BUILD BACK BETTER: LESSONS FROM SRI LANKA'S RECOVERY FROM THE 2004 INDIAN OCEAN TSUNAMI

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Abstract
The concept "Building Back Better" (BBB) was formally introduced following the 2004 Indian Ocean Tsunami, which implies using a collaborative approach to improve the physical, social and economic conditions of a community during post-disaster reconstruction and recovery. This paper introduces eight BBB Principles which contribute towards achieving BBB. The post-tsunami recovery effort in Sri Lanka was examined using the BBB Principles to determine the extent to which BBB has been incorporated in immediate and long-term disaster management practices. Reports, literature, and data collected from a site visit made to Sri Lanka in 2010/2011 were analysed to establish the findings. Although BBB concepts were recognized, failure in execution resulted in a non-BBB recovery. Lessons learnt from shortcomings have been understood and incorporated into current disaster management practices. Good BBB practices currently in effect include: hazard-based land-use planning and risk-based structural regulations; increased awareness; participatory approaches; and stakeholder training. The absence of legislative support to implement BBB initiatives is the only draw-back preventing so far. Lessons from Sri Lanka can benefit disaster management practices worldwide.

Keywords: post-disaster reconstruction; recovery; build back better; sri lanka; indian ocean tsunami.

INTRODUCTION

Restoration of the physical, social and economic impacts of a disaster is a complicated and extensive process. Johnson *et al*. (2006), Lyons (2009) and Halvorson and Hamilton (2010) commented that reconstruction and recovery projects are often poorly managed and tend to focus on quick restoration of affected communities. Long-term consequences of recovery decisions are not considered leading to vulnerable communities that are unable to cope with future hazards. The 2004 Indian Ocean Tsunami disaster which affected 14 countries was a catalyst in bringing forth a new concept to reconstruction and recovery; "Build Back Better" (BBB) (Cosgrave, 2007; Kennedy *et al*., 2008). The concept of BBB is to take the opportunity during post-disaster reconstruction and recovery to not only restore but improve a community's physical, social and economic conditions to create a new state of normalcy that is resilient and sustainable (Clinton, 2006; Khasalamwa, 2009; Roberts, 2000).

Sri Lanka was the second most affected country by the Indian Ocean Tsunami following Indonesia. Thirteen districts along the Eastern and Southern coast of the country were impacted with 35,322 lives lost and a total of 516,150 people displaced (Asian Development Bank *et al*., 2005; Frerks and Klem, 2005). The total direct losses from the tsunami were estimated to be $1 billion (4.5% of the Gross Domestic Product) with further long-term losses incurred from the impacts to the fisheries and coastal tourism industries (Asian Development Bank *et al*., 2005; Boano, 2009).

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This paper aims to discuss the effectiveness of the post-tsunami recovery effort in Sri Lanka using BBB as a benchmark and obtain lessons to improve future recovery efforts in Sri Lanka as well as other countries worldwide. The first objective of this study was to understand BBB as a concept based on findings from existing literature. The findings have led to introducing eight core principles that represent BBB. The second objective of the study was to assess the degree of implementation of the "BBB Principles" in Sri Lanka. This can be used as a tool to determine whether the recovery effort in Sri Lanka was a success or failure in terms of BBB. Adoption/non-adoption of the principles during the reconstruction period and their long-term implications are studied.

BUILD BACK BETTER

Kennedy *et al*. (2008) explained the term "Build Back Better" as "the need to link humanitarian relief and post-disaster reconstruction with longer-term disaster mitigation and vulnerability reduction efforts in order to ensure that reconstruction would not lead to conditions which could result in a similar disaster recurring". BBB has been mentioned as a necessary component for recovery by the United Nations Office for Disaster Risk Reduction (UNISDR), the United Nations Development Programme (UNDP) and Practical Action among others, as well as in recovery efforts after the Indian Ocean Tsunami (Clinton, 2006; James Lee Witt Associates, 2005), the Haiti Earthquake (Christian Century Foundation, 2010; Frist, 2012) and the 2009 Samoan Tsunami (NZ Red Cross, 2009).

The means by which BBB can be put into practice have been presented in various guidelines including: "Key Propositions for Building Back Better: A Report by the UN Secretary-General's Special Envoy for Tsunami Recovery" by former United States President Bill Clinton (2006), "Building Back Better: Way Forward" by the Disaster Relief Monitoring Unit of the Human Rights Commission of Sri Lanka (2006), "Building Back Better: Creating a Sustainable Community after Disaster" by Monday (2002), and "Rebuilding for a more Sustainable Future: An Operational Framework" by the Federal Emergency Management Agency, USA (FEMA, 2000).

BUILD BACK BETTER CATEGORIES AND PRINCIPLES

Examination of existing guidelines surfaced three key categories which are required to BBB: (1) Risk Reduction, (2) Community Recovery and (3) Implementation.

Risk Reduction

Risk reduction addresses improving a community's physical resilience to natural hazards. Risk Reduction in terms of BBB can be represented by two principles: Principle 1 Improvement of Structural Designs and Principle 2 Land-Use Planning. Extensive damage from the world's major natural disasters have been due to the lack of recognition of accurate risk exposure levels and insufficient mitigation mechanisms to withstand these risks (Batteate, 2006). Risk reduction is primarily executed through enforcement of building codes and regulations to ensure that structures are designed to resist the hazards they are exposed to (Kennedy, 2009; Omidvar *et al*., 2010). However, issues such as increased cost; unavailability of resources and increased pressures discourage the adoption of new building regulations (Chang *et al*., 2010; Edwards, 2010; Egbelakin *et al*., 2011). BBB advocates putting measures in place to ensure that new building regulations are adhered to. Legal backing and education and training is needed to implement the changes (Clinton, 2006; Reddy, 2000). Long-term funding mechanisms can be put in place to improve affordability (James Lee Witt Associates, 2005). Quality assurance needs high priority using skilled builders and conducting regular inspections (Lewis, 2003).

The use of hazard and risk-based land-use planning tools to manage developments is another risk reduction technique (Principle 2) (Haigh *et al*., 2009; Mora and Keipi, 2006; United Nations, 2005). In Australia following the Victorian Bushfires revised maps were introduced

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indicating bushfire risk levels and corresponding building and planning controls to minimize risk (2009 Victorian Bushfires Royal Commission, 2010). All developments were banned along the coastal strip to eliminate future tsunami risk following the Indian Ocean Tsunami and Samoan Tsunami (Potangaroa, 2009; Ruwanpura, 2009). In both countries relocation for protection from the tsunami hazard led to the creation of further vulnerabilities. For example, communities were exposed to new types of hazards such as flooding and landslides, and lost their sea-dependent livelihoods as a result of relocation (Khazai *et al*., 2006; Mulligan and Shaw, 2007).

Land-use planning in accordance with BBB must balance safety with the interests of the community. Risk zone maps based on multi-hazard assessments must be created to determine appropriate land-uses in conjunction with building regulations (Haigh *et al*., 2009). Buy-back schemes and land-swap schemes as that adopted in Australia are possible ways of avoiding developments on high risk lands (2009 Victorian Bushfires Royal Commission, 2010).

COMMUNITY RECOVERY

Disasters have a considerable impact on the psycho-social and economic situations of affected communities. Clinton's BBB Propositions stated that "a sustainable recovery process depends on reviving and expanding private economic activity and employment and securing diverse livelihood opportunities" (Clinton, 2006:12,18). Two BBB Principles have been extracted under Community Recovery: Principle 3 Social Recovery which addresses improving psycho-social aspects of the community and Principle 4 Economic Recovery to improve the economic climate.

The 2009 Victorian Bushfires recovery displayed a good example of BBB-based social recovery under Principle 3: each affected family was individually supported and guided through the recovery process by "case managers"; information centres were established including a counselling service; and social, entertainment and cultural programmes were put in place catering to all members of the community (VBRRA, 2010).

Economic recovery is normally supported through business grants, subsidized loans, provision of equipment, training programmes for up-skilling, and attempts to attract new businesses (Christchurch City Council, 2011; GoSL, 2005b; James Lee Witt Associates, 2005; VBRRA, 2009). Risk reduction priorities can impede economic recovery by moving people away from employment opportunities (Khasalamwa, 2009). BBB-based recovery based on Principle 4 focuses on thorough data collection and providing tailor-made economic recovery solutions to suit the local community. Funding provided should be attractive and flexible (Monday, 2002). Business support and counselling services can be established to help people with decision-making (VBRRA, 2010). New livelihood options and low-cost training programmes should be introduced based on local skills and trades (DNS and PA, 2005).

IMPLEMENTATION

The term Implementation identifies the means by which Risk Reduction and Community Recovery are to be put in place in an efficient and effective way. Principles that contribute to BBB-based Implementation are: Principle 5 Stakeholders, which represents clear role allocation and coordination; Principle 6 Legislation and Regulation, to control and facilitate implementation; Principle 7: Community Consultation, to provide fitting solutions; and Principle 8: Monitoring and Evaluation to ascertain compliance and extract lessons learnt to improve future practices.

Inadequacies in clear role allocation and coordination of different stakeholders have hindered the efficiency of recovery efforts in the past (DN and PA, 2008; James Lee Witt Associates, 2005; Johnson *et al*., 2006). Principle 5 recommends creating a national-level recovery authority such as the Victorian Bushfire Reconstruction and Recovery Authority (VBRRA) in Australia (2009 Victorian Bushfires Royal Commission, 2010), or the Bureau of Rehabilitation and Reconstruction (BRR) in Indonesia (Meigh, 2009) to coordinate stakeholders and prepare integrated recovery plans with clear roles for all stakeholders. Training should be

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provided to ensure stakeholders are competent with their roles (Boano, 2009). Grass-roots level involvement is necessary (Lloyd-Jones, 2006; Lyons, 2009).

Clinton's tenth proposition (2006) said that "legal frameworks must be in place to ensure disaster reduction becomes a priority at national and local levels". Principle 6 requires legislation and regulation to be used to enforce compliance to introduced risk reduction and community recovery initiatives (Lewis, 2003). Legislation should also be used to facilitate recovery activities by simplifying permit procedures for example (Meese III *et al*., 2005).

Over-centralized recovery programmes without sufficient consultation and participation at the grass-roots level have created unsatisfactory results (Baradan, 2006; Clinton, 2006; DN and PA, 2008). Grass-roots level involvement is integral for BBB in accordance with Principle 7 (Haigh *et al*., 2009; James Lee Witt Associates, 2005). The community must be kept informed and gathered for regular community meetings to explain recovery activities (Baradan, 2006; DN and PA, 2008). Community consultation groups must be established to act as a liaison between the community and other stakeholders to facilitate communication (Florian, 2007).

Principle 8 requires putting in place long-term monitoring schemes to check for compliance of disaster risk reduction (DRR) practices (Clinton, 2006; Lloyd-Jones, 2006). Regular progress reports should be produced including lessons learnt (Mikko, 2009). Continuous education and training must be provided for stakeholders on disaster risk reduction (Bakir, 2004). All lessons must be transferred to Government organisations to improve post-disaster recovery practices in the future (FEMA, 2000).

RESEARCH METHODOLOGY

The level of implementation of BBB concepts and their short-term and long-term implications for reconstruction and recovery in Sri Lanka following the Indian Ocean Tsunami were studied using the proposed eight BBB Principles.

Data on immediate post-disaster recovery was obtained from progress reports published by the Sri Lankan Government and international non-governmental organisations (NGOs) who participated in the recovery efforts. A research visit was made to Sri Lanka from January to February 2011, where qualitative data was collected from semi-structured interviews. The interviews were approximately 1 hour in duration where the participants were questioned on their understanding of BBB and the work implemented under each BBB Principle in post-tsunami and current disaster management practices, their implications and interviewees' recommendations. The data collected seven years after the tsunami presented a valuable opportunity to observe what impacts the post-tsunami recovery process has had on the long-term recovery of affected communities with respect to BBB; whether common perceptions of the recovery effort displayed any changes over time; and to what degree lessons learnt on BBB practices have been adopted in current disaster management systems.

The participants were professionals who had direct involvement in post-tsunami recovery and current disaster management activities from a range of multi-level organizations to provide a cross-sectioned view of the recovery effort (see table 1). Interviewees from the Coastal Conservation Department (CCD) and Urban Development Authority (UDA) who overlooked coastal developments, and an interviewee from the National Building Research Organisation (NBRO) were chosen to explain the central government-level processes and regulations that were in place to deal with the resettlement of these communities, while interviewees from the Galle Municipal Council and Galle Divisional Secretariat were chosen to provide a local government view on how the reconstruction and livelihood development activities were implemented and their impacts on the community. NGOs such as Practical Action, United National Development Programme (UNDP), Asian Disaster Preparedness Centre (ADPC) and Care International were selected as they were leading NGOs involved in the primarily NGO-led recovery effort who dealt with rebuilding as well as socio-economic community recovery. A senior

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staff member of a heavily impacted school provided feddback on how the community received donor recovery efforts. Officials from the Disaster Management Centre (DMC), which is an organisation established under the Sri Lanka Disaster Management Act No. 13 of 2005 for the purpose of creating safe and sustainable communities, were interviewed to gain an understanding of current disaster management practices in Sri Lanka developed through lessons learnt from the tsunami experience. The validity of the information provided by the interviewees was ensured through a process of triangulation where the findings were cross-verified with data from documents and the other participants. The interviewees were not made aware of the details of other participants interviewed to prevent bias and guarantee the dependability of the information provided.

An inductive approach using Grounded Theory and Constant Comparative Method was used to analyse the data using the computer programme NVivo 9. The interview data was transcribed then coded under the BBB principles identified.

Table 1: Profile of interviewees (Source: Authors).

	Number of interviewees	Organization	Interviewee Code
International level	4	Asian Disaster Preparedness Centre (ADPC)	P1
		United Nations Development Programme (UNDP)	P2
		Practical Action (PA)	P3
		Care International	P4
National level	8	Disaster Management Centre (DMC)	P5-P9
		Coastal Conservation Department (CCD)	P10
		National Building Research Organisation (NBRO)	P11
		Urban Development Authority (UDA)	P12
Local level	3	Galle Municipal Council	P13
		Galle Divisional Secretariat	P14
		Peraliya School	P15

SRI LANKA'S POST-TSUNAMI RECOVERY AND CURRENT DISASTER MANAGEMENT PRACTICES

The results from the data analysis are presented under the eight BBB principles. The post-tsunami reconstruction and recovery as well as current disaster management practices are discussed under each BBB principle to evaluate the extent at which BBB has been considered and incorporated along with recommendations for future BBB-based recovery efforts.

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RISK REDUCTION

Principle 1: Improvement of Structural Designs

Principle 1 refers to implementing structural design improvements to improve the resilience of the built environment to natural hazards. P11 and P13 stated that the large-scale reconstruction faced by Sri Lanka after the tsunami was overwhelming and led to building and construction standards being overlooked due to the urgency with which tsunami project plans were prepared. P4 said that owner-building also led to neglecting structural soundness in favour of aesthetics. Pathiraja and Tombesi (2009) commented that the tsunami rebuild has created sub-standard vulnerable structures.

In the long run lessons from the tsunami rebuild have caused a change in direction in development practices in Sri Lanka according to P1 and P10. The CCD official said "now we are trying to incorporate DRR into the structures for the long-term case. I believe that stricter building regulations and specifications are the best way to go". DMC with the support of ADPC have already implemented the "Priority Implementation Partnership" (PIP) projects to mainstream DRR into the housing sector (ADPC, 2009). P5 and P6 from DMC said that a risk profile for the country which is to be used to develop construction guidelines is underway.

Principle 2: Land-Use Planning

Principle 2 proposes the utilization of a hazard-based approach in land-use planning to minimize risks. "Coastal buffer zones" were introduced in Sri Lanka as a risk reduction strategy during post-tsunami reconstruction. Construction was prohibited on coastal land, and people who previously lived within the buffer zone area were relocated (Boano, 2009; Frerks and Klem, 2005; Kennedy *et al*., 2008). Relocation was problematic due to the scarcity of suitable land for new settlements (GoSL, 2005b; Mulligan and Shaw, 2007). P3 along with Kennedy (2009) and Khazai *et al*. (2006) reported that the rush to rebuild resulted in omitting proper hazard assessments, exposing people to new hazards such as flooding in relocated areas. P11 said that "the resettlement was done without much consideration. There is a big gap in creating a proper resettlement policy which needs to be looked at".

The UDA interviewee explained the new zoning system which was introduced and implemented in Hambantota as a result of the lessons learnt after the tsunami experience in accordance with Principle 2: "First information on physical, social, and environmental aspects, land uses and hazard information were compiled. Then a zoning map was produced with permissible and prohibited uses. Alternative land-uses such as beach parks and areas for fisheries and harbour were introduced in high risk areas not fit for commercial and residential developments".

COMMUNITY RECOVERY

Principle 3: Social Recovery

Principle 3: Social Recovery describes the need to improve the psycho-social aspects of affected people to support overall recovery. P12 said: "The biggest disaster in post-disaster recovery was not understanding the socio-economic situation and cultural patterns of the people". The lack of consideration of traditional settlement patterns, housing types and layouts, and cultural and ethnic issues due to non-participatory reconstruction practices caused conflicts and resentment among locals (Boano, 2009; Mulligan and Shaw, 2007; Ruwanpura, 2009; Silva, 2009). P3 pointed out that there was a lack of formalized psychological support given to people in Sri Lanka which needs attention. On the other hand owner-driven housing construction programmes resulted in community cohesion which contributed towards psychological recovery (Asian Development Bank *et al*., 2005).

P12 showed how improvements made based on the tsunami experience were adopted in the new Hambantota development programme: "We have identified those who have close

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connections with the sea and have located them in safer areas whilst still maintaining views of the sea. They are still able to maintain the connection with the sea, which was considered an important part in the development strategy".

Principle 4: Economic Recovery

The Economic Recovery principle highlights the necessity to improve the economic climate of the impacted community alongside rebuilding operations. The industries most heavily impacted by the tsunami and the recovery process were fisheries and tourism with an estimated loss of US $ 330 million (Frerks and Klem, 2005). There were several livelihood recovery programmes set up to assist the community such as: "cash-for-work" schemes to involve locals in rebuilding, and medium and long-term micro-credit interventions where concessionary loans were given to micro, small and medium enterprises (Asian Development Bank *et al*., 2005; GoSL, 2005b). However, the livelihood recovery programmes faced criticism for not paying attention to community needs and traditional livelihoods such as fishing (Lyons, 2009; Mulligan and Shaw, 2007). P14 said, "A lot of hotels built near the sea wanted to rebuild immediately after the tsunami, but weren't granted permission due to the coastal buffer zone rule. There were also problems with fishermen being relocated 4-5km away from their original locations near the sea and therefore unable to work".

Experienced NGO organisations such as Care International and Practical Action worked to support local businesses and livelihoods, shared P4: "Care supported a lot of livelihood projects by providing funds and resources. In some cases small shopping areas were built to allow merchants to start small shopping stalls, market places, small boutiques etc.", and P8: "Practical Action started projects such as rain water harvesting in dry areas; boat building and fishery; lagoon rehabilitation etc. to introduce new livelihoods to the communities and support existing ones".

IMPLEMENTATION

Principle 5: Stakeholders

This principle requires coordination and clear role allocation between stakeholders involved in the recovery effort to improve efficiency. The creation of the Post-Tsunami Recovery and Reconstruction Strategy and Guiding Principles (GoSL, 2005a) were a promising start. The decision taken by the Sri Lankan Government was to conduct a non-Governmental donor-led operation where donors from public and private sectors were asked to bid for projects and take responsibility of different districts/towns under the overall supervision of the coordinating bodies TAFREN and RADA (GoSL, 2005a).

There was a large influx of local and international NGOs to conduct recovery operations who were in competition with each other and worked under pressure to achieve fast results in an uncoordinated manner resulting in a disjointed recovery effort (Boano, 2009; Khasalamwa, 2009). P10 recounted the unsatisfactory job done by NGOs due to their lack of awareness about the local community and their competitiveness with other agencies.

The post-tsunami experiences led P12 to recommend that "District, Divisional and Provincial Level authorities need to be educated about respective planning/building guidelines. Then these authorities need to advise NGOs to adhere". P4 agreed with the importance of Government-led recovery efforts: "Government agencies should take a lead role in the reconstruction and recovery process. It's about empowering local authorities and facilitating availability of data through all tiers for decision-making".

P9 and RADA (2006b) identified that the low disaster management capacity in Sri Lanka is a cause for the poorly executed recovery operations. P11 commented that "in Sri Lanka the problem is we have all the resources at the top: guidelines, expertise, knowledge, qualified people. But when you go to ground-level where the programmes will actually be implemented

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they are very helpless". P2 and P13 mentioned that various training programmes have been introduced to build the disaster management capabilities in the country to educate stakeholders such as the Coastal Community Resilience Training Workshop (US Aid Asia, 2007) and the Guidelines on construction in disaster-prone areas training programme (DMC, 2010). P6 and P11 explained the on-going Priority Implementation Partnership (PIP) projects launched in 2008 to develop and test a coordinated multi-stakeholder approach towards DRR incorporated developments (NHDA) (DMC *et al*., 2011a; DMC *et al*., 2011b).

Principle 6: Legislation and Regulation

Principle 6 refers to the use of legislation and regulation to control and facilitate risk reduction and community recovery operations. The introduction of the coastal buffer zone as a legislative measure for risk reduction was consistent with Principle 6, but was unsuccessful because of the ambiguity with which it was enforced (Boano, 2009; Mulligan and Shaw, 2007). The regulation was changed several times which led to confusion and illegal housing construction within the buffer zones according to P13 and Silva (2009). P14 pointed out another issue: "The problem is most of our administrative procedures are very long, so NGOs weren't willing to spend time on these things. The local Government officials weren't interested in doing final checks which led to low quality construction".

The 2010-2011 floods in Sri Lanka affected 1,055,262 people with 362,646 people displaced (UN, 2011). P1 attributed the destruction caused by these floods to poor permit procedures: "From the recent floods it can be seen that housing construction on flood-prone lands have somehow been approved without looking at the hazards". This shows that the adoption of Principle 6 has not seen effect despite the lessons learnt. P5, P10 and P12 stated that attempts are being made to convert risk reduction guidelines produced such as the "Guidelines for building at risk from natural disasters" (Society of Structural Engineers, 2005) into legislation and to revise permit procedures to incorporate DRR checks without causing extra delays to promote adoption.

Principle 7: Community Consultation

Principle 7 refers to consultation and participation of the community to provide locally fitting solutions. Village Rehabilitation Committees (VRCs) were formed including villagers with knowledge about the community to help identify community needs as recommended under BBB Principle 7 (Disaster Relief Monitoring Unit of the Human Rights Commission of Sri Lanka, 2006).

However findings by Boano (2009), Mulligan and Shaw (2007) and Khazai *et al*. (2006) show that community consultation was not carried out sufficiently in post-tsunami recovery activities. P3 and P13 shared that the low level of community consultation during the resettlement and donor-driven construction process resulted in people being unsatisfied with their new homes and locations. There were complaints regarding poor quality, unsuitability for local lifestyle and culture, and discontent about not being consulted.

Contrary to the common experience P14 recollected a successful recovery operation carried out in Habaraduwa (RADA, 2006a) as a result of thorough community consultation: "First we distributed applications to all the affected people asking for their personal details. Then we gave them information about the new land sites available and a choice of the type of house. Meetings were held for each housing site to compromise and match people with their requirements as much as possible".

Principle 8: Monitoring and Evaluation

The final Principle, Monitoring and Evaluation, refers to putting systems in place to monitor and evaluate reconstruction and recovery activities to ensure sustainability and obtain lessons for the future. National and local Government as well as most NGOs involved had no previous

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experience in large-scale post-disaster environments (Frerks and Klem, 2005). The lack of experience and pre-planned systems contributed to an ad-hoc recovery effort without sufficient attention to long-term impacts which did not fulfil BBB standards (Kennedy, 2009;Khasalamwa, 2009).

P12 held the opinion that the enormity of the reconstruction and recovery experience following the tsunami provided a valuable learning experience: "In immediate post-tsunami construction quality and incorporation of BBB couldn't be looked at properly. It was the first experience in Sri Lanka and we tried to incorporate whatever knowledge we had into the reconstruction, but the results varied. Now there's a very good understanding of these things, and everything's in place so reconstruction will be successful in the future". P10 was also confident that DRR-incorporated developments will be seen in the future. P13 claimed that from the Galle Municipal Council's point of view: "We haven't done any assessments or monitoring to pick up lessons learnt. So if a disaster happens, a similar situation might occur again", and P1 agreed that BBB is still just a concept that professionals have awareness of, but with no proper system to incorporate it.

P11 was disappointed with the slow response to the 2010-2011 flood events in Sri Lanka: "The 2010-2011 floods were considered the second largest disaster after the tsunami. They finally got an opportunity to practice what was learnt after the 2004 tsunami, but nothing was put into use. They completely 'missed the bus' this time. This shows that although they have the knowledge, they still don't understand how to use it in practice".

DISCUSSION

The key issue which prevented producing structurally resilient buildings following the tsunami in accordance with Principle 1 was the lack of proper building codes and legal enforcement. Owner-building was an important component of the recovery process in Sri Lanka (Boano, 2009). If quality assurance mechanisms such as regular inspections and education and support services were provided as suggested under Principle 1, owner-built construction would have been successful. Lessons learnt from the tsunami experience have led to some positive changes. The implementation of risk-based building regulations, if applied with sufficient legal backing will create resilient structures for the future. Considering the affordability of the changes and providing appropriate funding and incentives will promote adoption.

Although a coastal buffer zone and relocation process attempted to move communities to safer areas, poor execution with no consideration for other hazards and community needs impeded a positive outcome in accordance with Principle 2. Having observed the poor rebuilding operation, land use planning regulations, land-use mapping and zoning suitable to communities are now being adopted in Sri Lanka. The concept that high risk lands shouldn't be abandoned, but rather utilized wisely by using building controls and introducing alternative land-uses are steps towards BBB. Legislation, education and support must be provided to encourage conformance. A comprehensive resettlement strategy identifying available low risk lands with livelihood, business, educational and recreational opportunities for communities needs to be created for the future.

Social recovery in terms of BBB Principle 3 requires the provision of social, cultural and psychological support to aid community recovery (Lyons, 2009; Silva, 2009), which were not well-implemented in Sri Lanka. However changes have been introduced in the long-term to pay more consideration to social aspects in line with BBB from lessons learnt. Incorporating community needs with safety has now been identified as an important part of recovery. Social recovery can be further enhanced in the future by allowing more communication and transparency with the community by holding regular community meetings and establishing community groups. Owner-driven construction was a good initiative which allowed communities to actively get involved in their own recovery. Providing formalized support for owner-building would have ensured social

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recovery along with the creation of resilient structures. The psychological impact of experiencing a disaster was not well understood and supported in Sri Lanka. In the future, support through services such as counselling, information centres, regular updates through media and personal case managers assigned to each family must be considered.

The economic recovery experience showed both successes and failures in terms of BBB Principle 4. The provision of grants and low-interest loans, as well as local livelihood projects set up by NGOs, were helpful in re-establishing sources of income. The key issue was precedence given to safety over livelihood opportunities during relocation. The importance of considering factors such as traditional trades, skills, and preferences in DRR strategies have now been understood following the tsunami experience. Having a database including relevant community information would help in creating appropriate recovery strategies which take these factors into consideration in the future. In cases where relocation is inevitable, providing training and creating new job opportunities based on local skills is important.

The creation of coordinating bodies like TAFREN and RADA were a good start for managing stakeholders in accordance with Principle 5. However the results show that in practice the pressures existent in the post-disaster environment and the lack of formal arrangements resulted in an uncoordinated ad-hoc response. It is mostly likely that external organisations such as NGOs who may not be familiar with local processes will be utilized for recovery activities in developing countries like Sri Lanka. Therefore empowerment and inclusion of local authorities is essential. It was learnt from the tsunami experience that if all the organisations who were involved had been provided some basic training about local regulations and requirements, and had been supervised by Government bodies, the outcome may have been more positive. The training programmes launched show promise in creating disaster-literate stakeholders. Future post-disaster recovery operations would benefit from employing these trained stakeholders with clear role allocation.

Principle 6: Legislation and Regulation has not been effectively adopted to control and facilitate recovery activities to achieve BBB in Sri Lanka. Time-consuming permit procedures and weakly enforced legislative measures have resulted in the creation of vulnerable post-tsunami communities. The tsunami experience failed to influence an improvement in the adoption of national housing standards which contributed towards the extensive damage during the 2010-2011 floods in Sri Lanka. The flood disaster showed that people were still living in non-resilient structures built on high risk lands ignoring DRR regulations. BBB in Sri Lanka requires a stronger legal framework and strict enforcement carried out by national and local Government authorities. Permit procedures must also be simplified and shortened to ensure wide adoption. Education of communities about the importance of these regulations for their well-being and providing incentives in the form of funding or grants to promote adoption might influence adherence.

Although community consultation was considered a priority in the BBB Guiding Principles (GoSL, 2005a), the highly-centralized NGO-governed approach taken to recovery overlooked community consultation and grass-roots level involvement in practice. There were exceptions like Habaraduwa where community consultation led to generating satisfactory recovery operations which reflected Principle 7. The formation of community societies such as the VRCs was a good initiative. The formal use of VRCs as a community consultation platform will help recovery efforts in the future.

The destruction and ad-hoc recovery following the 2010-2011 floods in Sri Lanka show that although lessons learnt from the tsunami experience have been recognized, they have not been properly implemented to improve disaster management practices in the country. If long-term systematic monitoring mechanisms had been put in place during post-tsunami recovery, lessons learnt may have been picked up and turned into practice formally. It is important for lessons learnt to be transferred to Government streams and improve their processes for the future. Conducting

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regular training sessions for stakeholders would also help update their disaster management knowledge and influence adoption.

CONCLUSIONS

The Indian Ocean Tsunami was a large-scale multi-national disaster which initiated the concept of "Building Back Better" (BBB) to the post-disaster recovery environment. Eight BBB Principles were used to assess the extent to which BBB was adopted in the post-tsunami recovery effort as well as long-term DRR practices in Sri Lanka in order to extract valuable lessons for future post-disaster recovery efforts.

The reconstruction and recovery effort in Sri Lanka suffered from many shortcomings that were not in-line with the recommended BBB Principles and did not result in "building back better". Although some BBB concepts were recognized and adopted, execution has not been completely successful. Data collected seven years following the tsunami showed that long-term implications of the shortcomings in post-tsunami recovery have led to the recognition and adoption of BBB practices in Sri Lanka.

The findings show that non-adoption of BBB Principles adversely affected the effectiveness in Sri Lanka's post-tsunami recovery effort. The systematic changes adopted in Sri Lanka in the long-term based on lessons learnt from the tsunami experience affirmed the importance of the introduced BBB Principles for successful post-disaster recovery and improving community resilience. Effective adoption of all BBB Principles during post-disaster reconstruction and recovery will assist in building back better to create resilient communities.

These lessons may be applicable for countries worldwide. The research presented in this paper focuses on Sri Lanka as a case study and therefore the lessons are limited to countries of similar nature. Further research on case studies from different countries using the proposed BBB Principles will allow testing the universality of the principles for wider adoption.

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