victorian Bushfires in Australia were chosen as a case study to further explore the legislative decisions made and their impacts on reconstruction.

[1] This paper was adopted from the essay entitled "The impact of post-disaster legislative and regulatory changes on the recovery of the built environment" (Mannakkara, S. and Wilkinson, S., *The Impact of Post-disaster Legislative and Regulatory changes on the Recovery of the Built Environment* (Sydney: The Society of Construction Law Australia, 2013).) as a submission for the Brooking Prize held by the Society of Construction Law, Australia. The authors would like to acknowledge the Society of Construction Law for the commendation awarded for this essay.

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[2] Kennedy, J., Ashmore, J., Babister, E. and Kelman, I., "The Meaning of 'Build Back Better': Evidence From Post-Tsunami Aceh and Sri Lanka" (2008) 16(1) *Journal of Contingencies & Crisis Management* 24.

[3] Kennedy, Ashmore, Babister, and Kelman, "The Meaning of 'Build Back Better'" (2008) 16(1) *Journal of Contingencies & Crisis Management* 24. Khasalamwa, S., "Is 'Build Back Better' a Response to Vulnerability? Analysis of the Post-tsunami Humanitarian Interventions in Sri Lanka" (2009) 63(1) *Norwegian Journal of Geography* 73.

[4] United Nations, *Hyogo Framework For Action 2005–2015: Building the Resilience of Nations and Communities to Disasters* (United Nations, 2005).

[5] James Lee Witt Associates. *Building Back Better and Safer: Private Sector Summit on Post-Tsunami Reconstruction*, (Washington DC: James Lee Witt Associates, LLC, 2005).

[6] Mora, S. and Keipi, K., "Disaster risk Management in Development Projects: Models and Checklists" (2006) 65(2) *Bulletin of Engineering Geology and the Environment*.

[7] Ozcevik, O., Turk, S., Tas, E., Yaman, H. and Beygo, C., "Flagship Regeneration Project as a Tool for Post-disaster Recovery Planning: the Zeytinburnu Case" (2009) 33(2) *Disasters* 180.

The findings from this study are integrated with existing knowledge to determine general legislative and regulatory policy recommendations to enable and support BBB-based recovery.

Principles for building back better

The concept of BBB first emerged prominently during the multi-national recovery effort following the Indian Ocean Tsunami.[8] The "Key Propositions for Building Back Better" by Clinton[9] was the first official document produced identifying ten propositions to achieve BBB in post-disaster recovery (Figure 1). Disaster experiences have led authors and organisations like the Disaster Relief Monitoring Unit of Sri Lanka,[10] the Federal Emergency Management Agency in the USA,[11] the United Nations,[12] Ozcevik et al.[13] and Monday[14] to provide their own recommendations and suggestions for reconstruction and recovery and building back better.

[8] Clinton, W. J., *Lessons Learned from Tsunami Recovery: Key Propositions for Building Back Better* (Office of the UN Secretary-General's Special Envoy for Tsunami Recovery, 2006). GoSL, *Post-Tsunami Recovery and Reconstruction Strategy* (Colombo, 2005). James Lee Witt Associates. *Building Back Better and Safer* (2005).

[9] Clinton, *Lessons Learned from Tsunami Recovery* (2006).

[10] Disaster Relief Monitoring Unit of the Human Rights Commission of Sri Lanka. "Building Back Better: Way Forward" in National Workshop on Guiding Principles (Colombo: Sri Lanka, 2006), Practical Action - South Asia Programme.

[11] FEMA. *Rebuilding for a More Sustainable Future: An Operational Framework*. FEMA Report. (Washington, DC: Federal Emergency Management Agency, 2000).

[12] United Nations, *Hyogo Framework For Action 2005–201* (2005).

[13] Ozcevik, Turk, Tas, Yaman, and Beygo, "Flagship Regeneration Project as a Tool for Post-disaster Recovery Planning: the Zeytinburnu Case" (2009) 33(2) *Disasters* 180.

[14] Monday, J. L., "Building Back Better: Creating a Sustainable Community after Disaster" (2002) *Natural Hazards Informer* 3. Available: *http://www.colorado.edu/hazards/publications/informer/infrmr3/informer3b.htm* [Accessed October 27, 2013].

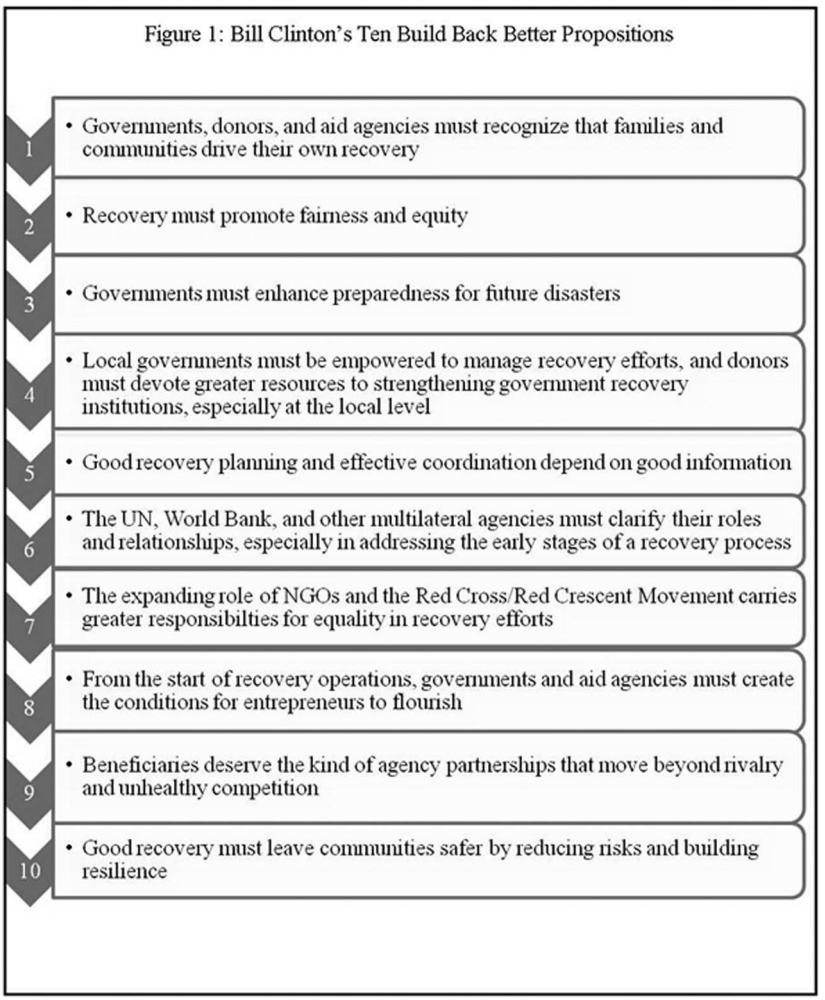

Figure 1: Bill Clinton's Ten Build Back Better Propositions

Consideration of the above literature and other BBB-related documents have been used to form three categories required for BBB (Figure 2): (1) risk reduction, which looks at the improvement of structural resilience in the built environment through improved structural designs and land-use planning; (2) community recovery, which works on the social recovery of affected people and regeneration of the local economy; and (3) implementation, which is the means by which (1) and (2) can be put in place efficiently and effectively. Implementation is achieved through improved stakeholder management and legislation and regulation for enforcement and facilitation of recovery activities. Monitoring and evaluation is important through all principles to identify and address issues arising during the recovery process.

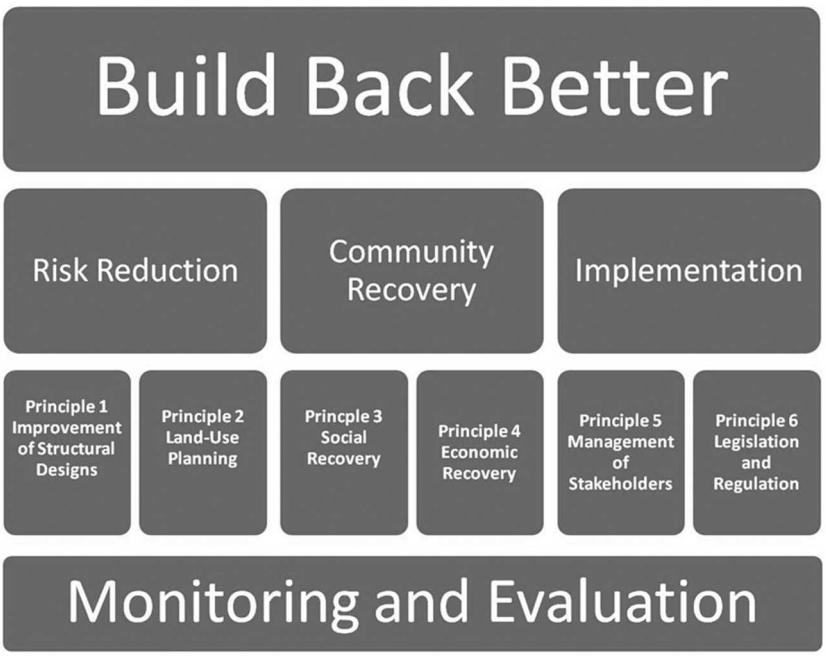

Figure 2: Overview of the Build Back Better Framework (Source: Author)

Post-disaster legislative issues and recommendations

A key obstacle preventing successful BBB-centred recovery is the absence of proper controls to enforce BBB principles.[15] Having BBB knowledge and producing recovery plans in-line with these principles is futile without proper legislation and regulations in place to ensure they are implemented.[16] A common challenge in post-disaster environments is the sudden increased workload, especially in the building industry, along with a drop in the workforce across local organisations which slow down and impede recovery activities.[17] Post-disaster reconstruction requires time-consuming activities such as hazard analysis, land selection, infrastructure development and rebuilding to be done in a relatively short period of time.[18] It is important to facilitate recovery-related activities by simplifying, fast-tracking, and exempting certain rules and regulations using special legislation.[19]

Legislation necessary to BBB can be classified into two categories: (1) legislation for compliance and (2) legislation for facilitation.

[15] Bakir, P. G., "Proposal of a National Mitigation Strategy Against Earthquakes in Turkey" (2004) 33(3) *Natural Hazards*. Florian, S., "Housing reconstruction and rehabilitation in Aceh and Nias, Indonesia—Rebuilding lives" (2007) 31(1) *Habitat International* 150.

[16] Clinton, *Lessons Learned from Tsunami Recovery* (2006). James Lee Witt Associates. *Building Back Better and Safer* (2005). Mora, and Keipi, "Disaster risk Management in Development Projects: Models and Checklists" (2006) 65(2) *Bulletin of Engineering Geology and the Environment*.

[17] Chang, Y., Wilkinson, S., Potangaroa, R. and Seville, E., "Resourcing Challenges for Post-disaster Housing Reconstruction: A Comparative Analysis" (2010) 38(3) *Building Research and Information* 247.

[18] Johnson, C. and Lizarralde, G., "Post-Disaster Housing and Reconstruction" in Smith, S. (ed.) *International Encyclopedia of Housing and Home* (Oxford: Elsevier, 2010), pp.340–346.

[19] Rotimi, J. O., Myburgh, D., Wilkinson, S. and Zuo, K., "Legislation for Effective Post-disaster Reconstruction" (2009) 13(2) *International Journal of Strategic Property Management* 143.

Legislation for compliance

Compliance entails using legislation to enforce recovery initiatives to conform to BBB principles. The lack of enforcement of hazard-related laws and adequate risk-based building controls contributed to the large-scale devastation caused by the 2004 Indian Ocean tsunami.[20] The same was seen in countries like Pakistan,[21] Turkey,[22] Samoa,[23] and Haiti.[24] Enforcing updated risk-based building design standards through the use of compulsory building codes and maintaining construction standards through careful inspections is an important regulatory requirement in reconstruction.[25]

Minimal consultation and consideration of the lifestyle, livelihood and economic structure of local communities when creating recovery policies can lead to increased vulnerability. Resettlement following the tsunami resulted in the loss of traditional livelihoods of locals in Sri Lanka.[26] Florian[27] reported that there were no provisions in place to support economic recovery in Aceh, Indonesia and the lack of regulation around how funding would be provided led to inequality and uncertainty. The main focus of recovery is the community, thus locals must be consulted and included in the process of developing new legislation and regulations to ensure the changes are suitable and beneficial for the community.[28]

Lack of awareness and understanding of new legislation can lead to non-compliance. In the post-tsunami recovery effort in Sri Lanka, external non-governmental organisations (NGOs) which took part did not comply with local standards due to unawareness.[29] The "National Post-Tsunami Lessons Learned and Best Practices Workshop" held in Sri Lanka highlighted the importance of training stakeholders (especially external NGOs) about existing and newly introduced legislation and regulations.[30] The community's support can also be obtained by educating them about legislation and regulations which must be adhered to in reconstruction and recovery.[31]

[20] DNS and PA, *Tackling the Tides and Tremors: South Asia Disaster Report*, Duryog Nivaran Secretariat and Practical Action — South Asia Programme (2005). Mulligan, M. and Shaw, J., "What the World can Learn from Sri Lanka's Post-Tsunami Experiences" (2007) 3(2) *International Journal of Asia-Pacific Studies* 65.

[21] Kijewski-Correa, T. and Taflanidis, A., "The Haitian Housing Dilemma: can Sustainability and Hazard-resilience be Achieved?" (2012) 10(3) *Bulletin of Earthquake Engineering* 765.

[22] Bakir, "Proposal of a National Mitigation Strategy Against Earthquakes in Turkey" (2004) 33(3) *Natural Hazards*.

[23] Bird, D. K., Chague-Goff, C. and Gero, A. "Human Response to Extreme Events: a Review of Three Post-tsunami Disaster Case Studies" (2011) 42(3) *Australian Geographer* 225.

[24] Kijewski-Correa and Taflanidis, "The Haitian Housing Dilemma: can Sustainability and Hazard-resilience be Achieved?" (2012) 10(3) *Bulletin of Earthquake Engineering* 765.

[25] James Lee Witt Associates. *Building Back Better and Safer* (2005). Lewis, J., "Housing construction in earthquake-prone places: Perspectives, priorities and projections for development" (2003) 18(2) *The Australian Journal of Emergency Management*.

[26] Khazai, B., Franco, G., Ingram, J. C., Rio, C. R. d., Dias, P., Dissanayake, R., Chandratilake, R. and Kanna, S. J., "Post-December 2004 Tsunami Reconstruction in Sri Lanka and Its Potential Impacts on Future Vulnerability" (2006) 22(S3) *Earthquake Spectra* S829.

[27] Florian., "Housing reconstruction and Rehabilitation in Aceh and Nias, Indonesia—Rebuilding lives" (2007) 31(1) *Habitat International* 150.

[28] Ingram, J. C., Franco, G., del Rio, C. R. and Khazai, B., "Post-disaster Recovery Dilemmas: Challenges in Balancing Short-term and Long-term Needs for Vulnerability Reduction" (2006) 9(7–8) *Environmental Science and Policy* 607.

[29] Boano, C., "Housing Anxiety and Multiple Geographies in Post-tsunami Sri Lanka" (2009) 33(4) *Disasters* 762.

[30] GoSL and UN, *National Post-Tsunami Lessons Learned and Best Practices Workshop* (Colombo: Government of Sri Lanka and United Nations, 2005).

[31] Batteate, C., *Urban Disaster Risk Reduction and Regeneration Planning: An Overview*. International Symposium on Urban Disaster Risk Reduction and Regeneration Planning: Integrating Practice, Policy and Theory (San Luis Obispo, California: California Polytechnic State University, 2005).

Legislation for facilitation

Facilitation denotes legislation being used to simplify and assist recovery activities to speed up the recovery process. Legislation which is customarily used to impose security and safety controls (such as building consents) can become an obstacle in high pressure post-disaster environments. Time-consuming procedures, insufficient resources to process permits and the lack of fast-tracked methods delay reconstruction.[32] Delays in permits were a major reason for the hold-up in housing repair and rebuilding following the 2005 Bay of Plenty storm in New Zealand.[33] Meese III et al.[34] suggested fast-tracked consenting procedures, collaboration with other local councils and open access to information between stakeholders to speed up recovery.

Legislation can be used to remove unnecessary red tape to facilitate recovery activities.[35] Meese III[36] reported a good example in the recovery following the 1994 Northridge Earthquake, United States, where legislative suspensions and emergency powers greatly reduced highway reconstruction time. The construction work provided employment and opening up the highways soon after the disaster helped boost the economy.

Research methods

The findings for this study were obtained from examining existing literature on the subject and the Victorian Bushfires case study. The 2009 Victorian Bushfires took place on February 7, 2009 in the state of Victoria, Australia, where 173 lives were lost. The bushfires destroyed 430,000 hectares of land and affected nearly 3,500 properties, forests, national parks and agricultural facilities in 78 communities.[37] The Victorian Bushfires case study was chosen as it is an event which is currently at the stage of medium-term recovery, providing a good opportunity to view the impacts of legislative decisions on the recovery process.

Data was collected from Victoria by conducting site visits on three consecutive years in 2010, 2011 and 2012. A range of stakeholders involved in the reconstruction and recovery effort were interviewed using open-ended, semi-structured questionnaires to obtain qualitative data (Table 1). The interviewees were asked about their knowledge of BBB; their involvement in the recovery effort; the positive and negative impacts of existing/newly introduced legislation; lessons learnt, and recommendations for improvement. Interviewees were selected from the recovery authorities established to oversee the recovery process (VBBRA and FRU); the organisation responsible for community recovery (DHS); the Building Commission (BC), which was involved with structural regulations; DPCD

[32] Rotimi, Myburgh, Wilkinson and Zuo, "Legislation for Effective Post-disaster Reconstruction" (2009) 13(2) *International Journal of Strategic Property Management* 143.

[33] Middleton, D., *Habitability of Homes after a Disaster*. 4th International i-REC Conference on Building Resilience: achieving effective post-disaster reconstruction (Christchurch, New Zealand: International Council for Research and Innovation in Building and Construction, 2008).

[34] Meese III, E., Butler, S. M. and Holmes, K. R. *From Tragedy to Triumph: Principled Solutions for Rebuilding Lives and Communities*. Heritage Special Report (Washington DC: The Heritage Foundation, 2005).

[35] Disaster Management Centre, Coast Conservation Department and Asian Disaster Preparedness Centre (eds), *Mainstreaming Disaster Risk Reduction into Approval Permits of Development Activities in the Coastal Areas of Sri Lanka* (Colombo: DMC, CCD and ADPC, 2011).

[36] Meese III, Butler, and Holmes, *From Tragedy to Triumph*, Heritage Special Report (2005).

[37] VBBRA, *100 Day Report* (Victorian Bushfire Reconstruction and Recovery Authority, 2009).

and the Department of Justice, which were in charge of land-use planning; the Rebuilding Advisory Service (RAS) set up by VBRRA to provide rebuilding advice to the community; volume builders; local council; town planners (VBRRA), and grassroots-level organisations, such as the Marysville Temporary Village, Marysville CRC and Marysville Chamber of Commerce to understand local community responsibilities and perspectives on recovery.

An inductive approach using grounded theory and the constant comparative method[38] was used to analyse the data based on the categories formed from literature using the computer programme NVivo 9. The results were then triangulated with reports and other documentation to ensure validity and accuracy of the information.

Table 1: Profiles of the Interviewees in the Australian Case Study (Source: Author)

Research trip	Interviewee code	Number of interviewees	Description
	P1 – P9	9	Victorian Bushfire Reconstruction and Recovery Authority (VBRRA)
	P10 & P11	2	Building Commission (BC)
Research Trip 1 July 2010	P12	1	Temporary Village
	P13	1	Local Council
	P14 & P15	2	Volume Builders
	P16 & P17	2	Department of Human Services (DHS)
	P18	1	Rebuilding Advisory Service (RAS)
	P19	1	Building Commission (BC)
	P20	1	Department of Human Services (DHS)
Research Trip 2 July 2011	P21	1	Department of Planning and Community Development (DPCD)
	P22 – P23	1	Fire Recovery Unit (FRU)
	P24	1	Marysville Community Recovery Committee (CRC)
	P25	1	Marysville Chamber of Commerce (CoC)
	P26 – P28	3	Volume Builders
	P29 – P30	2	Fire Recovery Unit (FRU)
Research Trip 3 October 2012	P31	1	Building Commission (BC)
	P32	1	Department of Planning and Community Development (DPCD)
	P33 – P34	2	Rebuilding Advisory Service (RAS)
	P35	1	Department of Justice

[38] Maykut, P. and Morehouse, R., *Beginning Qualitative Research - A Philosophical and Practical Guide* (The Farmer Press, 1994). Yin, R. K., *Case Study Research - Design and Methods* (California: SAGE Inc., 2009).

Post-disaster legislative actions in Australia

The data from the case studies were analysed and divided among the two categories introduced previously: (1) legislation for compliance, and (2) legislation for facilitation.

Legislation for Compliance in Australia

One of the first steps taken in Australia was to publish a revised edition of the Australian "Building Code for Bushfire-prone Areas" (AS 3959) on March 11, 2009.[39] The revisions introduced bushfire attack levels (BAL) to identify the bushfire-risk of properties.[40] Stringent design and construction requirements were specified for each BAL to provide greater fire protection. Interviewees P3, P10 and P13 among others found the changes promising and easy to implement in lower risk BAL. However interviewees P3, P10, P13 and P20 declared that the unavailability of building materials to comply with building code specifications and significant cost increases in high-risk BAL zones created major delays.

Another key change in legislation was regarding land-use. Soon after the fires, the entire state of Victoria was declared bushfire-prone and placed under the Wildfire Management Overlay (WMO), which imposed stricter planning regulations.[41] Interviewee P20 said that, by 2011, more accurate mapping of bushfire-risk in Victoria was being carried out to replace the WMO with a Building Management Overlay (BMO). BMOs integrated WMO with building controls.[42] Interviewee P36 noted that planning regulations were intended for future developments which caused issues for people who had bought properties in the past which now fell under high risk zones as a result of re-mapping. Some of these people were unable to build due to the new regulations, or had to comply with costly building standards.

The introduction of the "buy-back scheme" posed a solution for people on high-risk lands.[43] Interviewee P36, who was a member of the buy-back scheme project team, provided insight into the workings of the scheme. The scheme applied to those who had lost their owner-occupied principal place of residence (PPR) in the 2009 bushfires who had not started rebuilding yet and those whose properties were within 100 metres of significant forest. The scheme was voluntary and those interested had to submit applications. Interviewee P36 explained the reason for opting for a voluntary scheme over a compulsory scheme: "It's a tricky area for government. With a compulsory scheme you are going to end up chucking people off the land who want to stay, however legitimate the reason is for doing that. With a voluntary scheme, you get people who want to be involved".

[39] VBBRA, Building Commission and CFA, *A Guide to Retrofit your Home for Better Protection from a Bushfire* (2010).

[40] Ecological Australia, *Application of AS 3959-2009 Construction of Buildings in Bushfire Prone Land*. Ecological Australia, 2010.

[41] 2009 Victorian Bushfires Royal Commission, *Final Repor*t (2009 Victorian Bushfires Royal Commission, 2010). VBBRA, *100 Day Report* (2009).

[42] Department of Planning and Community Development (DPCD) (ed.), "List of Amendments to the Victoria Planning Provisions" (Victoria: Victoria State Government, 2013). Victorian Government, *Victorian Bushfire Recovery Three Year Report* (Melbourne: Victorian Government, 2012).

[43] Department of Justice Victoria, "Bushfire Buy-back Scheme" [Online] (Victoria: Department for Justice Victoria, Australia, 2012). Available: *http://www.justice.vic.gov.au/buyback* [Accessed May 30, 2012]. Author. [Gray?] "VIC home owners weigh bushfire buyback" *Domain*, December 16, 2011. Victorian Government, *Victorian Bushfire Recovery Three Year Report* (2012).

Interviewee P19 raised a potential problem with the buy-back scheme with regards to empty lots left behind. He questioned how the empty lots will be maintained and how affordable it is for councils to provide infrastructure and utility services to the few who have not opted for the scheme. Interviewee P36 responded that currently maintenance is done by the government and the plan is to sell empty lands to neighbours at affordable rates, or merge the land to adjoining forest. Interviewee P21 suggested land-swap schemes as another way to deal with high risk lands: "With a land-swap, you can open up new subdivisions in safe areas and provide a section there in exchange for the land you have. That could be cheaper and more attractive than the government having to buy back all high risk lands". Interviewee P36 mentioned a successful land-swap scheme implemented in Grantham, a town affected by the 2011 Queensland floods in Australia.[44]

Legislation for facilitation in Australia

The processing and issuing of planning and building permits were identified as potential bottlenecks due to the high demand and low capacity in the councils of affected areas. Interviewee P22 explained how permit procedures were facilitated over the recovery period: "In Australia you need a planning permit and a building permit to build. During recovery planning and building permits were exempted for temporary accommodation so they could be put up quickly. For permanent dwellings planning permits were exempted and only building permits were needed".[45] Interviewees P19 and P20 added that property falling under the WMO which would normally be subject to more rigorous planning and building permit requirements were relaxed only to require a simplified planning consent and building permit.[46]

A common problem was that people misunderstood the exemptions and believed they could build permanent dwellings without planning and building permits, resulting in the construction of sub-standard homes (interviewees P21 and P22). Interviewee P34 revealed that "you can't get a building permit retrospectively. But what you can do is prove that it is compliant and get a Class 1A, which allows them to live in it. But it won't be considered an actual building permit, so when trying to sell that house, the house will be considered non-existent". Interviewee P25 emphasised the importance of educating the public and stakeholders about new regulations and changes to avoid such issues.

Interviewees P1, P2 and P31 said that there were no special permit facilitations put in place for businesses to support economic recovery. The slow revival of businesses in the affected towns impacted overall recovery. Residents felt unsure of settling down in communities without any commercial promise, whilst businesses did not want to establish in communities without sufficient residents. Putting in place special provisions to enable businesses to re-establish themselves speedily would benefit disaster-affected communities.

[44] Queensland Floods Commission of Inquiry, *Queensland Floods Commission of Inquiry Final Report* (Queensland: Queensland Floods Commission of Inquiry, 2012).
[45] DPCD (ed.), "List of Amendments to the Victoria Planning Provisions" (2013).
[46] DPCD (ed.), "List of Amendments to the Victoria Planning Provisions" (2013).

Discussion

The findings from the Victorian Bushfires case study provide modifications to the BBB principles for legislation from literature.

Legislation for compliance

Putting in place legislation which enforces revised building codes to increase disaster resilience in the built environment is recommended for BBB. Insurance may often not fund the extra cost of improving the structural resilience of buildings, which is why the government and donors have to take responsibility in arranging extra funding sources. As cautioned by Ingram et al.,[47] *legislative and regulatory changes need scrutiny* to avoid issues such as resource constraints, high cost and impacts on livelihood which can unnecessarily hinder recovery progress, as stated in literature and observed in Australia.

Land-use planning legislation should be introduced to deal with high risk lands. Compulsory resettlement operations were unsuccessful in Sri Lanka and Samoa following the respective tsunami disasters.[48] Voluntary buy-back schemes implemented in Australia also presented issues due to the practical and social consequences of empty lots left behind. Those who opt for the scheme have the challenging task of resettling themselves. Remaining residents may have to suffer a lack of services provided by the local council in these areas and also have to face living in a neighbourhood missing many of their previous neighbours. Land-swap schemes are recommended as a suitable BBB alternative, where being relocated from high risk lands is counterbalanced by the provision of new land in new/upgraded subdivisions in nearby low-risk areas. Governments have to arrange the new subdivisions to be attractive with new/upgraded infrastructure and livelihood and recreational opportunities. Community input is also needed to allow locals to have a choice about where they would like the new subdivisions to be and what services they will require. These offers should be extended to all high-risk land owners and not only disaster-victims.

The psycho-social recovery of the disaster-affected community impacts on overall post-disaster recovery.[49] Murphy[50] stated that the involvement of the local community is important for the success of post-disaster recovery projects in-line with BBB. A high level of community involvement where locals are empowered and supported to start and execute local-level recovery projects supports the psycho-social recovery of disaster victims.[51] Community consultation was

[47] Ingram, Franco, del Rio and Khazai, "Post-disaster Recovery Dilemmas: Challenges in Balancing Short-term and Long-term needs for Vulnerability Reduction" (2006) 9(7–8) *Environmental Science and Policy* 607.

[48] Kennedy, J., "Disaster Mitigation Lessons from 'build back better' following the 26 December 2004 Tsunamis" in Ashmore, J., Babister, E., Kelman, I. and Zarins, J. (eds) *Water and Urban Development Paradigms* (London: Taylor and Francis Group, 2009). Potangaroa, R., *Native Engineering Technologies: The 2009 Samoan Tsunami and its Significance for New Zealand* (2009).

[49] Cook, A., Watson, J., van Buynder, P., Robertson, A. and Weinsteina, P., "Natural disasters and their long-term impacts on the health of communities" (2007) 10(2) *Journal of Environmental Monitoring* .Kristensen, P. L. T., (2012) 75(1) "Bereavement and Mental Health after Sudden and Violent Losses: A Review" Psychiatry: *Interpersonal & Biological Processes* 76.

[50] Murphy, B. L. "Locating Social Capital in Resilient Community-level Emergency Management" (2012) 41(2) *Natural Hazards*.

[51] Clinton, *Lessons Learned from Tsunami Recovery* (2006). Davidson, C. H., Johnson, C., Lizarralde, G., Dikmen, N. and Sliwinski, A.,"Truths and Myths about Community Participation in Post-disaster Housing Projects (2007) 31(1) *Habitat International* 100.

encouraged heavily in the Victorian bushfires rebuild. *Mandating community-inclusive recovery planning and decision-making through legislative provisions* will be central to catering local needs. The creation of community consultation groups, introducing mechanisms to allow community feedback into decision-making and holding regular multi-stakeholder meetings to include the community throughout the recovery process can be introduced through legislation.

Recovery continues long after rebuilding has been completed. The concept of BBB imposes that long-term monitoring and extraction of lessons to improve recovery plans for the future is necessary for success. Therefore *legislation must impose continued monitoring and enforce necessary facilitations to support recovery-related activities for long-term recovery*.

Legislation for facilitation

Facilitations and exemptions to the permit process should be made to speed up rebuilding, as recommended in literature to improve efficiency and build back better. The Australian case study showed problems faced due to the lack of understanding and misinterpretation of legislative exemptions. *Training and education should be provided for all stakeholders and the community about new legislative changes*. Extra support and advice can be provided through advisory/support centres, as recommended in literature and by interviewees from Australia.

Current literature mentions the importance of supporting social and economic recovery, management of stakeholder groups involved in recovery and monitoring and evaluation of recovery activities for BBB, but does not provide practical information and ideas on implementation. The VBRRA strategy in Australia addressed some of these aspects, but interviewees from Australia felt that more support could have been provided. Economic and social recovery should be supported more specifically by using legislation and regulation. *Special facilitations should be made for businesses above what is normally provided for residential rebuilding*. Rebuilding of business buildings and providing more public access to businesses can be supported through special fast-tracked processes, simplified permits and subsidised resources for construction. Further assistance can be provided to set up/recover businesses by allowing legislative provisions for subsidised equipment, low-interest business loans and special arrangements between businesses to support each other.

Legislation could be used for better management of stakeholders to BBB through fast-tracked tender processes for stakeholder selection for recovery projects, imposing quality controls, creating partnerships and role allocation/modification.

Conclusions

The literature review extracted BBB principles for post-disaster legislation and regulation from examples in primarily developing countries. The issues faced by developed countries with more mature legislative systems and economies such as Australia showed some differences. Integrated consideration of the issues faced by both developed and developing countries have led to recommendations for revised BBB principles for legislation, which are universally applicable. The

improved principles presented in this article (Figure 3) will aid in better implementation of BBB practices by Governments, engineers and other stakeholders involved in post-disaster recovery.

Further research on this subject using a wider range of case studies will help to test and validate the recommendations. There is insufficient knowledge on how legislation can help social and economic recovery, as well as aspects that aid BBB, such as stakeholder management and monitoring and evaluation. Legislation and regulation also cannot achieve everything that is sought in implementing BBB practice. It is necessary to understand the role of voluntarism required by the government and other stakeholders involved in recovery to achieve BBB along with legislation and regulation. Deeper investigation of these factors individually will help to gain greater understanding and support the findings of this article.

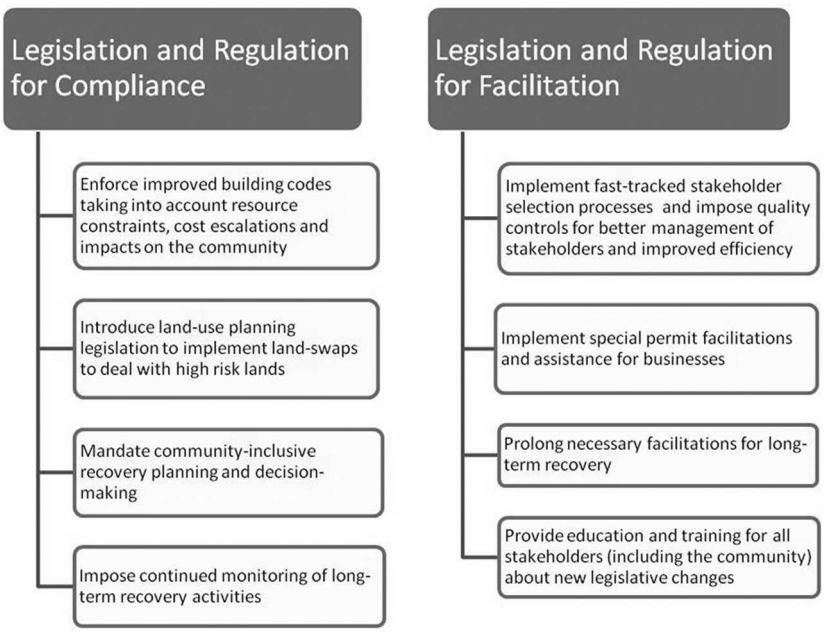

Figure 3: Modified BBB Principles for post-disaster legislation and regulation