

Overview of Reconstruction and Redevelopment of Key Infrastructure Facilities in Galle, Sri Lanka

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Abstract

In response to the urgent need to rehabilitate areas affected by the Indian Ocean Tsunami of 26 December 2004, the Government of Sri Lanka had launched several rehabilitation projects to recover the infrastructure facilities. However, due to lack of capacity and basic infrastructure, some of the development approach and strategies that are in progress in these projects are debatable. Therefore, this study examines the overview of the proposed and progressing recovery strategies over the criteria such as future hazard mitigation, ground condition, equity and fairness, sustainability, capacity and environment impacts, in line with the peculiar characteristics of the individual project. Results show housing development in some areas will have serious drawback not only due to scarcity of material or usage of poor quality materials but also due to difficulties in providing permanent water supply, sanitation facilities and so on. But in certain infrastructure sectors improvements have been adapted considering better facilities in near future such as telecommunication and electricity. Although road network and railway facilities have been restored quickly, but either these strategies was targeted to long term sustainability or considered to remove the existing bottlenecks. Developed database and documentation with the authorities revealed that almost all the projects are behind schedule.

Introduction

The tsunami that struck Sri Lanka in the morning of December 26, 2004, killed over 31,000 people, smashed and damaged over 99,000 homes, and destroyed several supporting infrastructure faculties in the coastal cities. Since then immediate assistance, medium and long term redevelopment tasks were initiated with the help of government and non-governmental organizations. Government of Sri Lanka itself had launched several rehabilitation projects to recover the infrastructure facilities. However, due to lack of capacity and basic infrastructure, some of the development approach and strategies that are in progress in these areas are debatable. Because, redevelopment strategies not only avoid re-creating or setting up new vulnerabilities, but also incorporated to other form of disasters such as river flood, land slides, flashflood/mudslide, cyclone, tsunami, meteor strike. Such threats to our service infrastructure must be viewed historically along with the prevention methodologies applied in the past.

Damage to the infrastructure facilities

Damages to the infrastructure facilities such as housing, water supply and sanitation, transport, power, telecommunication, education, fisheries and health are shown in Table 1. Galle district is located along the coast; and it is frequently vulnerable to storm surges during south-west monsoon period, similar to other south western coastal areas. Sea level rise is also a very long term problems for the city which contribute to high storm surges but sometime higher wind during South-West monsoon multiply the worst situation. The people in Galle district were seriously affected by the tsunami as shown in Table 1, because for the reasons stated above and due to the bay in headland which amplifies the tsunami waves.

Table 1. Affected Infrastructure Facilities in Sri Lanka and Galle

Affected Infrastructure Facilities	Country Level Impact	Galle District
Housing	35100-Fully Damaged 47500-Partially Damaged	7187 -Fully Damaged 4274 -Partially Damaged
Water Supply & Sanitation	10-pipe borne water scheme damaged 50000 house connection damaged Dug wells contaminated with sea water	7000- house connection damaged Hikkaduwa, Kahawa Dist.main Balapitiya Office & P/H Ahangama, Kanampitiya Magalle, Hikkaduwa, Akurala, Seenigama Bridge Crossings
Roads & Bridges	1615 km-roads damaged 25-bridges damaged	4-bridges damaged
Power	222,660 households loss access to electricity 6500 km service lines 600 km low voltage lines 50 km medium voltage lines destroyed	7500 households connections 6500 km service lines Low voltage lines & medium voltage lines destroyed
Telecommunication	Services partially or totally affected in the Coastal Belt Many towers & 25 exchanges fully destroyed	Services partially or fully damaged 4 cross sections & 2400 posts Kosgoda transmission plant & switch plant damaged
Others (Education, Health, Fisheries Sector)	182 schools damaged	29 schools damaged
	72 hospitals damaged	2 hospitals damaged
	11 fishery harbors 15300 boats & 1 million nets	2 fishery harbors 702 boats fully & 551 partially damaged.

Reconstruction and redevelopments in progress

Immediate targets had been to temporarily restore infrastructure services, wherever affected, and to provide services to transit camps and sites having transitional shelters. This was to be followed by restoration of all services to pre-tsunami levels and the servicing of sites for permanent shelter. Further the Government of Sri Lanka recognizes permanent infrastructure rebuilding into core part of the tsunami-recovery process. But there are several practical problems, as an example disposing the tsunami waste became a major task for the relevant authorities, still there are debris to be removed from the temporary dumping ground.

Housing

Temporary transitional houses were provided by donors and government. As per 2005^[1] considering the priorities, about 67% of such houses were completed, remaining works for constructing transitional accommodation facilities are on progress in Galle district. Study visits to the transitional housing projects revealed that usage of poor quality materials may shorten the life time of the structures in several ways. Floor level of these structures is also very low to prohibit water during rainy season as well as to avoid insects. Doors, windows and roof timbers were already affected by rot and insects in some areas.

Two programs have been introduced as long term recovery strategies to repair or rebuild damaged permanent house constructions. First was owner driven housing construction {constructions are being carried out by house owner}, and the next was donor driven housing construction {for affected people who were living inside the buffer zone} as illustrated in Table 2.

Table 2 Donor driven housing constructions

DS Division	Type of House	Number of Houses
Galle Four Gravate	Flats	1000
	Single/twin units	500
Balapitiya	Single units	500

(Source: UDA- Galle)

The donor driven housing constructions are new housing schemes with single, twin houses or flats. However, it is deeply associated to reduce vulnerability issues. There are problems in providing other infrastructure facilities to these newly planned housing schemes, which will be discussed sector by sector in the following sub-sections. In the reconstruction of infrastructure it is essential to make structures more resilient to hazards and to plan for sea-level rise and other potential future climate change impacts.

Water Supply and Sanitation

Availability and access to clean water has become a serious and real problem after the tsunami. The sea waves contaminated hundreds of wells in the region which were source of drinking for many people in rural areas. With the help of government and NGOs many people had restore reasonable water supply after six days, in Galle district. Almost all pipe borne water schemes were damaged and as a result connections from houses to the central water pipes were destroyed. Government gave priorities to the water and sanitation for schools and community centers as first to go. However, still sanitary facilities are remaining in poor stage. When we consider the Galle district there are 1,095,920 people and about 18% of water requirement are fulfilled by National Water Supply and Drainage Board (NWSDB) and others are by natural sources such as wells, rivers, ponds and etc. NWSDB is currently incapable of supply water to new housing schemes without augmentation of existing water scheme. Therefore the possible sources of water supply range from pipe borne schemes to protected wells depending of the demand and technical viability.

The components in the progressing strategies include the improvement of water resources and sanitation facilities and expansion of the schemes to meet the future requirements of the population in the restored / resettled areas or any area there are potentials. An assessment reveals that these service provisions should also include new settlements and newly developed commercial areas. However this study found that designing excess water supply and sanitary facilities for schools, temples, community centers, etc will be very useful idea to stand against similar disasters in future. As an example, establishing extra capacity water storage tank or ground sump for schools, temples could be used in an emergency case for the displaced peoples. In addition, the treatment plant always store excessive capacity for the emergency situations. Further, during pipe laying precautions for preventing sea water access to the pipes network should be taken up.

Transport

The affected roads were repaired and made motorable within two days after tsunami. Sufficient repairs to bridges and/or installation of temporary bridges were immediately employed to enable the movement of traffic. Donors had shown their strong commitment to normalize the situation as well as to rebuild and modernize of both national and provincial roads and bridges along the southern, eastern and northern coastal belt.

Train travels to towns in southern province have been characterized for their charming journeys, and the railway lines passing through beaches with the views of the sea. Unfortunately the railway system paid a heavy price on December 26, 2004 for its fantastic location. 160 km of railway tracks twisted from the Colombo Fort area to Matara^[1]. As the train service is an essential mode of transportation for people, emergency repairs were carried out immediately. Railway between Galle and Colombo city was restored on 26 January 2005. There were lots of voluntary supports extended while reconstruction, which shows a very strong commitment from the public.

Power and Energy

The power supply in many of the tsunami struck regions came to an abrupt halt following the disaster, as infrastructure lay ravaged by the encroaching waves. Many households lost access to electricity as service lines and voltage lines came crumbling down. The Government has planned a three stage approach to the rebuilding of the power supply. The first phase will focus on the installation of electrical distribution systems along the coastal belt. Work on this phase has already begun. The second stage further rehabilitation of the damaged electrical distribution system. A third stage provides for the provision of additional transmission and generation of power along the coastal areas.

Telecommunication

Telecommunications services were badly affected all along the coastal belt as the immediate consequences of the tsunami. Towers, cable network and exchanges were badly damaged. However, Sri Lankan telecommunications officials and private phone companies were very prompt in repairing this critical service. Majority of the affected areas now have their phone services reinstated. The telecommunications companies are also planning a comprehensive project including wireless network, in near future. After tsunami, telecom is expanding under ground cable network system to minimize the damage due to a similar disaster in future.

Other Sectors

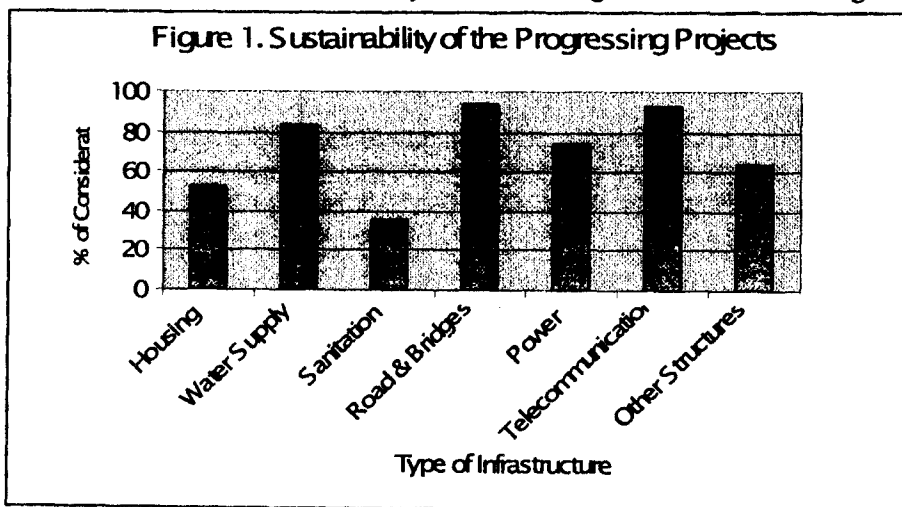
Government's attendance in tsunami-affected schools now stands at around 95 percent, evidence suggests that some children were dropped out of school to work^[1]. Some families are reluctant to send their children to damaged or temporary school environments. Many families have moved out of the local area, so that their children's education is questionable. Teachers' attendance is also an issue in some areas where reporting rate for duty was less than 75 percent^[1]. Although school buildings had been badly damaged by tsunami, lot of NGO first priority help significantly for its development. New school buildings are being constructed as storied buildings. Health sector was partly paralyzed due to tsunami. Top most priority was given to restore hospitals, government and NGOs help quite a lot. Damaged two fishery harbors were already repaired. People were more concerned with the distribution of fisheries equipment, thus polarization of these kinds of redevelopment and reconstruction status should be avoided.

Factors influencing redevelopment

Various factors influence Galle community's ability to recover their life style after tsunami. For example, remaining basic sources such as accessibility, water, construction materials, power supply and means of communication are vital for redevelopment. Moreover, access to security, diversity of income sources, age and gender structure in the community, their level of cohesion, political power, equity issues, and the effectiveness of institutions are also critical. Moreover, at a household level, their circumstances differ such as their income, number of members remaining in a family after tsunami, their access to information and health as well as other factors further differentiates a household's ability to recover. These are the issues considered in this study as 'ground condition'. Therefore, suitability of proposed and progressing redevelopment strategies were examined considering these ground conditions as well as other criteria such as future hazard mitigation, equity, sustainability, capacity and environment impacts, in line with the peculiar characteristics of the individual project.

Appropriate approach

Development strategies should have longer vision than short term gains. Considering the options and opportunities in the future, and coordination and facilitation of dialogues across the sectors can also help and guide the reconstruction process. As an example, suitability of proposed and progressing redevelopment strategies were examined considering various criteria as stated in the above paragraph. Due to limitation of space, the result from the sustainability analysis is shown in Figure 1, which shows that the sustainability of the housing and sanitation arrangements were poor.



Further, history show that there is a dangerous disconnect among the professionals from multiple disciplines that plan, design, construct, operate, maintain, and manage these complex infrastructure. Planners, engineers, lawmakers and more importantly politicians have their self-centered visions. Their interactions are very important at this juncture for effectively redevelop the infrastructure facilities in an integrated way. Therefore ultimately what is needed is a strong institutional structure and more than it a strong leadership.

Galle development plan

Greater Galle city development project was already started well before tsunami. Now the implementation of this Galle development plan has accelerated with few twists in the plan by identified necessary changes after tsunami. Under the Galle city development project, Galle town is planned in a proper way, with more facilities for business, trade, education, health and recreations facilities, and thus basic infrastructure facilities is to be modernized. This project includes thirty four proposals. New economic centre, which will be located at the entrance of the Galle city and new maternity hospital with children's ICU at Karapitiya are in progress. The proposed city plan will cost about Rs. 20 billion. Entire Galle city project will take about 10 years to complete.

Conclusion

Any strategies for a sustainable recovery of the Galle town need to acknowledge the increasing potential of coastal hazards. Our research highlights that historically schools, temples and community centers were used as shelters during any form of disasters. Therefore basic infrastructures in these buildings could be designed with excess capacity. Such an approach could be considered as a no-regrets strategy because even if no disaster occurs, the investment will improve the quality of life of the local communities in many ways. On the other hand there are many limitations in recovery process such as lack of adequate construction materials, machineries, labor forces. Lack of capacity multiple the negative courses for many long term vision projects.

The development and reconstruction strategies should guarantee sustainability, equity and fairness. too. Further, these strategies should be companied with ground situation, too. Therefore appropriate strategies have to be identified to overcome them.

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