

**EX-POST ENVIRONMENTAL AND SOCIAL REVIEW OF  
INVOLUNTARY RESETTLEMENT HOUSING SCHEMES IN SRI  
LANKA**

UDYA MADHAVI ABEYSINGHE

158022 E

Degree of Master of Science

Department of Civil Engineering

University of Moratuwa

Sri Lanka

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Science

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## **DECLARATION OF THE CANDIDATE & SUPERVISOR**

I, Udyā Madhavi Abeysinghe hereby declare that this is my own carried out at the Division of Environmental Engineering, Department of Civil Engineering, University of Moratuwa, Sri Lanka and this thesis does not incorporate without acknowledging any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgment is made in the text.

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Date: .....

Udyā Madhavi Abeysinghe

Division of Environmental Engineering

Department of Civil Engineering

University of Moratuwa

Sri Lanka

The above candidate has carried out research for the Masters dissertation under my supervision.

Signature of the Supervisor: .....

Date: .....

Prof. J. M. A. Manatunage

Division of Environmental Engineering

Department of Civil Engineering

University of Moratuwa

Sri Lanka

## **Abstract**

### **Ex-post Environmental and Social review of Involuntary Resettlement Housing Schemes in Sri Lanka**

Worst natural disaster recorded in the recent history of Sri Lanka was tsunami 2004. Two third of the Sri Lanka coastline was hit by tsunami wave and took over 40,000 lives and made millions dollars' worth of property lost. Immediate actions were taken by the Sri Lankan government to recover the lost and damages of the people with the aid from different national and international organizations. About 485 tsunami resettlement sites were constructed in 12 districts in Sri Lanka. After a decade of the tsunami disaster, it is vital to look into the long term impacts of the tsunami resettlement programs implemented in different areas of the country. Although the basic steps followed for the resettlement is same, some of the factors are different from the site to site especially, donor, administrative area and social characteristics of beneficiaries.

The criteria chosen to assess the long-term satisfaction of the re-settlers consisted of factors related to site selection, the design of dwelling units and surroundings, material well-being and provision of services and infrastructure, aspects related to social factors and perceptions regarding the resettlement process, neighborhood and social interactions.

Creation of opportunities to rebuild is a critical factor that determined the satisfaction and dissatisfaction on the resettlement program. To make resettlement a success story, it is essential to identify the failure factors too. Economic, social, environmental and even physical factors differentiation from region to region has to acknowledge seriously.

Sites were selected from the data base of Rapid Environment Assessment survey using stratified sampling method. It was observed that the resettled communities included in the present study are not satisfied in the long-term due to various physical, environmental and socio-economic factors. Mainly Inconvenience to livelihood activities, Beneficiary selection process, Housing planning without considering the cultural and social status of the affected people-, Poor building quality, improper Wastewater management, Infrastructure provision were identified as critical factors that led long term dissatisfaction of affected people and finally abandonment of sites.

**Keywords:** Involuntary resettlement, tsunami, long term impacts, success and failure

## **DEDICATION**

To my husband Asitha Kurukulasuriya

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## Table of Contents

1	CHAPTER INTRODUCTION .....	1-1
1.1	Background of the Research .....	1-1
1.2	Problem Statement .....	1-2
1.3	Rational of the Study.....	1-2
1.3.1	Objectives of the Study .....	1-2
1.4	Methodology .....	1-2
2	CHAPTER LITERATURE REVIEW .....	2-4
2.1	What is Resettlement?.....	2-4
2.2	Types of Resettlement.....	2-4
2.2.1	Voluntary Resettlement.....	2-4
2.2.2	Involuntary Resettlement. ....	2-5
2.3	Impacts of Resettlement.....	2-7
2.4	The fact of Satisfaction .....	2-9
2.5	Identification of environmental and social factors that causes satisfaction of displaced people 2-10	
2.6	Resettlement Experiences in Sri Lanka.....	2-14
2.7	Tsunami 2004 in Sri Lanka .....	2-14
2.7.1	Resettlement process in tsunami 2004 Sri Lanka.....	2-15
2.7.2	Policies, Regulations and Institutional Framework of Involuntary Resettlement in Sri Lanka2-16	
2.8	Other Resettlement Policies and Regulations .....	2-22
2.8.1	World Bank Resettlement Policy .....	2-22
2.8.2	Asian Development Bank Involuntary Resettlement Policy .....	2-23
3	CHAPTER RESEARCH METHODOLOGY.....	3-24
3.1	Site selection methodology .....	3-24
3.2	Criteria for site selection .....	3-24
3.3	Data collection methodology .....	3-27
3.4	Methodology for objective one .....	3-27
3.5	Methodology for objective two.....	3-27
3.6	Methodology of objective three .....	3-35
3.7	Data analysing methodology.....	3-36
3.7.1	Data analysing methodology - Questionnaire survey one.....	3-37
3.7.2	Data analysing methodology - Questionnaire survey two.....	3-37
4	CHAPTER RESULTS ANALYSIS AND DISCUSSION .....	4-38
4.1	Selected sites for survey.....	4-38

4.2	Compliance with Legislations.....	4-41
4.1.1	Compliance with legislation - Environmental.....	4-41
4.1.2	Compliance with Legislations - Site planning .....	4-41
4.3	Average Household size.....	4-42
4.4	Level of Satisfaction of Environmental Factors.....	4-42
4.1.3	Dwelling.....	4-42
4.1.4	Surrounding Environment.....	4-57
4.1.5	Services .....	4-62
4.5	Level of Satisfaction for Social Factors .....	4-76
4.1.6	Infrastructure facilities .....	4-76
4.1.7	Leisure and Neighborhood .....	4-86
4.6	Overall satisfaction of Environmental and social factors.....	4-96
4.7	Level of Ownership and percentage of owners who are willing to sell or rent houses ..	4-98
4.8	Abandoned Houses.....	4-99
5	CHAPTER CONCLUSION.....	5-100
	REFERENCES.....	5-104

## List of Figures

Figure 2-2 Number of reported displaced people due to tsunami, by district .....	2-15
Figure 2-1 DSDs of Sri Lanka affected by tsunami 2004 .....	2-15
Figure 3-1 Graphical illustration of the summary of field survey methodology for study .....	3-26
Figure 3-2 Graphical presentation of Methodology .....	3-27
Figure 4-1 Locations of sites selected for the study .....	4-40
Figure 4-2 Site selected .....	4-40
Figure 4-3 Open space between living area and kitchen in Kirinda New Town Tsunami Resettlement Houses .....	4-46
Figure 4-4 Godadenikanda Houses are very close to each other .....	4-46
Figure 4-5 Cooking outside in Galmulla, Hambantota district .....	4-49
Figure 4-6 Kitchen use as a storage room in Godadenikanda, Galle (behind rainwater harvesting tank) .....	4-49
Figure 4-7 Temporary kitchen at Mayurapura Hambantota .....	4-49
Figure 4-8 Temporary kitchen built by wood panels adjacent to the house in Epitawaththa Matara .....	4-49
Figure 4-9 Toilets built separate toilets outside the houses Epitawaththa Matara .....	4-50
Figure 4-10 Insecure staircases in .....	4-52
Figure 4-11 Insecure wiring in .....	4-52
Figure 4-12 Collapse of roof due to improper maintenance Arahena .....	4-54
Figure 4-13 Crack on wall. This house is abandoned due to Unlivable condition in Arahena Matara .....	4-54
Figure 4-14 Cracks on wall in .....	4-54
Figure 4-15 Cracks on the floor, Welldaya, Hambantota .....	4-54
Figure 4-16 Nidangalawella, Hambantota district incomplete house .....	4-56
Figure 4-17 Layout plan of the TZUCHI village resettlement site Hambantota .....	4-60
Figure 4-18 Garbage dump nearby road at Godadenikanda .....	4-69
Figure 4-19 Garbage dump and burn on an empty land Galmulla Hambantota .....	4-69
Figure 4-20 Waste burned along the road side Siribopura II .....	4-69
Figure 4-21 Bathing water contaminated with soap flow to the canal flow on back yard. ....	4-71
Figure 4-22 Grey water flow openly on the back yards of the houses Kapuwaththa II, Hambantota .....	4-72
Figure 4-23 Grey water flow through a poorly constructed drain and little kid play nearby, Mayurapura, Hambantota .....	4-72
Figure 4-24 Polluted canal adjacent to Nupawela flats due to waste water disposal .....	4-73
Figure 4-26 Constructed wetland in Kesbepana, Galle .....	4-73

Figure 4-25 Drain outs from constructed wetland Kesbepana .....	4-73
Figure 4-27 Constructed wetland at Mudiyansewaththa, Matara.....	4-74
Figure 4-28 structures covered with weeds in constructed wetland Mudiyansewaththa, Matara ..	4-74
Figure 4-29 Unsealed soakage pits in .....	4-75
Figure 4-30 Nearby canal and marshy land in Eluwila, Galle .....	4-75
Figure 4-31 Drainages blocked in Arahena Matara and Godadenikanda, Galle.....	4-75
Figure 4-32 Dust in road and sealed louvers.....	4-77
Figure 4-33 Road from TZUCHI village to Hambantota town.....	4-77
Figure 4-34 Internal roads and shades in TZUCHI village Hambantota.....	4-77
Figure 4-35 Small shops at houses to sell day to day goods at Rassandeniya Matara .....	4-83
Figure 4-36 Policeman was on duty for 24 hr at the Grama Niladari office and now not functioning at Rassandeniya, Matara.....	4-89

## List of Tables

Table 2.1 Summary of Environmental and Social factors for long term satisfaction .....	2-11
Table 2.2 Environment and Social factors for long term satisfaction of resettlement program.	2-13
Table 2.3 Number of resettlement sites based on the district.....	2-16
Table 2.4 Summary of Environmental and Social Policies and regulations applied for tsunami resettlement by different institutions.....	2-18
Table 2.5 Mandatory elements of the UDA housing guidelines for tsunami resettlement .....	2-20
Table 3.1 Total number of tsunami resettlement sites and surveyed sites in each district.....	3-24
Table 3.2 Environmental and Social Criteria, Sub criteria and Indicators for site selection .....	3-25
Table 3.3 Sample size .....	3-26
Table 3.4 Environmental and Social variables used to ascertain the level of satisfaction of beneficiaries .....	3-35
Table 3.5 Source of environmental and social factors identification for questionnaire survey	3-36
Table 4.1 Selected Tsunami Resettlement sites .....	4-38
Table 4.2 Settlement planning requirement by UDA.....	4-58
Table 4.3 Design tools for urban physical quality enhancement .....	4-61
Table 4.4 Water storage facility of resettlement sites .....	4-63
Table 4.5 Solid waste management methods of surveyed tsunami resettlement sites .....	4-67
Table 4.6 NHDA Guidelines for parking requirements .....	4-78
Table 4.7 Approximate distance to the institutions from the resettlement sites.....	4-79
Table 4.8 Settlement planning requirements by the UDA .....	4-86
Table 4.9 Satisfaction Level of Environment Factors.....	4-96
Table 4.10 Satisfaction level of social factors.....	4-97

## List of Graphs

Graph 4-1 Average Household size .....	4-42
Graph 4-2 Level of Satisfaction of Dwelling Size .....	4-43
Graph 4-3 Level of Satisfactions of Light and Ventilation .....	4-45
Graph 4-4 Level of Satisfactions for Noise.....	4-47
Graph 4-5 Level of Satisfaction of Interior design .....	4-48
Graph 4-6 Level of Satisfaction of Fire and Other safety facilities .....	4-51
Graph 4-7 Level of satisfaction of Building quality .....	4-53
Graph 4-8 Level of satisfaction of Completion house .....	4-55
Graph 4-9 Level of overall satisfaction of Dwelling.....	4-56
Graph 4-10 Level of satisfaction of Site Selection .....	4-57
Graph 4-11 Level of satisfaction for layout of the property.....	4-59
Graph 4-12 Level of satisfaction for Landscaping.....	4-61
Graph 4-13 Level of Satisfaction for Water Supply .....	4-65
Graph 4-14 Level of Satisfaction for Electricity.....	4-66
Graph 4-15 Level of satisfaction for solid waste management .....	4-68
Graph 4-16 Level of satisfaction for waste water management.....	4-71
Graph 4-17 Level of satisfaction for Public transport.....	4-76
Graph 4-18 Level of satisfaction for Parking spaces .....	4-78
Graph 4-19 Level of satisfaction for education facilities .....	4-80
Graph 4-20 Level of Satisfaction of Hospital facilities.....	4-81
Graph 4-21 Level of Satisfaction of Shopping and other daily facilities .....	4-82
Graph 4-22 Level of Satisfaction of Facilities for religion practices .....	4-83
Graph 4-23 Level of Satisfaction for Average distance to administrative matter .....	4-84
Graph 4-24 Level of Satisfaction for Land tenure .....	4-85
Graph 4-25 Level of Satisfaction of Leisure and Sports facilities .....	4-87
Graph 4-26 Level of Satisfaction for Neighborhood safety .....	4-88
Graph 4-27 Level of satisfaction of privacy.....	4-90
Graph 4-28 Level of satisfaction for Time for family commitments .....	4-91
Graph 4-29 Level of satisfaction for community development programs .....	4-92
Graph 4-30 Level of satisfaction for Convenience to livelihood .....	4-93
Graph 4-31 Level of satisfaction of conflicts and social issues .....	4-94
Graph 4-32 Level of satisfaction for Participation for planning .....	4-96
Graph 4-33 Ownership and willing to sell or rent houses .....	4-98
Graph 4-34 Percentage of abandoned houses from total number of houses .....	4-99

# 1 CHAPTER INTRODUCTION

## 1.1 Background of the Research

Dislocation of people from their usual habitats or income sources for any reason merely known as resettlement. Resettlement transpired voluntarily where re-settlers move by their desire or involuntarily; transfers by an external force such as by an administration law. Natural disasters, development projects, and conflicts are the most common causes of involuntary resettlement. In the case of natural disasters if the land is no longer hospitable to the human settlement people has to move from the area. Land acquisition can be taken place for some development projects such as dam development, highways. The Syrian mass migration during 2015 is a noble example for resettlement due to conflicts.

Resettlement had been a subject commonly deliberated for the last three decades in Sri Lanka due to; mass resettlement aftermath the tsunami disaster in December 2004, the big infrastructure projects (mainly water resources development) such as Mahaweli Development Project and war between Sri Lanka and LTTE. The conversation has generally centered around various impacts on re-settlers, with a particular focus on socioeconomic hardships. The critics of resettlement projects usually argue that relocation creates tremendous negative effects on communities as well as the micro-economy of the area. Whatever the cause of the displacement, some level of service provision is required to normalize and restore peoples' lives and to put in place sustainable solutions – to compensate for losses, address vulnerabilities and rebuild lives and livelihoods

Tsunami involuntary resettlement program in the years of 2005- 2006 was the largest ever involuntary resettlement program took place in Sri Lanka due to a natural disaster. Thirteen districts, out of twenty five districts were affected due to the disaster. 65% of the total coastal belt of the country were affected. Nearly 38 000 were dead, and 21 500 were injured, and 5000 people were missing. A number of housing units destroyed are 60 000, and 40 000 housing was partially destroyed, which were located in the coastal area of the country. Most of the tsunami-affected people in Sri Lanka were fishermen who lived on the coastal belt or on shore, and they were recognized as a marginalized group by socially and economically. A heap of financial, material and human aids from other countries, local and international organizations were flown to the country right after the devastation, according to the reports that were more than enough to rebuild the affected communities. However, the question rises that did we grab the opportunity after reviewing the place where affected people stand.

## **1.2 Problem Statement**

Dias et al. 2016 said that the rebuilding of new, permanent housing structures was completed successfully after the tsunami disaster; the issue is whether the community is satisfied with the resettlement programmes and whether they will inhabit the housing in the long term.

By a background study, it was observed that real state and economic considerations were paid more attention in the research arena of the resettlement subject although environmental, and associated social aspects were less considered. Neglected environmental factors during the planning, implementation and practicing became severe problems in the long term and arose as social issues and make resettled people vulnerable in different means and finally rejection of the resettlement sites by the beneficiaries. By the research, the attempt was given to capture the environmental and social considerations that have to be focused on future resettlement programs to make beneficiaries long term satisfied.

## **1.3 Rational of the Study**

The study is conducted to identify and understand the real ground situation of the tsunami resettlement site more than a decade of the disaster nature and magnitude of environmental and related social and physical problems of resettlement of low-cost housing schemes in Sri Lanka. As in past studies, environmental, social and physical issues are interrelated, and they can lead to unsatisfaction of re-settlers and causes conflicts in social, political, economic and many other areas and finally abandoned of dwellings. The study also attempts to highlight aspects which would lead to satisfaction/ dissatisfaction of recipients of the houses by a comprehensive study of past projects, researches, and field visits. Policy and planning gaps will study by appraising what have planned and what have implemented and practicing.

### **1.3.1 Objectives of the Study**

- To review the policy frameworks and planning aspects in providing resettlement options, especially related to environmental and social planning.
- To conduct in-depth studies to review the resettlement housing plans to highlight what considerations that have gone into the planning and implementation of environmental and social elements of each selected scheme.
- To study the level of satisfaction of the re-settlers after relocation with what they have received in respect of environment and social infrastructure and associated facilities.

## **1.4 Methodology**

Through a comprehensive literature survey and preliminary field observation; the factors that cause to long term satisfaction or dissatisfaction of an involuntary resettlement program were identified. Policies and regulations that were applied at the time of planning, implementation, and practicing

of the resettlement programs were studied through a series of interviews with officers who were involved at the time of resettlement. Level of satisfaction of the identified social and environmental factors, was examined and what are the policies and regulations went into the ground level and in which magnitude, were studied through a semi structured questionnaire survey. Data were analysed to find out the deviation from what have planned and what have been implemented for each selected site.

## 2 CHAPTER LITERATURE REVIEW

### 2.1 What is Resettlement?

Resettlement term is described in different ways by different agencies, but basically, resettlement is the movement of populations from one place to another other than their usual residence by force or voluntarily. This movement can be either national or international and permanent or in some cases they can return to their original places. During the past two decades, millions of people worldwide have been compelled to move from their homes. The physical relocation is only one of the most significant results in the resettlement process moreover it involves with multidimensional phenomena (WCD Thematic Review., 2000). Resettlement in the other hand provides a multisided opportunity for the reconstruction of systems of production and human settlements that represent a development in the standards of life of those affected, as well as the regional economy of which they are a part (Perera et al., 2013). Also, resettlement becomes an opportunity to address the needs of vulnerable populations and to engage in poverty reduction and land use planning to restore the balance that should be struck between human settlements and attributes of the natural environment. (Populations at risk., 2011).

Resettlement in bank terminology covers all direct economic and social losses resulting from land taking and restriction of access together with the consequent compensatory and remedial measures. Resettlement is not restrict to its usual meaning, physical relocation. Resettlement can be depending on the case include;

- a) Acquisition of land and physical structures on the land including businesses
- b) Economic rehabilitation of displaced persons to improve (or at last restore) incomes and living standards (Involuntary Resettlement Source Book, World Bank., 2004)

**Displaced person:** according to Involuntary resettlement source book.,2004 displaced person define as ‘person who are affected in any of the ways of relocation or loss of shelter, loss of assets or access to assets, loss of income sources or means of livelihood, whether or not the affected persons must move to location’.

### 2.2 Types of Resettlement

Resettlement can be classified in multiple ways; basically there are two types of resettlement; “Voluntary Resettlement” and “Involuntary Resettlement”.

#### 2.2.1 Voluntary Resettlement

Movement of people from their usual residence to another area with their own free will is voluntary resettlement. Fine examples for this phenomenon are rural-urban migration and transmigration programs organized by governments. This movement can be national or international; this can be

temporary or permanent, and as well there may have the opportunity of returning. This kind of resettlements frequently inspires the growth of the economy (ADB., 1995; Sherbinin., 2010). People involved in this type of movements are dynamic, more initiative and they are the willingness to take a risk and pursue new opportunities and challenges (ADB, 1995).

### **2.2.2 Involuntary Resettlement.**

Movement of a population by force, from their original place to another place by an external shock is known as displacement. Resettlement is a response to displacement or involuntary movement (Fernando et al., 2010). The external force that creates population move can be a natural or man-made disaster, a development project or a conflict. This movement can be either national or international and most of the time movement is permanent though some possibilities of returning might exist in some instants. This movement can be directly planned by the government or private developer and an area for resettlement has been chosen by after the discussion of the affected population or not. Resettlement can also involve the payment of compensation to affected people. (Sherbinin., 2010, Fernando et al., 2010). Three main phenomena that cause involuntary resettlement of large population are;

1. Disaster induced involuntary resettlement
2. Development induced involuntary resettlement
3. Conflicts induced involuntary resettlement

Other than that persecution due to ethnic or religious differences, also identified as a cause of involuntary resettlement. (Muggah., 2000).

#### **2.2.2.1 Disaster induced Involuntary Resettlement**

The World Bank, GFDRR., 2011 state that —Disasters are the result of the overlapping in time and space, of a natural phenomenon of certain intensity—that is, a *hazard*—with a population exposed to its impact. A natural phenomenon cannot be considered as a hazard unless it is analyzed in a socioeconomic context where its occurrence can affect society. This context also influences the level of susceptibility to damage—that is, *vulnerability*—to a particular hazard. When a disaster affects two areas with different socioeconomic and environmental contexts, the level of damage depends on these differences. Thus, the probability of its impact are defined as the product of two factors- the level of the hazard and the degree of vulnerability – which together constitute risk. There are slow-onset natural disasters like droughts where, there is a time to plan displacement, and there are rapid-onset natural disasters like hurricanes, tsunami and floods there is no time to plan or organize. In that case, damage is great and it can be even greater if there are no prior adopted regulations for actions in post-disaster period.

### **2.2.2.2 Development induced Involuntary Resettlement**

ADB., 1995 said that —Any development project that introduces significant changes in the pattern of use of land, water, or other natural resources might entail some adverse impacts on people who are currently using such resources and associated economic, social, cultural and religious facilities. There is a vast diversity of development projects that cause significant changes in the utilized environment by the project. Dams construction for hydropower generation or irrigation, construction or expansion of towns or ports, construction of highways, railways, irrigation canals are examples of development projects that may cause resettlement of people. According to WCD Thematic review., 2000, nearly 40 – 80 million people have been displaced by force worldwide due to reservoir constructions, and it is considered as the most significant negative impact of large water resources development projects. However, these development projects may be significant in regional or national development to achieve long term development goals. Therefore it states that resettlement should take place when it is unavoidable (ADB., 1995).

Many of these projects may be crucial importance to local, regional and national development. However they may also give rise to conflicts between long-term national development goals and interests of communities and individuals who are immediate and adversely affected. (ADB., 1995)

### **2.2.2.3 Conflict induced Involuntary Resettlement**

According to 1951 convention relating to refugees, A refugee is any person who —owing to well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion, is outside the country of his nationality and is unable, or owing to such fear, is unwilling to avail himself of the protection of that country; or who, not having a nationality and being outside the country of his former habitual residence as a result of such events, is unable or, owing to such fear, is unwilling to return to it (United Nation High Commissioner for Refugees (UNHCR) Resettlement Handbook., 2011).

According to United Nations High Commissioner for Refugees records (<http://www.unhcr.org>); The detailed study, which tracks forced displacement worldwide based on data from governments, partner agencies, and UNHCR’s reporting, found a total 65.3 million people were displaced at the end of 2015, compared to 59.5 million just 12 months earlier.

### **2.2.2.4 Broad comparison of types of involuntary resettlement**

In case of development-induced resettlement drop of livelihood is low than other types of involuntary resettlement because the administration and affecting people have time to plan evacuation and remove assets. Also in development induced displacement vulnerability of affected people define by predetermine criteria and ability to move back to the original place is zero. In disaster-induced involuntary resettlement drop of livelihood is very high and loss of common

property can be taken place. There might not be time to plan and organize evacuation; also changes in the usual environment can occur. In some cases, there is a possibility of return back to original places and in some cases the environment may no longer hospitable for the living or use of land for residential or commercial to people might be prohibited by law. Same as disaster-induced displacement, conflict-induced displacement in most of the cases there is no time to plan or organize the evacuation. But they might have the possibility of move back. The vulnerability of affected people is high in disaster-induced and conflict-induced resettlement in some hand than development induced resettlement

### **2.3 Impacts of Resettlement**

Resettlement is a multidimensional phenomenon, and physical relocation of people is only one of the most dominant outcome. However, the resettlement process is predominantly focussed on physical relocation of people rather than on economic and social development of negatively affected people. (WCD Thematic Review., 2000). According to the Correa et al., 2011 relocating a population, its economic activities and social networks as well as its natural physical built environment is a complex process with significant impacts direct and indirect on the society and on government. As stated on WCD Thematic review., 2000 and ADB., 1995 displacement causes severe social, economic and environmental stresses that lead to physiological, psychological, socio-cultural, economic and ecological damages. Homes abandoned, production systems are dismantled, and productive assets and income sources are lost especially in the cases of displacement to the environments where their skills may be less applicable, competition for the resources increase with the host population, well established kinship ties and social networks can be broken or weakened are some adverse impacts of resettlement. (ADB., 1995) Therefore the ultimate objective of the resettlement has to be improving the standards of living condition of the people, counterbalance these disabilities.

Certain groups 'especially indigenous people, children, elderly and women are more vulnerable to displacement induced impoverishment risks. Displacement involves not only the physical eviction from dwelling, but also the expropriation of productive lands and other assets to make possible an alternative use (Cernea., 2000). Affected peoples' are those who stands to lose, as a consequences of the project, all or part of their physical and non- tangible assets, including homes; communities; productive lands; resources such as forests, rangelands, fishing areas, or important cultural sites; commercial properties; tenancy; income-earning opportunities; and social and cultural networks and activities (ADB 1998a). Affected People may also, include —host communities when a large population is displaced onto the land of smaller existing (host) population. Rehabilitation refers to restoring the incomes, livelihoods and social systems of the displaced communities to at least the level of their pre-project status. (Downing, 2002).

Impacts on displaced population; Carnea 1997 has developed a risk and reconstruction model for resettling displaced population in the case of Involuntary Resettlement. This model emphasizes that the main (though not the only) risk is the impoverishment of the persons displaced and it defines eight ways that impoverishment comes about in a resettlement process. Scudder, 1986 indicates that the effects of displacement are severe as to cause multidimensional distress manifested at the physiological, psychological and sociocultural levels. Carnea, 1999 analyzed how the magnitude of the impacts of displacement may vary depending on the objective and subjective conditions of the population.

- Impacts on territory
- Impacts on the population that will continue living at the site
- Impacts on host population (Populations at risk, Correa et al., 2011)

As well as Smith, 2001 observed resettlement as a multisided opportunity for the reconstruction of systems of a population and human settlements that represent a development in the standards of life of those affected, in the regional economy of which they are apart. Therefore resettlement must be development oriented; hence planning must take account social and physical infrastructure development, school and health services, access to employment opportunities, housing plots allotment and dwelling must meet expanded needs. At the same time, it has to minimize the risk of impoverishment of displaced community by means of joblessness, landlessness, homelessness, marginalization, food insecurity, increased morbidity, and mortality, loss of access to common property and services and social disarticulation. Hence following three key elements should link with involuntary resettlement, compensation for lost assets, livelihoods, income and assistance for relocation including the provision of relocation sites with appropriate facilities and services and support for rehabilitation to achieve at least same level of well-being. (Perera, 2013 and Carnea, 2000).

If the resettlement is unavoidable, the authorities should protect the lives and welfare of displaced people, reduce and redress the loss of economic potential incurred by the affected people, local and regional economies and assist in developing the economic, social and cultural potential of displaced people and communities. In the absence of appropriate development measures for compensation, resettlement, and rehabilitation it may cause severe long-term hardship, impoverishment, and even decimation of affected communities, adversely affected host communities and lead to severe environment damage (ADB., 1995).

According to Correa et al., 2011 Resettlement is an opportunity to address the needs of the vulnerable population to engage in poverty reduction and land use planning to restore the balance that should be struck between human settlements and attributes of the natural environment. If

housing is not tailored to peoples 'characteristics or needs or if they cannot continue to pursue their productive activities they will refuse to move or may abandoned the new housing site.

A poorly planned and executed resettlement program can lead to social economic and cultural disasters even more severe than the natural disaster risks it is intended to prevent. Resettlement may impact not only the population being displaced but also the population that will continue living at the site, the host population, and the territory. It is essential to identify such potential impacts so that measures can be designed to manage those (Populations at risk, Correa et al., 2011). The involuntary resettlement caused by development projects, especially in developing countries has been criticized since 1980 s as an additional cause of impoverishment of the poor population. Despite current failures in planning and implementation of projects that involve involuntary resettlements, however the long-term consequence of resettlement are not early predicted nor perceived (Manatunge et al., 2013).

As Badri et al., 2006 and Vijekumara et al., 2016 state that well planned and managed resettlement processes can produce positive long-term development outcomes and conversely if it is poorly planned it will create a significant adverse impact on not only to affected communities but also on the host community. Vulnerability refers to the capacity of an individual or group of anticipate, cope with resist and recover from the impact of a natural hazard and is composed of a variety of factors that determine the degree to which lives and livelihoods are put at risk by such events (Blaikie et al., 1994). Cuny., 1983 and Askry, 1989., categorized vulnerability of affected people in three broad aspects, first physical or material vulnerability (Ex: land, health, technology, housing, infrastructure). The second type is the social or organizational vulnerability that is inequalities and institutional capacities, and the third one is the motivational or attitudinal vulnerability. According to Patricia, 2000, different populations have different levels of vulnerabilities.

As well as resettlement program should improve the resilience of the community, International Federation of Red Cross and Red Crescent Societies (IFRC) defines as the capacity to survive, adapt and recover from a natural disaster. Therefore resettlement had identified as one of essential action that could be taken at a natural disaster when making community resilience. (Danar & Pushpalal., 2014).

## **2.4 The fact of Satisfaction**

Many researchers, studies, and projects identified many factors that cause success and failure of a resettlement program. Smith., 2001 state three factors are crucial in determining the success or failure of resettlement project based on a study in Turkey. They are the physical environment of the new settlement, relationship to the old village and capability of community develops itself. According to Involuntary Resettlement Large Dam experiences, 2000; for success resettlement;

- Public agencies are typically limited in their capacity to handle the resettlement and obtaining the cooperation of other public agencies that are needed to make resettlement success.
- Genuine country commitment to doing resettlement well is the key to success
- Planning and implementation have to be recognizing as tools that essential for improved management.
- Adequate resource allocation both during and after construction period.
- Economic rehabilitation
- Compensation must be adequate and timely

However, the success or failure of a particular resettlement program is balanced on the satisfaction of the resettled community. According to the viewpoint of Davidson et al. (2007), community satisfaction is essential in post-disaster resettlements to obtain the long-term involvement of the communities in rebuilding their socio-economic lives. According to the argument of Ophiynadri (2011), community-based resettlement programmes create community satisfaction, and community satisfaction leads to a sense of ownership which is beneficial in building disaster resilient communities. Tas et al. (2007) have categorized the long-term satisfaction of people in permanent housing reconstruction into three broad categories, and under each category, they have explained the indicators for long-term satisfaction. The three broad categories for permanent satisfaction of people in housing resettlement are; residential satisfaction, satisfaction with social conditions and satisfaction with physical and natural conditions. These arguments justify that the satisfaction of the community in resettled houses is paramount to ensure the sustainability and the success of post-disaster housing reconstruction project. To achieve long-term success of a resettlement project, it is crucial to identify factors that cause satisfaction and dissatisfaction and need to address them by it's all the means on correct stages of the resettlement process..

## **2.5 Identification of environmental and social factors that causes satisfaction of displaced people**

As state by Dias et al., 2016 reconstruction of a house does not solve the housing issue, it is vital to look into the indicators which can convert a house into a home and the surrounding environment into a neighborhood. There are a numbers of factors that create success or failure of resettlement projects, such as economic, social, environmental, cultural, political, etc.

Post-tsunami housing in Sri Lanka was designed considering the physical structures only rather than addressing the emotional and psychological requirements of the disaster-affected communities (Perera et al. 2013). Perera et al. 2013 further state that it is essential to provide the feel of home in post-disaster reconstruction to ensure community satisfaction. It was observed during the literature survey that environmental consideration in the resettlement program was given very minimum attention with the comparison of other aspects such as development and

economic. In sustainable development, environmental aspect is essential and neglecting of environmental factors at the policy, planning, implementation and practicing stages of resettlement program can be risen as severe social issues which lead to rejection of resettlement program by the beneficiaries.

The housing must meet physical needs (including practical building systems and building materials), as well as social and aesthetic needs (thus respecting the culture of the affected population) on a local scale if it is going to deliver sustainability. With this approach to decision making, end-user satisfaction, environmental protection, and disaster mitigation can be provided and achieved. It must also recognize the end user as active stakeholders, aware and conscious of their own needs and wants, rather than as passive recipients, who need to be educated.

Following are selected environmental and social factors that determine the satisfaction of resettled beneficiaries, identified through a comprehensive local and international literature survey, expert consultation and preliminary site visits. Factors were ground truth concerning to Sri Lankan context by a detailed questionnaire survey.

**Table 2.1 Summary of Environmental and Social factors for long term satisfaction**

No	Factor	Finding of different author
<b>Environment factors</b>		
1	Dwelling size	Nearly all agencies used a standard design blueprint which did not take account of variations in household size or occupants needs (Shaw, J., & Ahmed, I. (2010)).
2	Lighting and ventilation	In the hot humid climate of Sri Lanka, natural ventilation and passive cooling is necessary for basic thermal comfort. (Shaw, J., & Ahmed, I. (2010)).
3	Noise	Identified as an important factor during the initial field visits.
4	Interior design	Allowing the community to design their houses by themselves is a factor for long-term satisfaction (Perera et al., 2013) Transfer the responsibility to the people in housing reconstruction (Takesada et al., 2008) Owner-driven approach shows a higher satisfaction score compared to donor-driven approach (Karunasena and Rameezdeen, 2010) Housing design is a key factor for long-term satisfaction (Steinberg, 2007) Residential satisfaction is determined by the sub-conditions of pavements, width of streets, safety perception, residence aesthetics and aesthetics of the housing (Tas et al., 2007) Beneficiaries have stated that the type of houses (design) is important for community satisfaction (Kennedy et al, 2008)
5	Fire and other safety facilities	Identified as an important factor during the initial field visits.
6	Building quality	Maintaining the relevant housing standards in housing construction is an important to ensure long-term community satisfaction. (Kennedy et al. (2008) )
7	Level of completion of house	Identified as an important factor during the initial field visits.
8	Site Selection	Location of the house has scored a higher score (Karunasena and Rameezdeen, 2010)

		<p>Selection of a proper location for the house is a key factor (Steinberg, 2007)</p> <p>Selection of an appropriate site for the settlement is the most crucially important factor contributing to success. (Perera, 2013)</p> <p>Selecting suitable location for the displaced communities linked with rebuilding the livelihoods of people As the community revealed, if the selected site does not facilitate the continuation of their livelihood, the location should have potential to provide new livelihoods for the people in affected communities. (Dias et al, 2016).</p>
9	Layout of the Property	<p>It is important to plan and design a village rather than just constructing a set of houses, further specifying the resettled area should provide a socio-economic infrastructure along with the feeling of being a “neighbourhood”. (Steinberg, 2007)</p> <p>“Putting houses in place” should be embedded within local social relations (Ruwanpura, 2009).</p>
10	Landscaping	<p>The physical and natural conditions for housing satisfaction are the order of buildings in relation to the vicinity (creation of neighbourhood) green areas, the relationship between building and nature, walking paths, urban furniture, appearance of the buildings, garden organisation, parking lots, environmental cleanliness, landscape, street lightning, noise level and drinking water (Tas et al, 2007)</p>
11	Water Supply	<p>It was reported that water supply problem was a factor in the decision of some households to vacate their houses,. (Shaw, J., &amp; Ahmed, I. (2010)).</p>
12	Electricity	<p>Perera et al, (2013) state that basic amenities and facilities, such as electricity should be provided at the same time as people are resettled.</p>
13	Solid waste Management	<p>Identified during the initial field visits as a crucial factor that creates tremendous negative impacts.</p>
14	Waste water Management	<p>Lack of drainage facilities is cited as one of the main problems in new resettlement, especially in the Southern province. This mainly due to poor planning. (Gunawardhane &amp; Wickramasinghe, 2007).</p>
<b>Social factors</b>		
15	Public transport	<p>Identified as an important factor during the initial field visits</p>
16	Parking space	<p>Identified as an important factor during the initial field visits</p>
17	Social infrastructure	<p>Provision of facilities such as temples, mosques, churches in the close proximity is another crucial factor for long-term satisfaction (Perera et al., 2013)</p> <p>Provision of social infrastructure is long-term success factor (Steinberg, 2007)</p>
18	Leisure and sport facilities	<p>Dias et al (2016) has identified an indicator for long-term community satisfaction, creation of spaces for social gatherings and functions. As informed by community members, the apartment blocks constructed for people do not have any kind of social gathering places. As a result, people who live on upper floors have faced difficulties such as dealing with a funeral function in their own houses, since no elevator or public space were provided on the ground floor. The residents had to carry the coffins by themselves to the upper floors. This is a very sensitive situation where the people have already lost their loved one and damage to the dead body is regarded as disrespectful to the relatives who recently left them. (Dias et al, 2016)</p>
19	Neighborhood safety	<p>It is important to plan and design a village rather than just constructing set of houses, should provide neighbourhood feeling for the people (Steinberg, 2007)</p>

		Relevant authorities should have a mechanism to identify the social relations and interactions in the previous settlement (Ruwanpura, 2009)
20	Privacy	Identified as an important factor during the initial field visits
21	Time for family commitments	Identified as an important factor during the initial field visits
22	Community development program	Identified as an important factor during the initial field visits
23	<b>Convenience to Livelihood</b>	Wickramasinghe & Gunawardhena (2007) reveal by the study “post tsunami interventions to provide housing, restore livelihoods and improve wellbeing have not fully achieved the intended objectives due to reasons such as poor planning and targeting.
24	<b>Beneficiaries participation to planning of resettlement</b>	Engagement of the communities is one of the most important factors to ensure long-term community satisfaction Allowing the community to design their houses by themselves (Perera et al., 2013) Transfer the responsibility to the people in housing reconstruction (Takesada et al., 2008) Incorporating community within the post-disaster reconstruction process is vital in order to ensure the satisfaction of the community (Johnson et al., 2006) Community can manipulate, inform, consult, collaborate and empower, where in the last category the community have more power to control the reconstruction project (Davidson et al., 2007) Owner-driven projects are more successful than donor-driven projects (Karunasena and Rameezdeen, 2010) Long-term satisfaction of people in housing resettlements is associated with the community empowerment (Steinberg, 2007) Engagement of communities for the post disaster housing reconstruction is important for long term community satisfaction. (Kennedy et al, 2008)
25	<b>Land tenure</b>	Key factor for long-term satisfaction is the provision of deeds to the community (Perera, 2013) Clearance of the land and property ownership as soon as the people are relocated is an indicator that affect the long term satisfaction of resettlers. (Steinberg., 2007)
26	<b>Conflicts and Social Issues</b>	Identified as an important factor during the initial field visits

As shown on the above table, based on an in-depth literature review below factors were considered for the primary data collection. However, Noise, Fire and other safety facilities, Level of completion of the house, Public transport, Parking space, Privacy, Time for family commitments, Community development program and Conflicts and Social Issues factors were identified as critical environmental and social factors during the field visits and discussions with experts.

**Table 2.2 Environment and Social factors for long term satisfaction of resettlement program**

<b>Environmental factors</b>	<b>Social factors</b>
<b>Dwelling</b>	<b>Infrastructure Facilities</b>
Dwelling size	Public transport
Lighting and ventilation	Parking space
Noise	Education facilities
Interior design	Hospital facilities
Fire and other safety facilities	Shopping and other daily facilities
Building quality	Facilities for religion practices

Level of completion of house	Average distance to admin matters
<b>Surrounding Environment</b>	<b>Leisure and Neighborhood</b>
Site Selection	Leisure and sport facilities
Layout of the Property	Neighborhood safety
Landscaping	Privacy
<b>Services</b>	Time for family commitments
Water Supply	Community development program
Electricity	<b>Convenience to Livelihood</b>
Solid waste Management	<b>Beneficiaries participation to planning of resettlement</b>
Waste water Management	<b>Land tenure</b>
	<b>Conflicts and Social Issues</b>

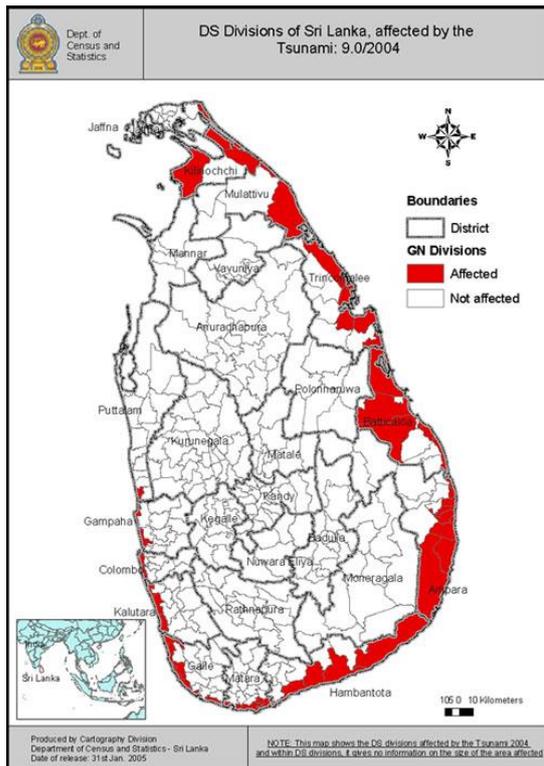
## 2.6 Resettlement Experiences in Sri Lanka

Displacement and resettlement issues have surfaced in the recent past of the country because of three phenomena that have had a significant impact.

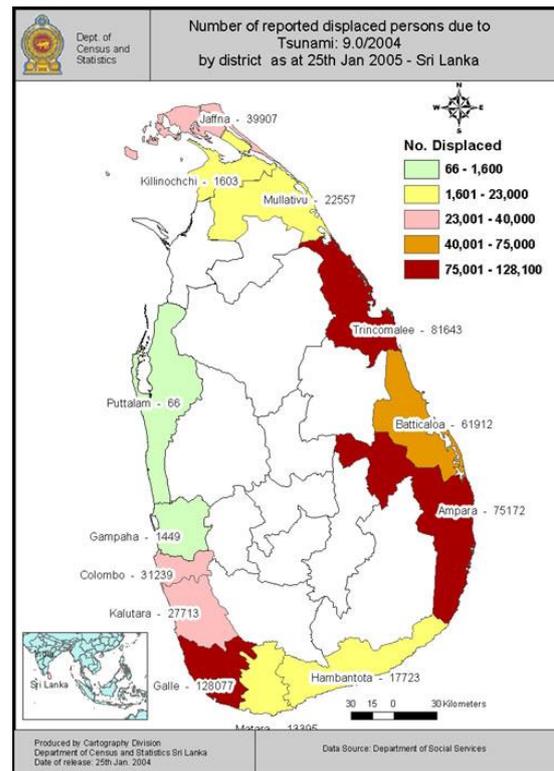
- Tsunami 2004
- Large infrastructure projects (mainly irrigation, power and transport)
- The war between the government of Sri Lanka and Liberation Tigers of Tamil Elam (LTTE)

## 2.7 Tsunami 2004 in Sri Lanka

On 26th December in the year 2004, a massive offshore earthquake which is the world's fifth-largest quake in a century had happened about 1500 km away near Northern Sumatra. The magnitude of the earthquake is 9.00 on Richter scale, and it is recorded as the largest earthquake in the sea. In terms of the dead and missing numbers, Sri Lanka's toll was second only to Indonesia. Most of the infrastructure on the coastline was damaged including houses, railway lines, telecommunication networks, water and electricity supplies, schools and hospitals. It had been identified that more than 98,000 permanent houses needed to be rebuilt (Reconstruction and Development Agency., 2006). Sri Lanka experiences periodic droughts, floods, landslides and occasionally cyclones especially in eastern coast however never suffers a tsunami or any other natural disaster in this scale in the recent history.



**Figure 2-2 DSDs of Sri Lanka affected by tsunami 2004**



**Figure 2-1 Number of reported displaced people due to tsunami, by district**

### 2.7.1 Resettlement process in tsunami 2004 Sri Lanka

As stated above more than 98,000 permanent houses were rebuilt for affected people by the tsunami. According to the Reconstruction and Development Agency (2006), rehabilitation took place in three phases. The first phase was the establishment of emergency shelters there were provided immediately after the disaster, these were tents, school buildings, temples and church with basic supply of food, water and sanitation. The second phase was the provision of temporary wooden houses, with two or three unfinished rooms without a kitchen and private sanitary facilities but with common water and sanitary facilities. The third phase was the provision of permanent houses with 46.5m<sup>2</sup> floor area. A feature of this policy was —house for house| even large extended families who had previously lived together was entitled to receive only one new house irrespective of how big their former house had been (Wickramasinghe and Gunawardhane, 2007).

Two main housing assistant schemes were adopted to provide houses, Owner Driven programs, and Donor Driven programs. In owner driven programs funds were directly supplied to the householders and they are responsible to repairing or rebuilding the houses. This was applied to the houses with minor damages in or outside buffer zone. The method is known as In-situ resettlement where affected people can resettle at the same place where they were live before the

disaster. Occupants with severely damaged houses were selected for the donor-driven programs. Households were resettled in a new place and houses build by donors.

**Table 2.3 Number of resettlement sites based on the district**

<b>District</b>	<b>Number of Sites</b>	<b>District</b>	<b>Number of Sites</b>
Ampara	40	Kalutara	54
Bataloa	32	Kilinochchi	16
Colombo	12	Matar	56
Galle	95	Mullativu	3
Gampaha	6	Puttalam	0
Hambantota	54	Tricomalee	63
Jaffna	54	Total	485

### **2.7.2 Policies, Regulations and Institutional Framework of Involuntary Resettlement in Sri Lanka**

At the time of Tsunami disaster in the year 2004 Sri Lanka did not have a policy or institutional framework that can be readily adapted to manage large scale resettlement program like this and had to develop from the bottom. Sri Lankan government was contracted tsunami resettlement reconstruction to several local and international organizations while government is retaining the responsibility of policy development, coordination, and supervision of the resettlement process (Shaw & Ahmed., 2010).

As a mandatory to the Coast Conservation Act, Coast Conservation Department which is the authorized department for coastal management and conservation, required to develop a Coastal Zone Management Plan (CZMP) for every 5 years. The Coastal Zone Management plan emphasizes the need for integrated Coastal Zone Management to conserve, develop, and use unsustainable manner the resources in the coastal region (Nayanananda., 2007). A 300 m no build zone regulation was established by the CZMP, however never strictly enforced. Within weeks after the tsunami, the government of Sri Lanka declared a buffer zone with heavy restrictions on building or rebuilding within 200 m of the high tide mark in the eastern coast considering the tsunami and frequent cyclone impact in those areas and 100 m restriction in rest of the areas. The regulation strictly adhered.

In Sri Lanka the population density in coastal areas is high due to the reason of livelihood and commercial activities are concentrated in those areas, including major cities. According to 2001 census; Population of Grama Niladari divisions along the coastal boundaries of Sri Lanka is 870 505. (Population data of some of the coastal GNDs were not available) (Census and Statistic Department., Sri Lanka). According to Nayanananda., 2007 the GDP of the coastal region in 2004 was 44 percent of the national GDP. This value is about 4 percent higher than the estimation of GDP in 1989 indicating an increasing trend.

Due to the newly enforced buffer zone policy, coastal belt lands were restricted for resettle the affected people. Therefore it was a challenging task to government and donor agencies to find suitable lands to affected people that can accommodate their expectation. Due to these reasons buffer zone policy was soften; people in undamaged and slightly damages houses were allowed to remain in the buffer zone, and allowing commercial building such as hotels to rebuilt in the restricted areas, at the end of 2005, 200 m and 100m setbacks were not strictly enforced. The revision to buffer zone was announced publicly on October 2005, however some of local authorities applied the policy until March 2006 due to unawareness of the policy amendment.

In the immediate aftermath of the tsunami, the ministry of Public security, Law and Order set up an operation centre, Centre for National Operations (CNO), to handle the response, and the Secretary to Ministry was appointed as the Commissioner General of Essential Services to oversee coordination of government agencies involved in rescue and relief. Government of Sri Lanka appointed three Task Force for Rebuilding the Nation (TAFREN), Task Force for Logistics, Law and Order (TAFLOL) and the Tsunami Housing and Resettlement Unit (THRU) under the Ministry of Urban Development and Water Supply in year 2005 to coordinate the Resettlement Housing Program (RHP)., (Jayasuriya et al., 2006 and Shaw and Ahmed 2010). Following the presidential election in 2005 November both were replaced by the Reconstruction and Development Agency (RADA). (Latter 2007 June it was absorbed in to the Ministry of Nation Building and Estate Infrastructure Development (MNBEID)). At the local level, the key role in disaster relief was played by the District Secretaries and below them Divisional Secretary and Grama niladari. Government of Sri Lanka signed MoUs with various donors to constructed houses however the responsibility for land identification and acquisition, development of design regulations, planning approvals, inspection of building work, and installation of power, water and sewage services were retaining with the government. As state by Jayasuriya et al 2006., and Manatunga et al., 2013, At the district level, disaster management authorities were appointment to coordinate local relief efforts. According to the interviews with government officials the exact relationship between central and local levels was often unclear- with constraints on the ability of the local authorities to make meaningful decisions.

### Site selection

Site selection was a critical issue at the time of post tsunami period, due to sudden land shortage that can accommodate affected coastal population. Divisional secretariat division was the authorized government body to select a suitable land. After the selection the land was given to donor agencies for rebuilding. Shawn and Ahmad., 2010 observed that site selection was a critical issue in the time of tsunami resettlement due to the land scarcity in the densely populated coastal regions in the southwest and east, also lagoons and marshy lands in the coastal regions, which make the land, is unsuitable for resettlement.

Beneficiary selection

Beneficiary selection was done by Grama Niladari, the government appointed village administrator and list had to approved by the Divisional Secretariat officials. At the time of post tsunami reconstruction most of the implementing agencies reported that beneficiary lists were not made available until construction was well advanced or even completed, thereby precluding verification of the number and identify of occupants, and preventing them from undertaking preliminary needs assessments and community consultation

Table 2.4 shows a summary of environmental and social policies and regulations established by different authorities in Sri Lanka that were applied in the tsunami resettlement.

**Table 2.4 Summary of Environmental and Social Policies and regulations applied for tsunami resettlement by different institutions**

<b>Policies and Regulations applied</b>	<b>NHDA Policy</b>	<b>UDA Policy</b>	<b>N P P D</b>	<b>CE A Policy</b>	<b>CCD Policy</b>	<b>Municipal councils and Local Authorities policies</b>	<b>CE B Policies</b>	<b>NWS &amp; DB Policies</b>
Site selection	Buffer Zone Policy	UDA decelerated area			Buffer Zone Policy			
	Environmental Legislation			CE A Policy				
Planning of settlement	Plot size and coverage		N P P D					
	Roads and parking requirements					Municipal councils and Local Authorities policies		
	Means of evacuation							
Service providence	Drinking Water supply							NWS & DB Policies
	Electricity service						CEB Policies	
	Telecommunication service						CEB Policies	
	Waste water disposal							NWS & DB

(Domestic and storm water)	Policies
Solid waste management	Municipal councils and Local Authorities policies
NHDA – National Housing Development Authority	UDA – Urban Development Authority
NPPD – National Physical Planning Department	CEA – Central Environment Authority
CCD – Coast Conservation Department	CEB – Ceylon Electricity Board
NWS & DB – National Water Supply and Drainage Board	

### National Involuntary Resettlement Policy

The National Involuntary Resettlement Policy (NIRP) was formulated with substantial support from international funding agencies such as Asian Development Bank, and came in to effect through a cabinet approval in year 2001. The objective of the policy is on involuntary resettlement due to public and private sector development projects covering land acquisition and resettlement to safeguard that people are not negatively affected and are able to restore their living standards and integrate into their new environments. (Godamunne., 2013).

### National Housing Development Authority

National Housing Development Authority (NHDA) is incorporated by Act No 17 of 1979. The Authority is under Ministry of Housing and construction and governed by the Chairman and the Board of Directors appointed by the Hon. Minister of Housing and Construction. This authority is responsible for planning and implementation of state interventions in housing sector.

### National Housing Development Guideline

As state on National Housing Development Authority guidelines; the local community involved in the housing reconstruction at the grass– root level is not familiar with the intricacies of design and constructing disaster resistance housing and at the same time, donor sponsored international experts who are here to assist the reconstruction are unaware on the local regulatory, statutory, planning and design requirements as well as the availability of building materials, technology and appropriate standards..

With the guidance of Ministry of Housing & Construction, National Housing Development Authority had formulated a guideline to be used by the housing developers specially when construction of houses in the disaster-prone coastal belt of Sri Lanka. Formulation of NHDA Guideline was initiated after the tsunami disaster and was published on year 2005 November. As the principal facilitator in the housing sector, the NHDA has come forward to shoulder the responsibility of helping the affected people to re-create their living environment in an

environmentally sustainable and socially responsive manner. Such an intervention will help mitigate the negative consequences of large-scale disasters in future”. (NHDA Guidelines., 2005).

According to the guideline followings are state as primary objectives:

- to cater to the needs of all categories of actors involved in the post-tsunami re- housing endeavours within the coastal belt.
- the need to address other, more frequent natural disasters such as cyclones and floods is also recognized As an initial step, the disaster-resistance issues that primarily affect the coastal belt of Sri Lanka, is given high priority. (NHDA Guidelines, 2005)

Policy and regulation section of this study mainly considered NHDA guidelines due to the reasons of it is a general document which highlights the policies and regulations by other departments and it was formulated with the main focus of tsunami resettlement housing development. However other policies and regulations were considered where applicable.

#### Urban Development Authority Policies

As the leading planning authority of the urban areas it was mandatory to obtain UDA development permit to engage in any building constructed within the areas of UDA jurisdiction. However this function often delegated to the local authorities under the areas of UDA jurisdiction. Urban Development Authority was established by the LAW, No. 41 of 1978 and dedicated for promote integrated planning and implementation of economic, social and physical development of certain declared areas. By the Act No 2 of 1980 Urban Development Project (Special Provisions), —when the President, upon a recommendation made by the Minister in charge of the subject of urban development, is of opinion that any particular land is, or land in any area, urgently required for the purpose of carrying out an urban development project which would meet the just requirements of the general welfare of the people, the president may by order published in the Gazette, declare that such land is, or lands in such area as may be specified are, required for such purposes. In thin study it was refer as —UDA specific areas.

**Table 2.5 Mandatory elements of the UDA housing guidelines for tsunami resettlement**

<b>Item</b>	<b>Guidelines</b>
Houses size	46.5 m <sup>2</sup> (min) (500 sq ft)
Minimum room requirement	506m <sup>2</sup> in areas without piped water supply and sewerage 152m <sup>2</sup> in areas with piped water supply and sewerage
Minimum room size	Two bedrooms, living room, internal kitchen and latrine
Minimum room height	Living, bedroom and kitchen 2.8m; bathroom, lavatory, porch, balcony, terrace and garage 2.2m
Land coverage	Housing 65% (max), common area 10% (min), roads, drains etc 20% (min), social infrastructure 5% (min)
Setbacks	1m in front, 2.3m at rear for one-two story houses, 1m in front, 3m at rear for three storey houses; for three + storey houses rear setback determined by 63.50 angle between bottom or rear wall and window top level on top floor; applicable for minimum road width of 3m in front.

Roads	For four lots 3m road width (min) with drain on one side For eight lots 4.5m road (min) with drain on one side For 20 lots 6.0m road (min) with drain in one side For >20 lots 9.0m road (min) with drains and pavements on both sides (max length of road 50-100m; minimum setback in front of houses 1m; internal path should be provided after four adjacent lots)
Parking	Parking space 2.4 ×4.8m (min); 1 parking space for each housing unit for houses>200m <sup>2</sup> ; parking requirements vary according to the size of apartment blocks. Eg; up to 50m <sup>2</sup> apartments one parking space for three apartments; for >200m <sup>2</sup> apartments one parking for each apartment or three for two apartments.

### National Physical Planning Department

To object of promoting and regulating integrated planning of economic, social, physical and environmental aspects of land in Sri Lanka; to provide for the protection of natural amenities, the conservation of natural environment, buildings of architectural and historic interest and places of natural beauty; to facilitate the acquisition of land for the purpose of giving effect to such plan and to provide for matters incidental to or connected with the matters aforesaid National Physical Planning Department was established in year 2000 by amending —Town and country planning Ordinance No 13 of 1946; Town and country planning (Amendment) Act No 49 of 2000.

As state on the NHDA guidelines key functions of the National Physical Planning Department are;

- i. Preparation and updating of national physical plan, regional plans and local plans
- ii. Design of house types for housing schemes and housing estates
- iii. Preparation of layout plans for housing and supervision of housing schemes
- iv. Preparation of comprehensive re-development schemes
- v. Development of new-towns

### Central Environment Authority

The Central Environmental Authority (CEA) was established in August 1981 under the provision of the National Environmental Act No:47 of 1980. The Ministry of Environment and Natural Resources (ME&NR) which was established in December 2001 has the overall responsibility in the affairs of the CEA with the objective of integrating environmental considerations in the development process of the country. The CEA was given wider regulatory powers under the National Environment (Amendment) Acts No:56 of 1988 and No:53 of 2000.

### Sri Lanka Land Reclamation and Development Corporation (SLLR&DC)

Permission from the SLLR&DC is required for the construction in any area declared as marsh land or wetland.

### Coast Conservation Department

Coast conservation Act defines the —coastal zone and divided to two major areas; reservation area and restricted area. Other than the coast protection infrastructure no permanent development is allowed in reservation area and limited development is allowed in restricted area with the permission of Coast Conservation Department.

Other than that The Ceylon Electricity Board (CEB) is a corporate body established in terms of Parliament No.17 of 1969 as the successor to the Department of Government Electrical Undertakings. It is a national institution charged with the responsibility of generating, transmitting and distributing electrical energy to reach all categories of consumers nationwide. The National Water Supply Drainage Board (NWS&DB), which presently functions under the Ministry of Urban Development, Water Supply & Drainage is the principal authority providing safe drinking water and facilitating the provision of sanitation in Sri Lanka. In accordance with the NWS&DB Act, a number of major Urban Water Supply Schemes operated by Local Authorities were taken over by the NWS&DB to provide more coverage and improved service. The legal provisions carry rules and regulations that are relevant to housing activities in their respective areas of Municipal council and Local Authorities.

## **2.8 Other Resettlement Policies and Regulations**

### **2.8.1 World Bank Resettlement Policy**

#### Policy Objectives

Involuntary resettlement may cause severe long-term hardship, impoverishment, and environmental damage unless appropriate measures are carefully planned and carried out. For these reasons, the overall objectives of the Bank's policy on involuntary resettlement are the following:

- a) Involuntary resettlement should be avoided where feasible, or minimized, exploring all viable alternative project designs.
- b) Where it is not feasible to avoid resettlement, resettlement activities should be conceived and executed as sustainable development programs, providing sufficient investment resources to enable the persons displaced by the project to share in project benefits. Displaced persons should be meaningfully consulted and should have opportunities to participate in planning and implementing resettlement programs.
- c) Displaced persons should be assisted in their efforts to improve their livelihoods and standards of living or at least to restore them, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher

This policy covers direct economic and social impacts that both result from Bank-assisted investment projects and are caused by;

- a) the involuntary taking of land resulting in

- a. relocation or loss of shelter;
  - b. lost of assets or access to assets; or
  - c. loss of income sources or means of livelihood, whether or not the affected persons must move to another location; or Operational Manual - OP 4.12 - Involuntary Resettlement
- b) the involuntary restriction of access to legally designated parks and protected areas resulting in adverse impacts on the livelihoods of the displaced persons (World Bank., 2001)

### **2.8.2 Asian Development Bank Involuntary Resettlement Policy**

ADB's Policy on Involuntary Resettlement was adopted in 1995 and became operational in January 1996. The Policy requires that involuntary resettlement be an integral part of project design, dealt with from the earliest stages of the project cycle.

The Policy aims to:

- avoid involuntary resettlement wherever feasible
- Minimize resettlement where population displacement is unavoidable by exploring all viable project options.

If, nonetheless, individuals or communities must lose their land, means of livelihood, social support systems, or way of life they should be:

- compensated for lost assets and loss of income and livelihood
- assisted for relocation
- assisted so that their economic and social future will generally be at least as favourable with the project as without it
- provided with appropriate land, housing, infrastructure, and other compensation, comparable to the without-project situation
- fully informed and closely consulted on resettlement and compensation options

(ADB., 1995)

### 3 CHAPTER RESEARCH METHODOLOGY

#### 3.1 Site selection methodology

There are 485 tsunami resettlement sites scattered in 12 districts in Sri Lanka. In the year 2006, a comprehensive survey was conducted by the University of Moratuwa, titled —Rapid Environmental Assessment (REA) on Tsunami Permanent Housing Sites in Sri Lanka which covered 409 sites. Galle, Matara, and Hambantota districts were selected for the study considering the severity of Tsunami impact, the scale of resettlement programs and easy accessibility. Sites which have 20 or more houses were selected for the study due to the reason of that some guidelines such as UDA guidelines are only applied for sites which have houses equal or more than 20. Only the projects implemented under the donor-driven program were selected to avoid any impacts due to different modes of implementation on the outcomes of resettlement (Ratnayake & Rameezdeen, 2008; Thiruppugazh, 2011; Dwayne Barenstein, 2012). Predetermined criteria developed from past studies and preliminary site visits were used for the site selection from the database of —Rapid Environmental Assessment (REA) on Tsunami Permanent Housing Sites in Sri Lanka survey.

**Table 3.1 Total number of tsunami resettlement sites and surveyed sites in each district**

<b>Provinces</b>	<b>Districts</b>	<b>Total no of resettlement sites in the district</b>	<b>No of surveyed resettlement sites in the District By university of Moratuwa - 2008</b>
Western Province	Colombo	12	11
	Gampaha	6	6
	Kalutara	54	52
Southern Province	Galle	95	91
	Hambantota	54	54
	Matara	56	53
Eastern Province	Ampara	40	38
	Trincomalee	63	21
	Batticaloa	32	16
Northern Province	Jaffna	54	50
	Kilinochchi	16	14
	Mulativu	3	3
	<b>Total</b>	<b>485</b>	<b>409</b>

Source: “Rapid Environmental Assessment (REA) on Tsunami Permanent Housing Sites in Sri Lanka” survey by University of Moratuwa

#### 3.2 Criteria for site selection

The criteria are developed based on past studies and preliminary site visits. The weighting values of the environmental and social factors were decided based on the severity of the impact on the wellbeing of beneficiaries as observed during field visits and based on literature review. Other than that exceptional cases were selected for the study.

**Table 3.2 Environmental and Social Criteria, Sub criteria and Indicators for site selection**

Criteria	Sub Criteria	Indicators	Weight	Weight Distribution	
75	Environmental	Environmental Sensitivity	If the site located near to highly environmental sensitive area	15	15
		Water supply system	If site does not have a sustainable water supply at all	15	15
	If the site has sustainable water supply but does not have adequate quantity of drinking water?			5	
	If the site has sustainable water supply but quality of water not acceptable level?			5	
	Solid waste management system	If site has poor solid waste management system	15	15	
	Waste water management	If site has poor wastewater discharge mechanism	15	5	
		If the ground water table high while no proper waste water management system		5	
		If the site do not have properly constructed drainage canal		5	
	Soil erosion	If there is soil erosion on access roads	10	5	
		If soil erosion only during heavy rains		5	
If there is sever soil erosion			10		
Greenery	If site does not have proper greenery?	2	2		
Road condition	If site does not have properly constructed roads?	3	3		
25	Social	Host Community	If the surrounding community not consult?	5	2
		Ethnic/ Religion composition	If the site does not have similar ethnic/ religion composition		1
	Compatibility with livelihood composition		If the site does not compatible in livelihood composition		2
	Convenience to livelihood	If the site located far away from sea/ work place	10	10	
		If the site does not have Proper transport/ public transport			
Access to social infrastructure	If the site does not provide easy access to social infrastructure?	10	10		
		If the site does not have Proper transport/ public transport			
<b>Total</b>			<b>100</b>		

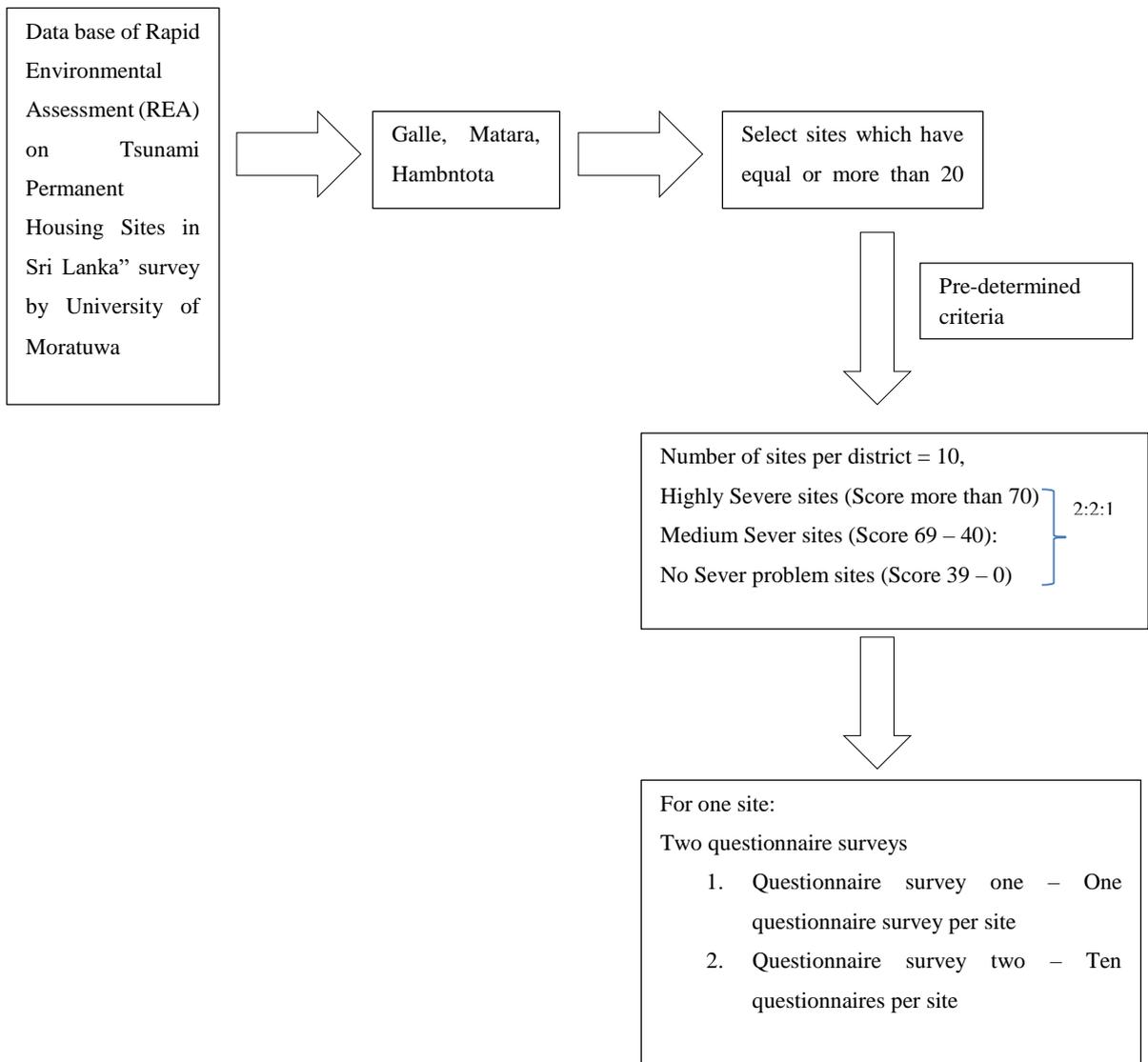
Using above mentioned weighing system 10 sites was selected per district from Galle, Matara and Hambantota districts. Sites were selected according to following proportionate;

- Highly Severe sites (Score more than 70) : Medium Sever sites (Score 69 – 40): No Sever problem sites (Score 39 – 0) = 2: 2: 1

For one selected site two separate questionnaire surveys were carried out. In the questionnaire survey one, one questionnaire was filled for one selected site and in the questionnaire survey two ten randomly selected recipients were interviewed.

**Table 3.3 Sample size**

District	Number of Sites	Questionnaire Survey one	Questionnaire Survey two
Galle	4	4 (one per one site)	40
Matara	10	10	100
Hambantota	10	10	100
Total	24	24	240



**Figure 3-1 Graphical illustration of the summary of field survey methodology for study**

### 3.3 Data collection methodology

The goal of the first three objectives of the study are, (i) review the policies and regulation applied, (ii) understanding on the real ground situation and (iii) study the level of satisfaction of the beneficiaries.

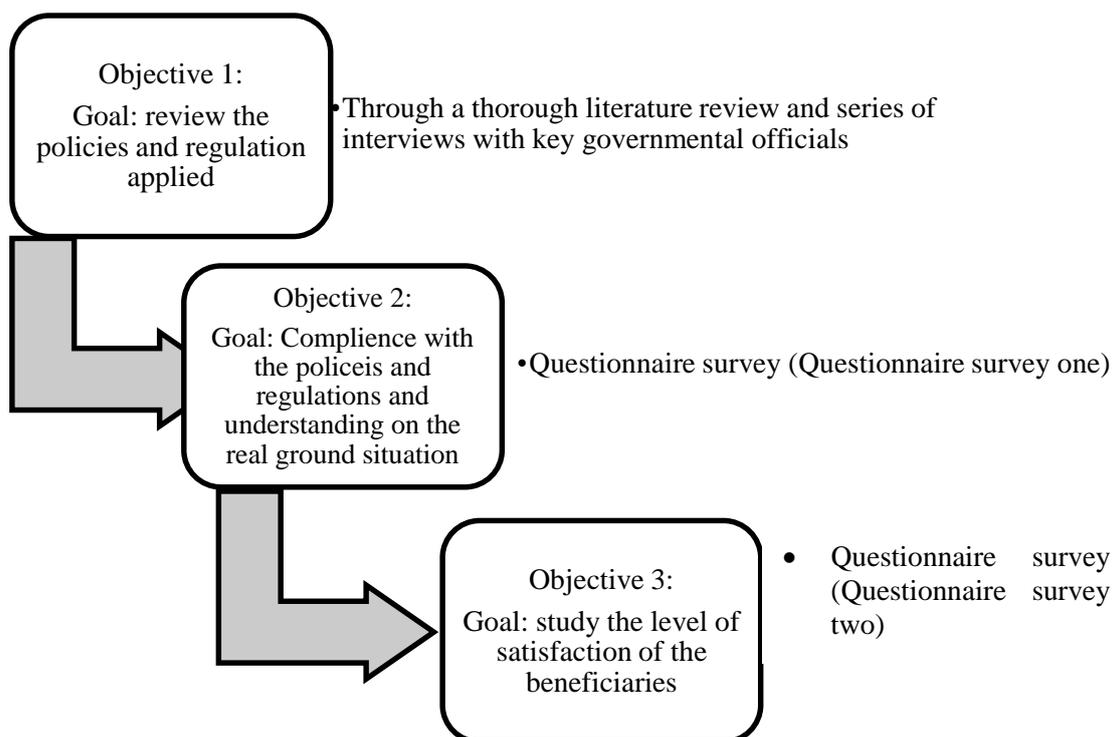


Figure 3-2 Graphical presentation of Methodology

### 3.4 Methodology for objective one

**Objective 1:** To review the existing practices, policy frameworks, and planning aspects in providing resettlement options, especially related to environmental and social planning.

Policies and regulations applied for considered planning, environmental and social factors were studied through a thorough literature review and series of interviews with key government officials who were involved in policy formulation, implementation of the resettlement programs at the time of post-tsunami were conducted.

### 3.5 Methodology for objective two

**Objective 2:** To conduct in-depth studies to review the resettlement housing plans to highlight what considerations that have gone into the planning and implementation of environmental and social elements of each selected scheme.

By the questionnaire survey one, the real ground situation of the sites was studied concerning environmental and social aspects. What are the policy and regulations that have gone into the planning, implementation, and practicing in the resettlement process were considered. One questionnaire was filled for one site by interviewing Grama Niladari (Village headman) or a community leader.

Below mention the facts that deliberated by the questionnaire which were developed by reviewing Policies and regulations, discussion with field expertise and preliminary site visits to find out the obesity or violence or the real ground situation of the tsunami resettlement sites.

## **1. Compliance with legislations**

### **I. Environmental legislations**

#### Does the site located

- i. 100m from the boundaries of or within any area declared under the National Heritage Wilderness Act No 4 of 1988
- ii. Within the distance of easily accessible from the site above mentioned (i) Forest.
- iii. Any area declared under the Botanic Gardens Ordinance (Chapter 446)
- iv. Within 100 meters from the boundaries of, or within, any area declared as a Sanctuary under the Fauna and Flora Protection Ordinance (Chapter 469)
- v. Within the distance of easily accessible from the site above mentioned (iv) Sanctuary.
- vi. Within a distance of one mile of the boundary of a National Reserve declared under the Fauna and Flora Protection Ordinance.
- vii. Within the distance of easily accessible from the site to above mentioned (vi) National Reserve.
- viii. Within the, 60 meters from the bank of a public stream as defined in the Crown Lands Ordinance (Chapter 454) and having width of more than 25 meters at any point of its course
- ix. Is there any endemic, endangered, threatened species available in that stream as endangered species listed in the red data book
- x. Any reservations beyond the full supply level of a reservoir
- xi. Natural wetland/ Marshy land / Lagoon availability
- xii. Less than 100m from the site to boundary of above mentioned ESA
- xiii. Within the frequently accessible distance more than 100m
- xiv. Any erodible area declared under the Soil Conservation Act (Chapter 450)
- xv. Any Flood Area declared under the Flood Protection Ordinance (Chapter 449)
- xvi. Any flood protection area declared under the Sri Lanka Land Reclamation and Development Corporation Act 15 of 1968 as amended by Act No 52 of 1982

- xvii. Any archaeological reserve, ancient or protected monument as defined or declared under the Antiquities Ordinance (Chapter 188).

**I. Planning Legislations**

- i. If the site is located in coastal zone,
  - a. Is the site located within the 300 m boundary landward from the mean high water line?
  - b. Entire site or part of the site do not located “Reserved area”
  
- ii. If the site is located in the “Restricted area”
  - a. Is the site located at least 3 m height from the mean high water line?
  - b. Dwelling housing unit or extended to dwelling housing unit, its floor area >139.35 m<sup>2</sup> and site is located in the coastal zone, Was it obtain a development permit from director- CCD at the construction stage?
  - c. Dwelling housing unit or extended to dwelling housing unit, its floor area <139.35 m<sup>2</sup> and site is located in the coastal zone, Was it obtain a development permit from Divisional Secretary at the construction stage?
  - d. If commercial structure likes grocery, shop, or boutique available in the site, it is floor area >32.51 m<sup>2</sup>, Was it obtain a development permit from director- CCD at the construction stage?
  - e. If commercial structure like grocery, shop, or boutique available in the site, its floor area <32.51 m<sup>2</sup> and site is located in the coastal zone, Was it obtain a development permit from Divisional Secretary at the construction stage?
  - f. Other any structure located in the site, Was it obtain a development permit from director- CCD at the construction stage?
  
- iii. Is the site located in area, which is demarcated for residential land use?
  
- iv. Floor Area of each and every housing unit more than 46.45 m<sup>2</sup>?
  
- v. Obtained preliminary planning clearance form L.A or UDA before proceed the construction?
  
- vi. From the total land utilize in the site,
  - a. Housing neighborhood facilities           =< 65%
  - b. Common area                                    >= 10%
  - c. Road street, Foot paths and drainage >= 10%
  - d. Social infrastructure                        >= 5%
  
- vii. Checking the plot sizes,
  - a. Is the project area declared as “Special Project” area?       (YES / NO)
  - b. If yes mention the minimum lot Size

- c. Plot size of individual dwelling in non-urban area,
  - d. Plot size urban area,
- viii. Recent building unit or units to the road, located at least 12.5 m behind from the center of the road?
  - a. Front Space from the street line to building line.  $\geq 1\text{ m}$  (3 ft)
  - b. Rear Space from the street line to building line.  $\geq 2.25\text{ m}$  (7' 6" ft)
- ix. Road size, drainage facilities and Pavement arrangement with number of lots.
  - a. Width of the road
  - b. Drainage
  - c. Pavement
  - d. Building line
  - e. Turning facilities
- x. Parking facilities availability
  - a. Parking bay size  $\geq 2.4 \times 4.8\text{ m}^2$
  - b. Parking bay per each housing unit

## 2. Service Providence

### I. Water supply

- i. What is the primary water source
- ii. If the water supply from NWS&DB connection or central water supply system
  - a. Pressure
  - b. Velocity
- iii. Water storage facilities and sufficiency of storage
- iv. Total water requirement  
(Average water consumption 140 Liters per person per day)
- v. Primary water supply system is sustainable?  
If not, what is the water scare period of the year?
- vi. Except primary water sources, what is the alternative source for emergency use or Special Use?
- vii. Water quality measurements visual observation
- viii. Is there any water recycling process in function individually or as central system in the site?

- ix. As water conservation practices wash water and Portable water two taps in use?
- x. In the site, is there any rain water harvesting program in function?
- xi. Harvesting rain water used for
- xii. If there is central rain water harvesting system for collect surface runoff at site,
  - a. Is there any water management plan for proper management of the water body?
  - b. Is it located in the place where every housing unit can get the visual and thermal advantages?
  - c. Standards of water quality of the tank meets,

## **II. Solid waste management**

- i. How to handle the solid waste generated at the site,
- ii. Is there a central solid waste recycling and composting project in function,
  - a. Average solid waste collection per day  
(0.3 kg per person per day/ 80% biodegradable & 20% no biodegradable)
- iii. If there is biogas generating plant,
- iv. Type of the biogas plant individual or central
- v. Amount and usage of Biogas generating from above any plant,
- vi. Is there any animal husbandry project or activity integrated to the biogas gas production?
- vii. Compost or sludge generated from biogas project use as soil conditioner and fertilizer for home gardening.

## **III. Waste water management**

- i. Is there any industry locating in the site as self-employment generating considerable amount of waste water?
- ii. What is the mechanism to handle domestic waste water (grey water)?
- iii. Will the grey water generating from the domestic and industrial water usage make an issue to the nearby Environmental Sensitive Area.
- iv. If the septic tank with anaerobic filter in use, method of Methane gas generating from the treatment process release,

## **IV. Sewage disposal mechanism**

- i. What is the sewage disposal mechanism
- ii. What is the average level of water table?

- iii. Any water pollution characteristics?
- iv. What is the size of soakage pit?
  - a. 0.6 dia X 2.4 m > Soakage Pit
  - b. 1m dia X 2.4 > Soakage Pit > 0.6 dia X 2.4 m
  - c. Soakage Pit > 1m dia X 2.4
- i. Is there any spilling of soakage pit at the rainy seasons of the year?  
If yes what are the remedial actions taken to control the situation.
- ii. Is there any central waste water treatment system applied for sewage treatment?
- iii. If there any above method is occupied, that treatment facility located 30 m or more than away from nearest building?

### 3. Physical features

#### I. Physical features of the site

##### Thermal Comfort and Greenery Maintenance

- i. In the site, majority of the housing units, Front open space equipped with Shady device like trees.
- ii. Buildings orientation
- iii. Outdoor shady environment rich in air circulation.
- iv. Outdoor shady environment enveloped and not properly circulation of air.
- v. When locating doors and windows of housing units, it was deeply concerned on wind direction and air circulation pattern, to allow proper air penetration through the housing unit.
- vi. Landscaping
- vii. Is there any program for greening or maintaining the green in the site? (E.g. tree planting programs)
- viii. Rain water harvesting vessel located at the difficult to shade facades of the
- ix. Housing unit.
- x. Material used for construct walls of housing units are,
- xi. Material used for construct door 7 windows of housing units are
- xii. Is there any option given in court yard of rear or front open to recharge ground water.
- xiii. Site boundary end up with the

##### Water Table and Flooding

- i. Flood frequency per year?
- ii. Rainfall intensity?
- iii. In Site drainage condition and capacity sufficient for handling storm water?

- iv. Out site drainage condition and capacity sufficient for handling storm water of the whole catchment area.
- v. High siltation causes to block the
  - a. In site drainage network
  - b. Out site drainage network
- vi. At the design stage of the drainage network, it was concern about the water load within the catchment area for handle storm water.
- vii. Is there any proper plan to maintain the drainage network?
- viii. Is there any mechanism to increase seepage water intensity?
- ix. Bottom surface of the drainage network porous?
- x. Porous surfaces in front of and rear side of the housing court yard?
- xi. Is there any water detention pond at the upside which can use for flood management?
- xii. Can rain water harvesting use as mechanism for flood control in

Slope stability

- i. Within the last resident period, is there any land slide reported in the site?
- ii. Is there any future potential of occurrence of landslide at the site?(If the thickness of the overburden is high and the direction of the slope of the layers is parallel to the direction of the slope, possibility of occurrence of landslide is high.)
- iii. Soil type
- iv. Are Slope and soil condition of the site creates severe soil erosion?(Slope should < 10%)

**4. Infrastructure**

**I. Distance to institutions**

- i. Approximate distance to the following institutions  
 School, Hospital, Govt. dispensary, Post office, Police station,  
 Religious place, market

**II. Road network**

- i. Road capacity or size satisfies the present traffic demand without occurring congestion?
- ii. Condition of the road is,
- iii. Distance to the public transport mode is tolerable (should be < 1km)?

- iv. Does the location of the site provide easy access to the majority to continue their livelihood patterns?
- v. Settlers using energy efficient transport mode?
- vi. Settlers encourage walking or using bicycle by providing shady pathways?  
If the site is located very much closer (within 50 m) to major road with heavy traffic, Is there any accident reported within last resident years of site?

## 5. Land use

### I. Previous land use type

- i. Land use before present land use of the site?
  - a) e.g. Natural undisturbed forest (Dry-mixed evergreen forest, thorn forest, lowland rain forest etc.), degraded forest/ vegetation, mangroves, sand dune, beach vegetation, thorn scrub, reverie forest, grassland, abandoned agricultural land, reclaimed land and other habitats, Others Specify
- ii. Is the site is located in a migration path? (Eg- Elephant Corridor or etc)
- iii. Is there any attack reported within last resident years of site from the wild life?
- iv. Is there any wild life like cobra, python roaming around the area?

### II. Natural resources consumption and energy usage

- i. What are the types of natural resource available within the easily accessible (walking distance) distance from the site?
- ii. What is the primary energy source use specially for cooking?
- iii. Is there any passive energy use as secondary energy source?
- iv. Is there any man made mini forest available for supply fuel wood to the community?

### III. Pesticide usage

- i. Any pesticides apply for the sites to control pests?
- ii. What are the land uses of the site adjacent lands?
- iii. Are there any agricultural activities which are applying weedicide or Pesticide at the adjacent land?
- iv. At the dry season, site is probable to occur soil erosion due to wind?

### IV. Self-employments and small scale industries

- i. What are the small/ medium scale industries locating in the site?
- ii. What is the raw materials use for the industry?
- iii. How to handle the solid waste generating from the industry?
- iv. How to handle the waste water generating from the industry?
- v. Are residents engage in self-employments of the site? (Explain)
  - a. What is the raw materials use?
  - b. How to handle the solid waste generate?
  - c. How to handle the waste water generate?

**6. Social factors**

**I. Conflicts**

- i. What are the common reasons to create conflicts between communities?
- ii. How frequently conflicts are occurred between inter community and with host community
- iii. What are the social networks maintain intra community and inter community within the site and neighborhood between the sites?
- iv. Is there any mechanism develop within the community to control the conflicts and ensure the social harmony?

**3.6 Methodology of objective three**

**Objective 3:** To study the level of satisfaction of the resettlers after relocation with what they have received in respect of the environment and social infrastructure and associated facilities.

A questionnaire survey (Questionnaire survey two) was conducted to achieving objective three. By the questionnaire survey two, the satisfactory level of the beneficiaries, after a decade of the disaster was measured by what they have received in respect of the environment and social infrastructure and associated facilities. By a thorough literature review, interviews with experts and preliminary survey following factors were selected as the most significant factors in environmental and social consideration. Ten recipients were chosen randomly from different parts of the site, ensuring the equal representation of both male and female and interviewed them. In this questionnaire interviewees were asked to rate the level of satisfaction of different environmental and social variables based on a typical five-level Likert scale.

1 – Strongly unsatisfied, 2 –Unsatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied

**Table 3.4 Environmental and Social variables used to ascertain the level of satisfaction of beneficiaries**

Environmental factors	Social factors
Dwelling	Infrastructure Facilities

Dwelling size	Public transport
Lighting and ventilation	Parking space
Noise	Education facilities
Interior design	Hospital facilities
Fire and other safety facilities	Shopping and other daily facilities
Building quality	Facilities for religion practices
Level of completion of house	Average distance to admin matters
<b>Surrounding Environment</b>	<b>Leisure and Neighborhood</b>
Site Selection	Leisure and sport facilities
Layout of the Property	Neighborhood safety
Landscaping	Privacy
<b>Services</b>	Time for family commitments
Water Supply	Community development program
Electricity	<b>Convenience to Livelihood</b>
Solid waste Management	<b>Beneficiaries participation to planning of resettlement</b>
Waste water Management	<b>Land tenure</b>
	<b>Conflicts and Social Issues</b>

**Table 3.5 Source of environmental and social factors identification for questionnaire survey**

<b>Factors</b>	<b>Identification</b>
Dwelling size, Lighting and ventilation, Interior design, Building quality, Site Selection, Layout of the Property, Landscaping, Water Supply, Electricity, Waste water Management, Social infrastructure, Leisure and sport facilities, Neighborhood safety, Convenience to Livelihood, Beneficiaries participation to planning of resettlement, Land tenure	In depth Literature review
Noise, Fire and other safety facilities, Level of completion of house, Public transport, Parking space, Privacy, Time for family commitments, Community development program, Conflicts and Social Issues	Factors were identified during the field visits and discussions with experts.

Other than that following information were collected;

1. Number of houses sold or rented and willingness to sell or rent
2. Number of abandoned houses in resettlement sites

### **3.7 Data analysing methodology**

Data were analyzed using Excel software.

### **3.7.1 Data analysing methodology - Questionnaire survey one**

By the questionnaire survey one, the real ground situation of the tsunami resettlement sites were studied and what are the policies and regulations that were implemented, practicing and violated in different sites were identified.

### **3.7.2 Data analysing methodology - Questionnaire survey two**

Beneficiaries level of satisfaction with regard to different environmental and social variables were identified.

## 4 CHAPTER RESULTS ANALYSIS AND DISCUSSION

In the year 2006, a comprehensive survey was conducted by the University of Moratuwa, Rapid Environmental Assessment (REA) on Tsunami Permanent Housing Sites in Sri Lanka which covered 409 sites out of total 485 sites. The study used an environmental checklist for assessing the suitability of sites for post-tsunami housing construction, which included physical, social, and biological/ecological features of the sites. The study was carried out to identify and understand the nature and magnitude of the environmental issues and to make necessary recommendations as mitigatory measures and to establish a spatial database that will enable long-term monitoring to ensure minimum adverse environmental impacts (UoM, 2006). As discussed in the chapter three, tsunami resettlement sites for this study were selected by predetermined criteria

### 4.1 Selected sites for survey

Out of 205 resettlement sites in Southern province 198 sites were surveyed by University of Moratuwa in the year 2006. Out of that 198, 24 tsunami resettlement sites were selected for this study using predetermined criteria for this study in the proportion of highly Severe sites (Score more than 70): Medium Sever sites (Score 69 – 40): No Sever problem sites (Score 39 – 0) = 2: 2: 1.

**Table 4.1 Selected Tsunami Resettlement sites**

<b>Distri ct</b>	<b>Severity</b>	<b>Site Name and Number</b>	<b>DSD or PS</b>	<b>Grama Niladari Division</b>	<b>Number of Houses</b>
Galle	Sever (Score more than 70)	Godadenikanda/ Walahanduawaththa (G1)	Akmeemana	Meegoda	27
		Karanketiya/ Walahanduawaththa (G2)	Akmeemana	Pilana	120
	Not Sever (Score 39 – 0)	Eluwila (Peragon Village) (G3)	Habaraduwa	Talpe	45
		Kesbepana (G4)	Habaraduwa	Unawatuna Central	51
Matar a	Sever (Score more than 70)	Pengiriwaththa, Rassandeniya (M1)	Matara	Rassandeniya	50
		Gramodayamandapaya I (M2)	Devinuwara	Thalalla	50
		Gramodayamandapaya II (M3)	Devinuwara	Thalalla	23
		Epitawaththa (M4)	Weligama	Thalaramba North	87
	Medium Sever (Score 69 – 40)	Mudiyansewaththa (M5)	Dickwella	Wategama	80
		Kandagodella (M6)	Devinuwara	Gandara West	24
		Arahena (M7)	Dickwella	Dodampahala East	35
		Narangahahena/ Kapugama (M8)	Devinuwara	Kapugama North	45

	Not Sever (Score 39 – 0)	Minikirula Temple Land (M9)	Dickwella		20
		Nupawela Flats (M10)	Matara	Nupe	64
Hamb antota	Sever (Score more than 70)	Kapuwaththa II (Hydramani) (H1)	Hambantota Pradeshiya Sabha		58
		Mayurapura (H2)	Hambantota Pradeshiya Sabha		79
		Siribopura I (TZUCHI Village) (H3)	Hambantota P.S.	Koholankala	674
		Siribopura II (H4)	Hambantota Pradeshiya Sabha	Koholankala	100
	Medium Sever (Score 69 – 40)	Kirinda New Town (H5)	Tissamaharama Pradeshiya Sabha	Kirinda	100
		Nidangalawella (H6)	Tissamaharama Pradeshiya Sabha	Kirinda	34
		Kapuwaththa III (Orit) (H7)	Hambantota P.S.		100
		Ruwinigama (H8)	Tangalle Pradeshiya Sabha	Nidahagama East	150
	Not Sever (Score 39 – 0)	Galmulla (H9)	Ambalantota	Hatagala	31
		Wellodaya (H10)	Tangalle Pradeshiya Sabha	Wellodaya	51

Sites were numbered only for the purpose of mapping.

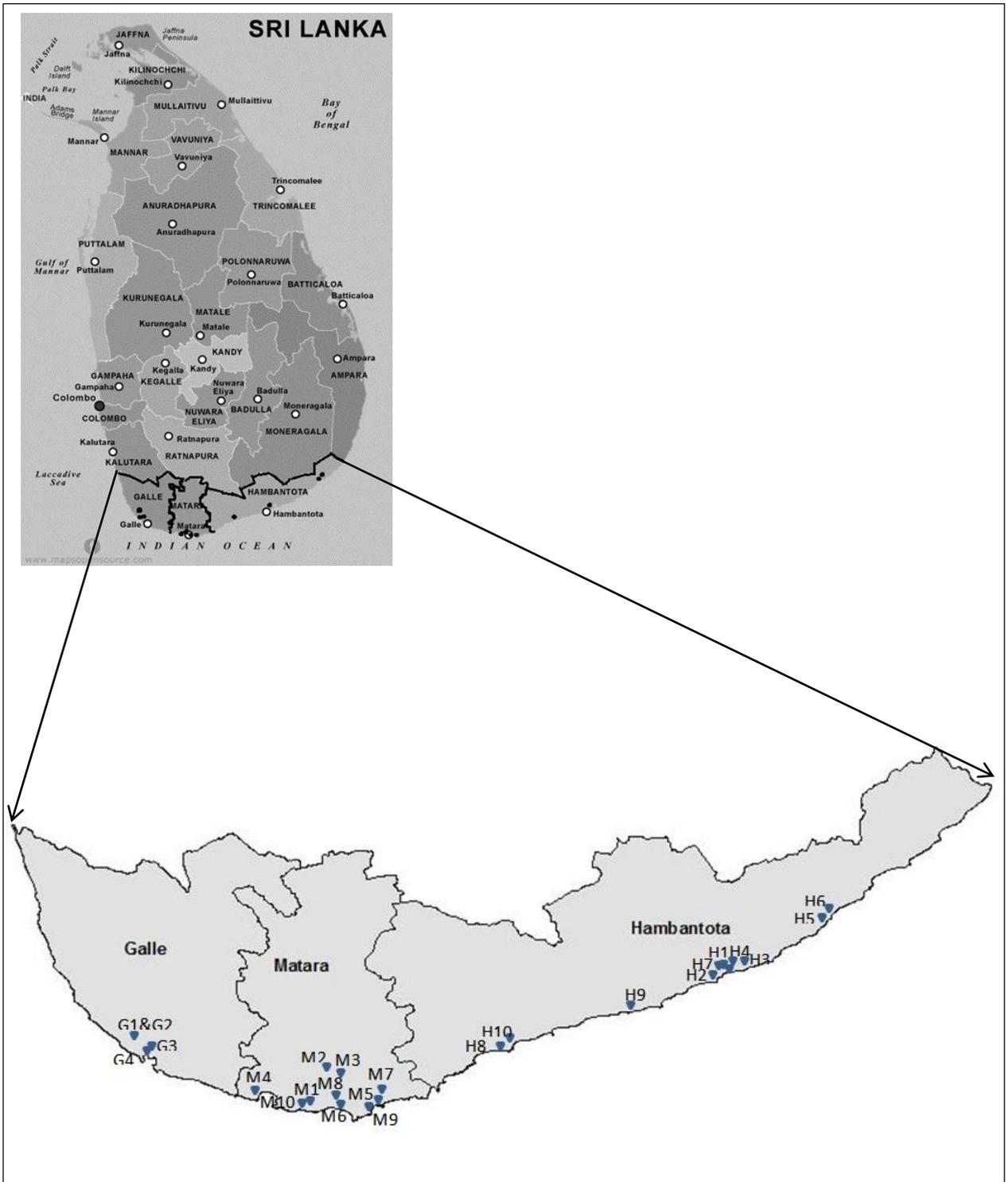


Figure 4-2 Site selected

## **4.2 Compliance with Legislations**

### **4.1.1 Compliance with legislation - Environmental**

None of the selected sites were located in 100m from boundaries of or within any area declared under the National Heritage Wilderness Act No 4 of 1988 or within the distance of easy access from the site. None of the sites situated in or adjacent to an area declared under Botanic Gardens Ordinance (Chapter 446) or within 100m from the boundaries of or within any area declared as a Sanctuary under the Fauna and Flora Protection Ordinance.

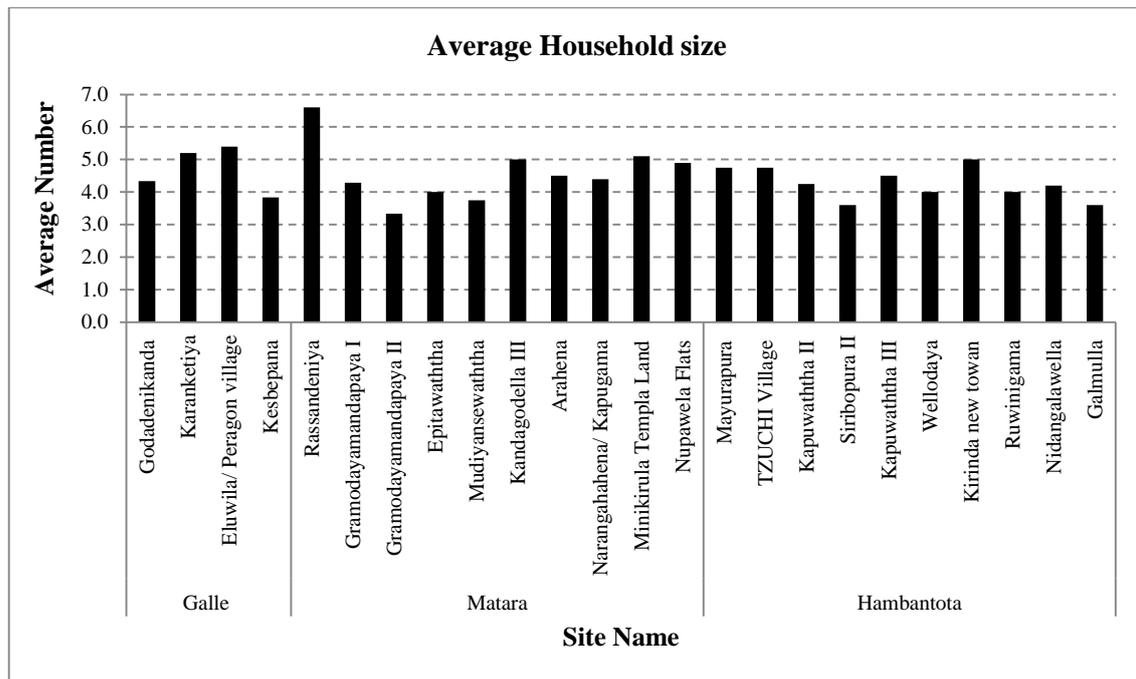
According to the survey result, a part of the Eluvila (Paragon Village) resettlement site was build upon developed land. Earlier it was a coconut husk submerged area. As well the land is adjacent to a marshy area which provides to ground for mangrove growths and some bird species. Resettlement site is in easy access to this marshy area and area is disturbed by encroachment and other human activities.

### **4.1.2 Compliance with Legislations - Site planning**

Tsunami resettlement site at Kirinda new town had violated the regulation of —site located within the 300 m boundary landward from the mean high water line of site planning regulations in NHDA guidelines. The livelihoods of the Kirinda resettlement sites tenants are mainly circled around —Kirinda temple. Kirinda temple is a well-known historical and religion place where thousands of pilgrims visiting yearly. Also it has high tourist attraction, especially for the nice beach and amazing view at the top of the Kirinda rock. According to the discussions with occupants and government officials in the area affected people who lived near Kirinda temple were reluctant to go another place other than in the close proximity to Kirinda temple where they were lived before the disaster in order to continue their previous livelihood. With high pressure from the affected community and relaxation of the buffer zone policy, government authorities were allowed to rebuild the houses at the same location. Other than that none of the selected tsunami resettlement sites are located on the coastal zone declared by Coast Conservation Department. According to the survey, all the sites were obtained preliminary planning clearance from the local authorities except all the four sites surveyed in Galle district. Four of selected housing units in Gall district did not obtain preliminary planning clearance form Local Authorities or UDA before proceeding the construction.

Rests of the factors were discussed under each respective topic in the order of, policy or regulations applied, real ground situation, and level of satisfaction.

### 4.3 Average Household size



Graph 4-1 Average Household size

Average household size of all the surveyed tsunami resettlement sites is 4.5 and, the highest average value is 6.6 in Rassandeniya, Matara district (Graph 4-1). In Galle district the highest average household size is 5.4 Eluwila tsunami resettlement site and in Hambantota highest is 5.0 in Kirinda New Town.

### 4.4 Level of Satisfaction of Environmental Factors

#### 4.1.3 Dwelling

##### 4.1.3.1 Dwelling size

###### 4.1.3.1.1 Policy and legislation for Dwelling size

According to the NHDA site planning regulations, minimum floor area of a dwelling unit must be 46.5 m<sup>2</sup> (NHDA., 2005).

Considering the floor area per person in surveyed tsunami resettlement sites;

Definition of Floor area per person;

Floor area per person defined as the median floor area (in square meters) of housing unit divided by the average household size. This indicator measures the adequacy of living space in dwelling. A low value for the indicator is a sign of overcrowding. (United Nations Population Division. 2000).

Calculation:

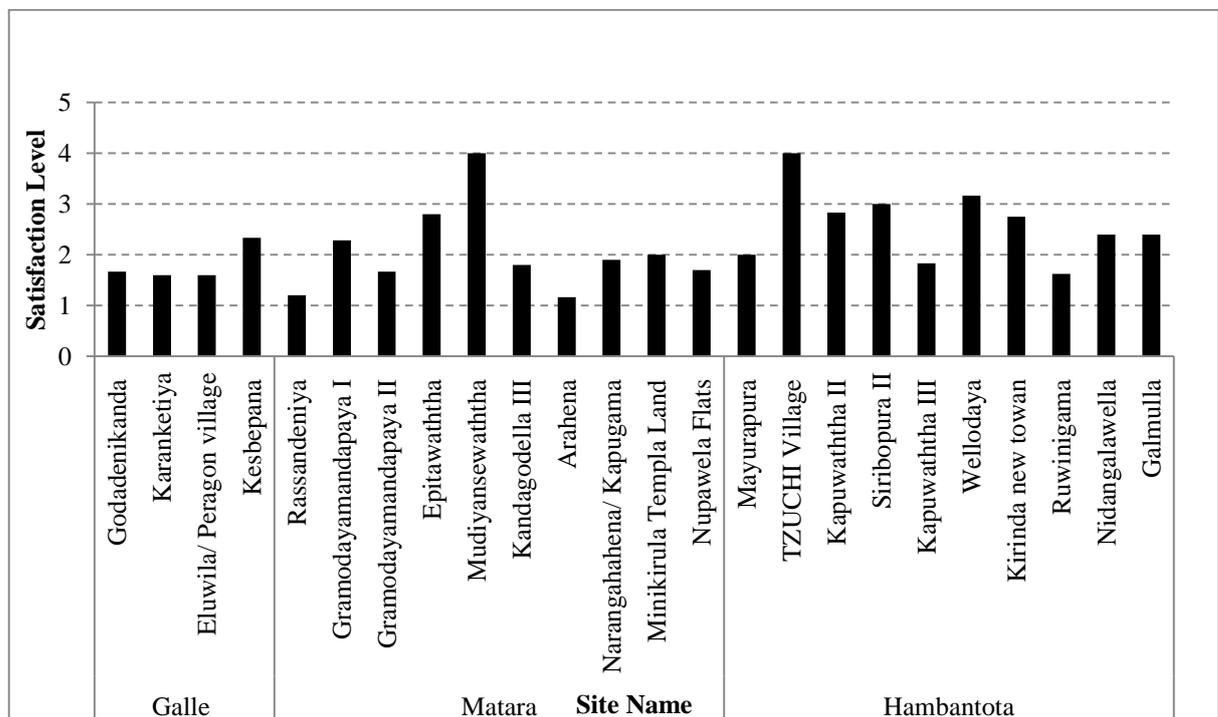
$$\text{Floor area per person} = \frac{\text{Floor area}}{\text{Household size}}$$

Floor area per person as an average of all the surveyed tsunami resettlement sites is 10.39 m<sup>2</sup> where in Galle it is 9.90 m<sup>2</sup>, Matara 10.13 m<sup>2</sup> and Hambantota 10.89 m<sup>2</sup>. As state by United Nations Population Division floor area per person is 20 m<sup>2</sup> or more in developed regions.

Floor area per person is one of the ten key housing indicators approved by the Commission on Human Settlement (UNCHS) to measure progress towards meeting the objectives of the Global Strategy for Shelter to the year 2000, adopted by the General Assembly in 1988 and by the Commission in 1995.

Adequate shelter means more than a roof over ones ‘head. It also means sufficient privacy, adequate space, physical accessibility, adequate security, including the security of tenure, structural stability, and durability, adequate lighting, heating and ventilation, adequate necessary infrastructure, such as water supply, sanitation and water management facilities (Commitments and the Global Plan of Action., 2003).

#### 4.1.3.1.2 Level of satisfaction: dwelling size



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

**Graph 4-2 Level of Satisfaction of Dwelling Size**

When it considering that floor area of the tsunami resettlement housing units, —Godadenikanda, Karanketiya, Eluwila, Kesbepanal sites floor area is low than 46.5m<sup>2</sup>. As presented on the graph

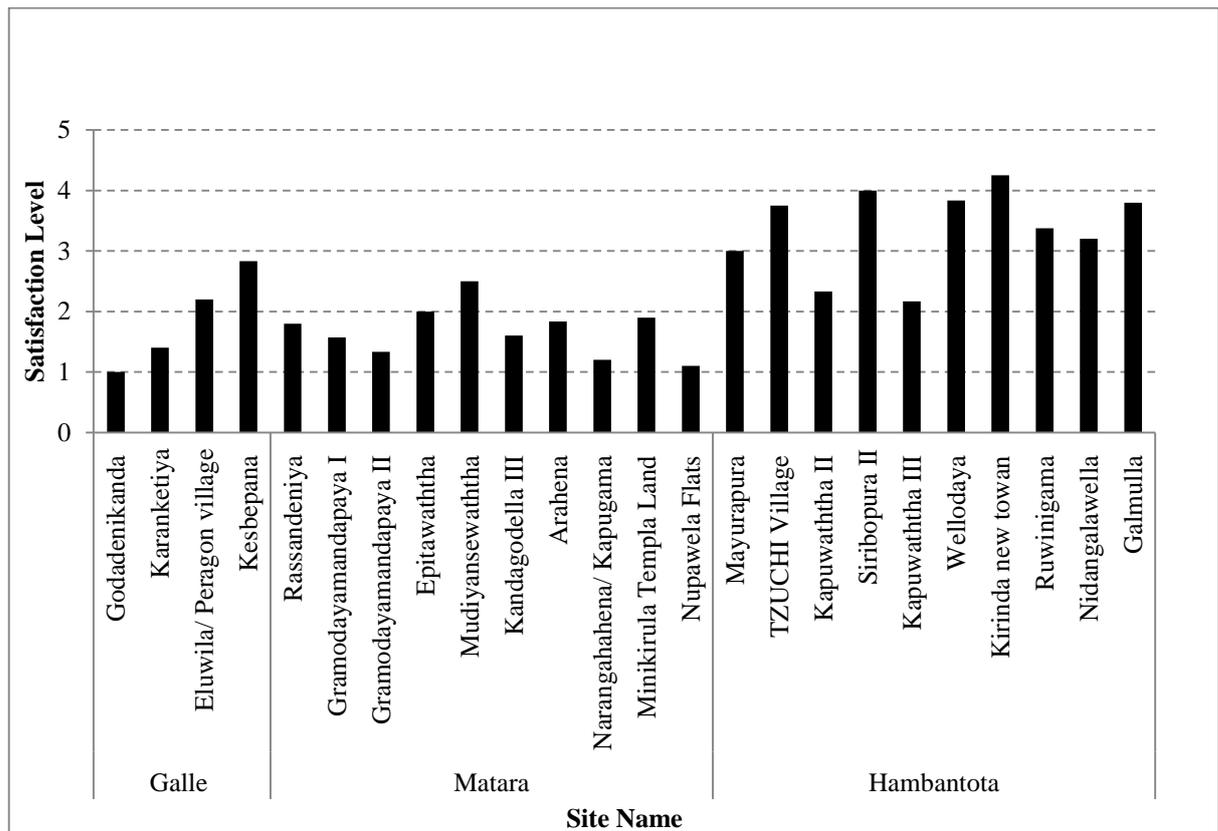
4-2 Rassandeniya and Arahena sites in Matara district show the least satisfaction level (1.2) for dwelling size of all the surveyed sites. As well as Mudiyansewaththa in Matara district and TZUCHI Village in Hambantota district indicate the highest satisfaction level (4.0). Considering only Galle district Karanketiya and Eluwila show the lowest satisfaction level (1.6) and Kesbepana shows the highest satisfaction level for dwelling size (2.3). Likewise in Matara lowest is Rassandeniya and Arahena and highest is Mudiyansewaththa and in Hambantota lowest is Ruwinigama (1.6) and highest TZUCHI Village (4.0). As a district level average of level of satisfaction for dwelling size for beneficiaries Galle 1.8, Matara 2.1 and Hambantota 2.6. It was shown that Hambantota district settlers are more satisfied with the dwelling size than the other two districts. As observed during the field observations the main reason for that is beneficiaries in the Hamabantota district are blessed with larger land plots than other two districts. Hamanatota district is large and low populated comparatively to the other two districts; therefore, land availability is high in that district. Therefore people build additions to their houses.

#### **4.1.3.2 Light and ventilation of Dwelling**

##### **4.1.3.2.1 Policy and legislation for light and ventilation**

There was no specific guideline addressed for light and ventilation factor for tsunami resettlement sites. Under the section of best practices, it was stated that site and building orientation to encouraging air movements. Sri Lanka is a tropical country; natural ventilation, and passive cooling is necessary for thermal comfort. To maximize thermal comfort, the house should be oriented towards the prevailing southerly wind direction so that the main living spaces are ventilated, and should have minimal exposure to the west to avoid heat gain from the afternoon sun. Orientation and passive thermal design features were not taken into account in most of the schemes. Or else it is vital to consider on the material use for the construction to increase the thermal comfort in the houses (Shaw, J., & Ahmed, I. (2010)).

#### 4.1.3.2.2 Level of satisfaction: Light and ventilation



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

**Graph 4-3 Level of Satisfactions of Light and Ventilation**

Graph 4-3 illustrated clearly that Average level of satisfaction of light and ventilation of dwellings, is considerably high for more sites in Hambantota district than two other districts. Highest satisfaction level recorded in Kirinda New Town in Hambantota 4.3. Considering only Galle district Godadenikanda tsunami resettlement site shows the lowest satisfaction level (1.0), and Kesbepana shows the highest level of satisfaction in Galle district. In Matara district, all the surveyed resettlement sites are unsatisfied or strongly unsatisfied with the light and ventilation of the houses. In Matara lowest is Nupawela flats, 1.1 and the highest is Mudiyansewaththa 2.5 and in Hambantota lowest is Kapuwaththa III, 2.2 and the highest is Kirinda New Town

In Kirinda New Town housing design is different than the others. There is an open space between the living area and kitchen area. The space is open to out by two sides. Therefore natural light and air ventilation improved inside the house.



**Figure4-3 Open space between living area and kitchen in Kirinda New Town Tsunami Resettlement Houses**

In Godadenikanda in Galle district houses are constructed very much closer to each other with share toilet pits for two houses. The plot size is six perches. Therefore light and ventilation are very low in dwellings. Also, residencies claimed that the direction of sunlight and wind was not considered during the construction.



**Figure 4-4 Godadenikanda Houses are very close to each other**

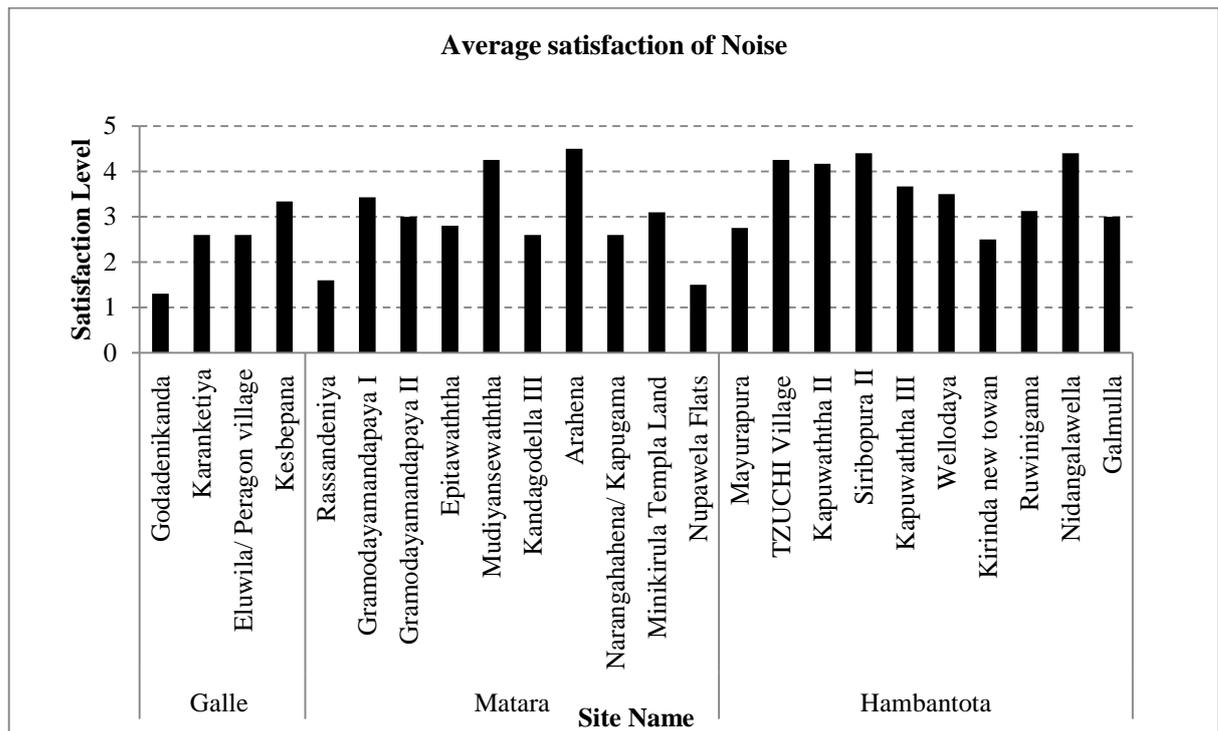
It was observed in the Nupawla flats in Matara sunlight is directly come to the staircase and houses through the openings that reduce the thermal comfort in the houses.

### **4.1.3.3 Noise**

#### **4.1.3.3.1 Policy and Legislation for Noise**

There was no specific guideline addressed for noise factor for tsunami resettlement sites.

#### 4.1.3.3.2 Level of satisfaction: Noise



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

**Graph 4-4 Level of Satisfactions for Noise**

Considering the average satisfaction level for noise in surveyed tsunami resettlement sites Nupawela flats in Matara district shows the lowest satisfaction level, which is 1.5. And Arahena in Matara district shows the highest satisfaction level for noise factor, which is 4.5. Considering Galle district Godadenikanda tsunami resettlement site residencies shows the lowest satisfaction level (1.3), and Kesbepana resettlement beneficiaries show the highest satisfaction level (3.3). As well in Matara Nupawela flats is the lowest and Arahena is the highest and in Hambantota district, Siribopura II and Nidangalawella show the highest satisfaction level (4.4) for noise factor and Kirinda New town resettlement site is the lowest (2.5) in Hambantota district. Results clearly show that Hambantota tsunami resettlers are more satisfied than the other districts. Observations and results show that people who live in most crowded tsunami resettlement sites are highly unsatisfied with the noise factor. No one has claimed on the noise of traffic or any other external causes, they complain on the noise of other occupants live in the site especially listening to the radio in high volumes.

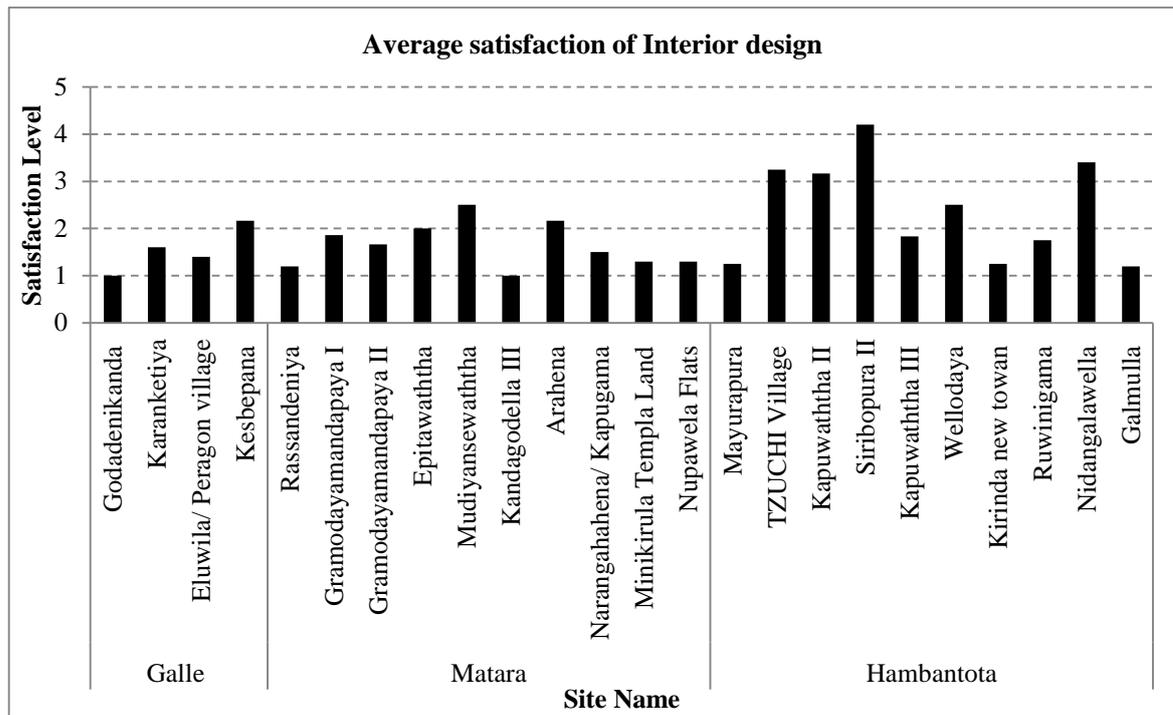
#### 4.1.3.4 Interior Design of Dwelling

##### 4.1.3.4.1 Policy and Legislation for Interior design

There is no specific policies or legislations state for the interior designs of the dwelling. However as per the interview with the officers, interior designing was done by the donor, with respect to the

availability of funding. However under the best practices section it was state that —In a —Core shell concept, the core of the house is provided by the designer or developer with the essential spaces such as living room, kitchen and toilet. Rest of the building has to be completed by the beneficiary according to his means and to meet his aspirations. Incremental (vertical and horizontal) expansion is also possible”.

#### 4.1.3.4.2 Level of satisfaction: Interior design



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

**Graph 4-5 Level of Satisfaction of Interior design**

Interior design is mostly unsatisfied for a number of surveyed tsunami resettlement sites in these three districts, among them Godadenikand in Galle district and Kandagodella III in Matara district is the least which is 1.0. Siribopura II resettlers are considerably satisfied with the interior design of the dwellings, 4.5.

As an explanation for the results, most of the low and middle-income class population in Sri Lanka (lots of beneficiaries living in tsunami resettlement sites belongs to low or middle income) use firewood, for cooking purposes. In the cooking process using firewood lots of smoke generate therefore in Sri Lanka usually kitchen is located outside the house or there must be a chimney.

Even though the UDA guidelines design internal kitchens for tsunami resettlement sites assuming gas fuel would be used for cooking. However most of these houses were not fitted with interior ceilings and rooms are not completely separated by walls. Therefore when cooking smoke flows to the other parts of the house and create an unpleasant environment and unhealthy especially for

little kids. In this situation most of the occupants built external kitchens temporary by using coconut leaves or wood panels. The original kitchen converted to small room or children's study room.



**Figure 4-5** Cooking outside in Galmulla, Hambantota district



**Figure 4-6** Kitchen use as a storage room in Godadenikanda, Galle (behind rainwater harvesting tank)



**Figure 4-8** Temporary kitchen built by wood panels adjacent to the house in Epitawaththa Matara



**Figure 4-7** Temporary kitchen at Mayurapura Hambantota

As in most tropical countries Sri Lanka, toilets are usually built in outside of the houses. But in all the tsunami resettlement houses surveyed toilets were constructed inside the houses and toilet door

open to the houses. It was observed that people who can afford built new toilets separately outside the houses if land is available.

As well as in Sri Lanka most of the people are bound with architectural believes, such as front door placement, main rafter. During the planning and construction these factors were totally neglected. Disregarding of socio economic conditions of the beneficiaries became a severe problem in long-term satisfaction of the resettlement.



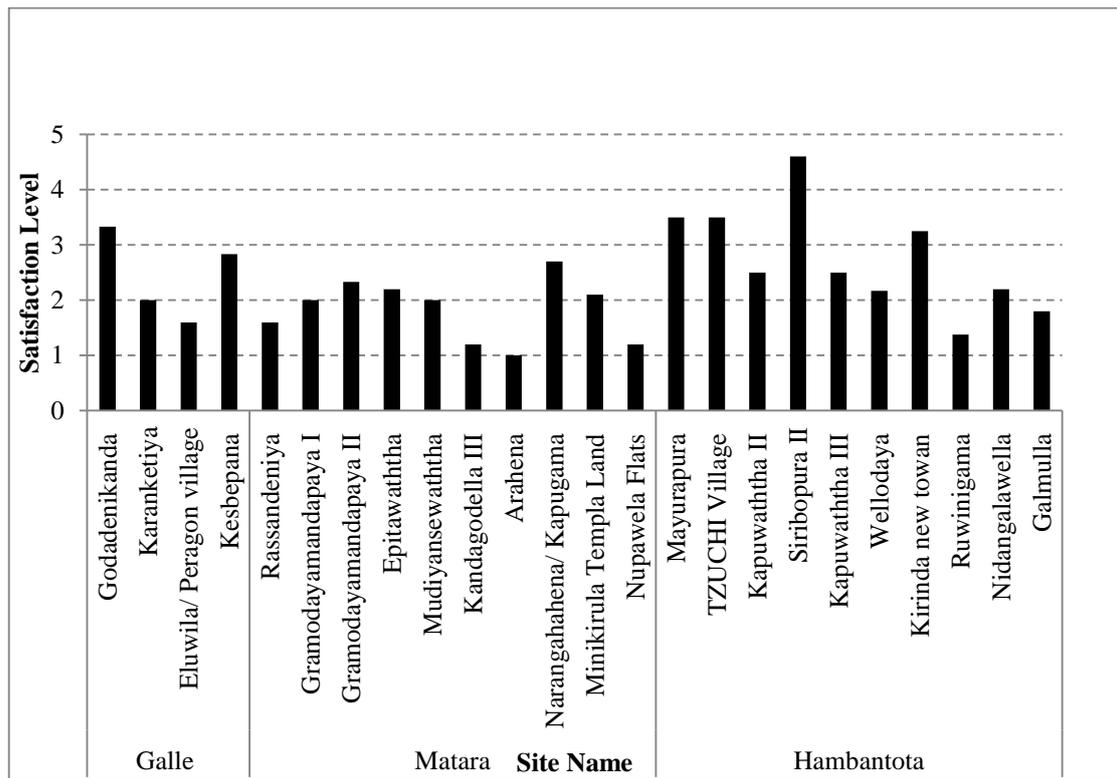
**Figure 4-9 Toilets built separate toilets outside the houses Epitawaththa Matara**

#### **4.1.3.5 Fire and Other safety facilities of dwelling**

##### **4.1.3.5.1 Policy and legislations of Fire and other safety facilities**

There is no specific policies or regulations address on fire and other safety facilities for the resettlement.

#### 4.1.3.5.2 Level of satisfaction: Fire and other safety facilities



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

**Graph 4-6 Level of Satisfaction of Fire and Other safety facilities**

When consider level of satisfaction of fire and other safety facilities of resettlers the graph 4-6 shows that resettlers of Siribopura II in Hambantota district are the highest satisfied 4.6 of satisfaction level. And Arahena in Matara district shows the least satisfaction of 1.0. Considering Galle district only Godadenikanda resettlers are most satisfied with fire and other safety facilities with 3.3 level of satisfaction and Eluwila resettlers are least satisfied with 1.2 satisfaction level. As well in Matara district Narangahahena is the highest with 2.7 satisfaction level and Arahena is the least. Most of the resettlement sites in Hambantota, occupants show high satisfaction level than the other two districts in this factor. Siribopura II resettlers are most satisfied resettlers in fire and safety factor and Ruwinigama resettlers are least in Hambantota with the satisfaction level of 1.4. In the view of fire and other safety measures it considered all the safety measures to prevent from accidents during day to day activities in a house. As discussed above ventilation is very poor in most of the sites and chimneys were not constructed or poorly constructed. Other than that as per the observation wiring is very poor and they are extremely dangerous to the people who live in. Electricity wires should be in conduit pipes which connect to a trip switch.



**Figure 4-11 Insecure wiring in  
Godadenikanda Galle**



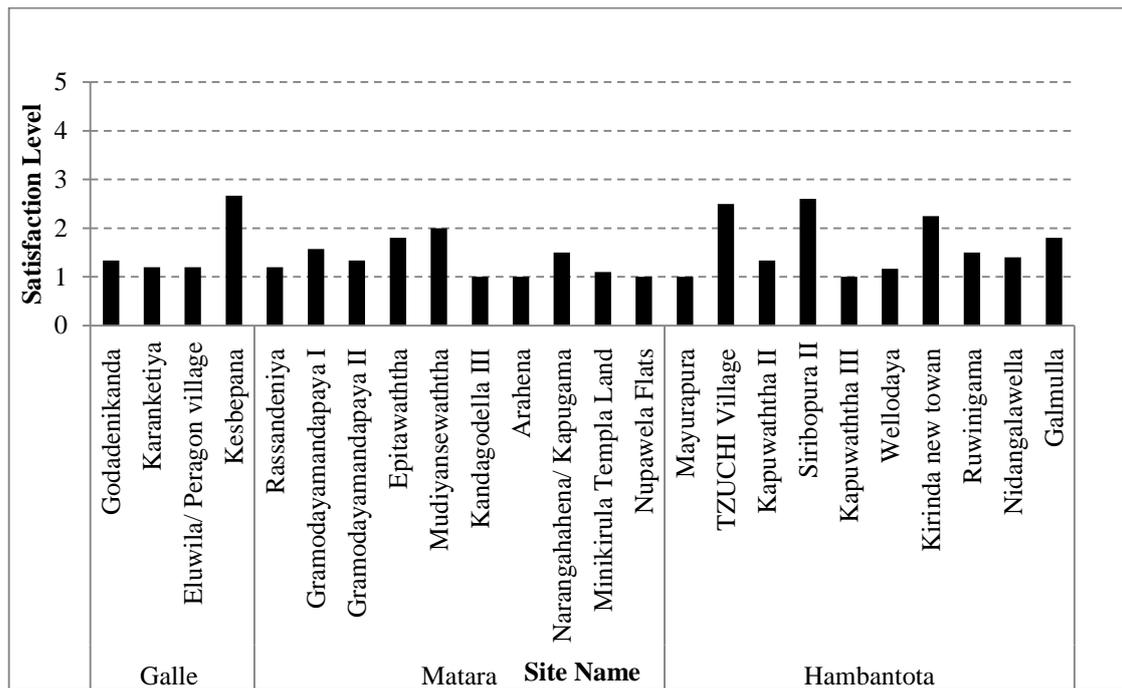
**Figure 4-10 Insecure staircases in  
Kandagodella III Matara**

#### 4.1.3.5.3 Policy and legislation of Building quality

NHDA guidelines state mandatory requirements from the relevant engineering Codes of Practice (British Standard Code of Practice – BSCP or the Institute for Construction Training and Development - ICTAD specifications) as applied to disaster-prone coastal areas of Sri Lanka, specifically targeting floods, cyclones, earthquakes and tsunamis.

UDA guidelines were mandatory only with respect to size specifications but not construction methods or materials, agencies had considerable flexibility in adapting their methods in accordance with budget constraints. (Shaw et al., 2010).

#### 4.1.3.5.4 Level of satisfaction: Building quality



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

**Graph 4-7 Level of satisfaction of Building quality**

Graph 4-7 illustrate that building quality factor is highly unsatisfied to the residents of all the surveyed tsunami resettlement sites in Galle, Matara and Hambantota districts. Highest level of satisfaction shows in Siribopura II in Hambantota however the satisfaction level is 2.6. Most of the sites show low to very low satisfaction level of 1.5-1. Observations during the field visit prove the factor. Cracked walls and floors, leaking roofs can be observed all most all the sites surveyed. There are several causes for this kind of result after a decade of the disaster.

1. Houses were constructed without considering land suitability such as soil type, ground water level. And lands were not developed to suitable level before the constructions.
2. At the time of post tsunami period lots of constructions were taken place in the country. Therefore there is a scarcity of quality building materials. And also the market price of the building materials went very high due to the high demand. Therefore contractors use low quality building materials. Use of low quality building materials for built houses is one of major factor for poor building quality.
3. Likewise skilled labors were not available to match the demand. Unskilled labor work also causes today results.
4. Also not maintain the houses properly effect to deteriorate the quality of the buildings.



**Figure 4-13 Crack on wall. This house is abandoned due to Unlivable condition in Arahena Matara**



**Figure 4-12 Collapse of roof due to improper maintenance Arahena**



**Figure 4-15 Cracks on the floor, Wellodaya, Hambantota**



**Figure 4-14 Cracks on wall in Minikirula Temple land Matara**

Houses of one part of the Wellodaya, Hambantota tsunami resettlement site are severely damaged. The main reason is rainwater is running off from that side and soil is sandy. Therefore sand washed away with runoff water making cracks on the floor. Proper drains had constructed to drain out the rain water and soil compaction had to be done prior to the house constructions. Due to failure of these precautions cracked floors can be seen almost all the houses in that side.

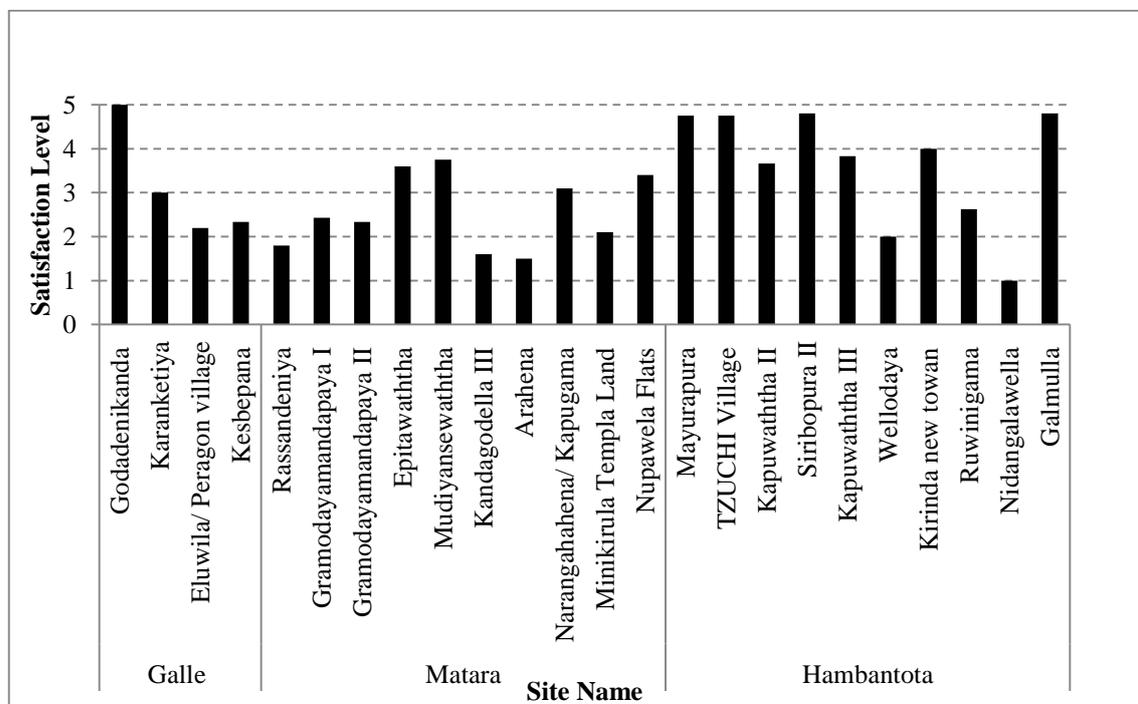
Cracked walls and floors were observed almost all the surveyed tsunami resettlement sites. Clay tiles should be tied to the rafter or battens to prevent uplift or dislocation in strong wind, but as that has not been done, the tiles have shifted in position, creating gaps and allowed water penetration. And untreated wood were used for doors and window construction and insect attacks were observed commonly.

#### 4.1.3.6 Level of completion house

##### 4.1.3.6.1 Policy and legislation of Level of completion house

Donor had no prior housing experiences and maintained no on-site presence. Work left entirely to local contractors who in turn subcontracted the work to others. In some areas it is reported selling of large portion of the construction materials by the contractors. (Shaw et al., 2010.). At the time of tsunami, under the terms of the contracts between GoSL and implementing agencies, the government was responsible for conducting building inspections. Inspection responsibilities were shared between a number of agencies including the UDA, RADA, Provincial councils and District Secretariats. However at the time of post tsunami the UDA faces a staff shortage to deliver the service.

##### 4.1.3.6.2 Level of satisfaction: Completion house



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

**Graph 4-8 Level of satisfaction of Completion house**

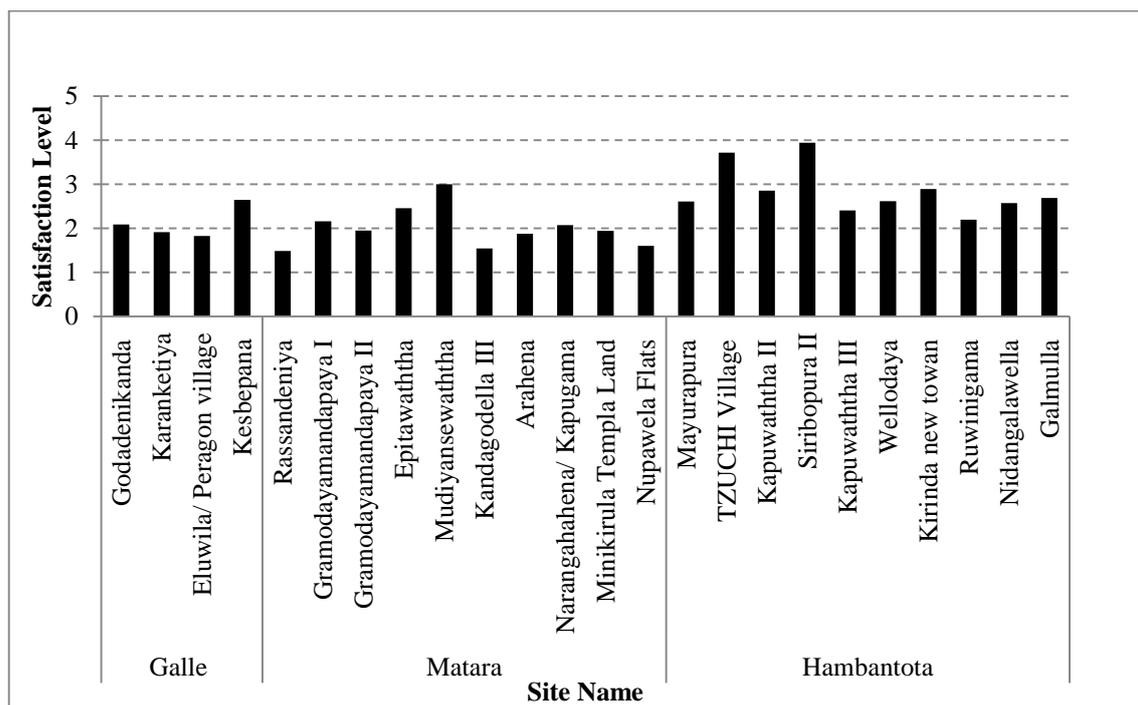
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service, in Matara district highest in Mudiyansewaththa and lowest is Arahena, and in Hambantota district highest is Mayurapura, Tzuchi village, Siribopurra II and Galmulla.



Figure 4-16 Nidangalawella, Hambantota district incomplete house

#### 4.1.3.7 Level of overall satisfaction of Dwelling



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

Graph 4-9 Level of overall satisfaction of Dwelling

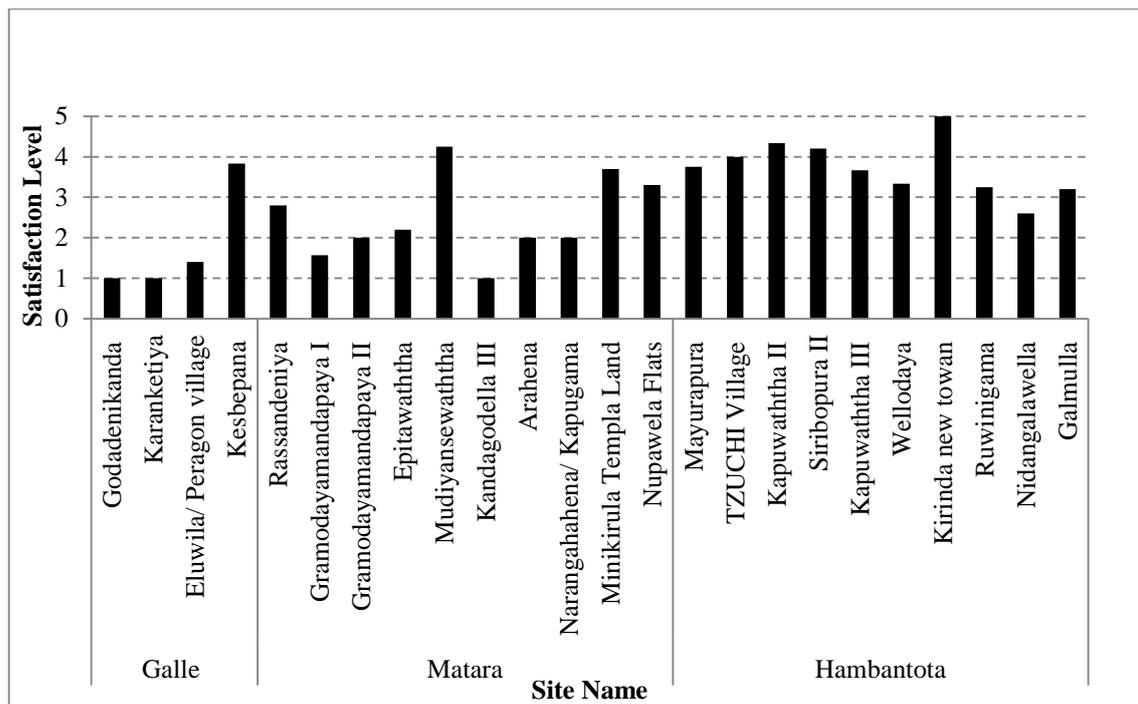
#### 4.1.4 Surrounding Environment

##### 4.1.4.1 Site Selection

###### 4.1.4.1.1 Policy and legislation for site selection

NHDA guidelines state that, under any circumstances housing development should not be conducted in —reservation area. If the construction carried out in restricted area it should have obtain permission from the Coast conservation department, if the land is at least 3 m above the Mean High water line. As well as it is mandatory to obtain UDA development permit to conduct housing development in the areas of under their jurisdiction. This function is delegated to local authorities. Areas declared as low-lying (or marshland/ wetland) are gazzeted under SLLR&DC Act No 15 of 1969. Within the gazzeted area clearance certificated is required to obtain from SLLR&DC to develop land. Other than that it was not addressed consideration of livelihood or any other facilities in the site selection.

###### 4.1.4.1.2 Level of satisfaction: Site Selection



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

**Graph 4-10 Level of satisfaction of Site Selection**

As shown on the above graph 4-10 Hmabantota district resettlers are highly satisfied with the site selection than Galle and Matara districts. Kirinda New Town tsunami resettlement site beneficiaries are highly satisfied with the site selection with the satisfaction level of 5.0. Lowest satisfaction shows Godadenikanda and Karanketiya in Galle district and Kandagodella III in

Matara district. Most of the resettlers are fishermen who lived on or near the shore in temporary or permanent houses.

Soon after the tsunami disaster Government of Sri Lanka strengthen the existing policy of “Buffer zone” for entire coastal area in the country. By the policy building within 100 meters of the high tide mark in the south western districts and 200 meters in the eastern districts were restricted. 200 meters for eastern districts were declared considering frequent cyclone effects to those districts.

According to the census data 2012, by census and statistics department Sri Lanka Galle district population density is 655 (person per km<sup>2</sup>), Matara district has the population density of 637 (person per km<sup>2</sup>) and Hambantota district 2.9 (person per km<sup>2</sup>).

With the declaration of buffer zone policy there was a huge land scarcity appeared for lands resettlement sites to build specially in Galle and Matara districts. Therefore some of the sites were constructed in very remote areas where land is available.

It was observed that site selection is a critical factor due to the reason of site selection influence many other factors;

- a. According to the background information of the resettlers, most of them are fishermen. Majority of them lived on or near to the shore that makes easy for them to carry out their day to day fishing activities. They used to keep their boats and equipment on the shore. Security was not an issue since houses are nearby. However some of the resettlement sites are established far away from the shore and fisherman face great difficulties to continue their livelihoods
- b. Site selection factor influence not only for the livelihood but also for many other factors such as education and other social needs. Some of the students have to change their schools or have to travel a long way.
- c. It also effect on the living style of resettlers. Some of the residencies claimed that they are used to live in urban living style and it is hard to adjust to rural living style.

#### 4.1.4.2 Layout of the Site

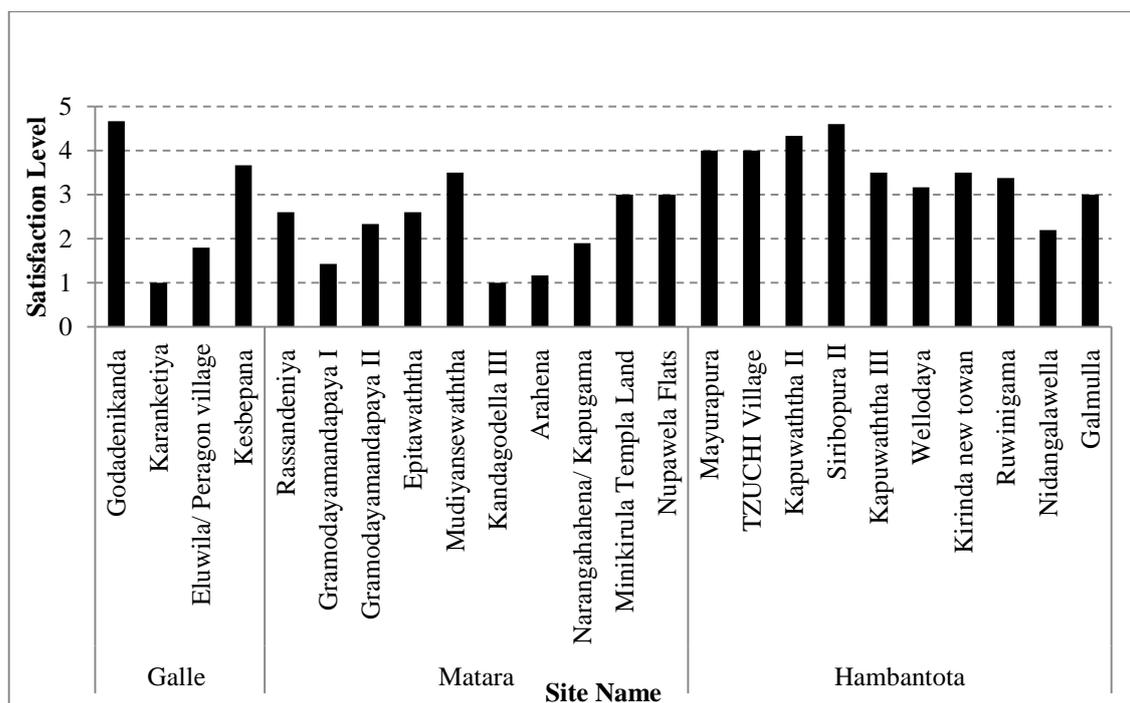
##### 4.1.4.2.1 Policy and legislation for Layout of the site

As state on the NHDA guideline the legal requirement for settlement planning development for 20 or more houses are given on below table.

**Table 4.2 Settlement planning requirement by UDA**

<b>Utilization</b>	<b>Coverage of settlement land</b>
Housing – Neighborhood facilities	65% (Max.)
Common area	10% (Min.)
Road, Streets, footpath and drains	20% (Min.)
Public and semi-public (social infrastructure)	5% (Min.)

#### 4.1.4.2.2 Level of satisfaction: Layout of the property



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

**Graph 4-11 Level of satisfaction for layout of the property**

As shown on graph 4-11 Godadenikanda, Galle district show the highest level of satisfaction 4.7 and Karanketiya in same district and Kandagodella III in Matara district show the lowest satisfaction level of 1.0 for the factor of layout of the property. Considering the other districts Matara highest satisfaction level of 3.5 in Mudiyansewaththa and in Hambantota highest is Sriribopura II, 4.5 and lowest is Nidangalawella 2.2. It clearly indicate that satisfaction level for layout of the property considerably higher for lots of (3.0 or more than 3.0 for 9 sites out of 10) sites in Hambantota district than Galle and Matara districts. Also Godadenikanda and Karanketiya tsunami resettlement sites in Galle district are very close to each other belong to Akmeemana Pradeshiya Sabha. Even though average satisfaction level for lay out of the property for Godadenikanada is 4.7 while Karanketiya it is 1.0.

By the mean of layout considered, access to sites, placement of houses, roads arrangement, and placement of social infrastructure and other common places, etc. As an example when the sites is very large some houses have easy access to main roads, public transport and other utility services and other do not have that result conflicts among the beneficiaries. The most problematic situation observed is in some sites people belong to different social and economic classes such as fisherman and government workers and people from different areas settled closely. Therefore there is huge conflict among them. That is the reason for above result in Godadenikanda and Karanketiya sites.

In Godadenikanda people from same area before the tsunami disaster were settled and in Karanketiya people from different areas were settled together. In Kapugama Matara one lady who is a teacher claimed that it is really difficult for studies of her two daughters due to high noise of radio of nearby houses. Also she even complains on drugs, prostitution and early marriages issues of fisherman community that make an irritation to other people also. These conflicts can be avoided by proper planning of the site.

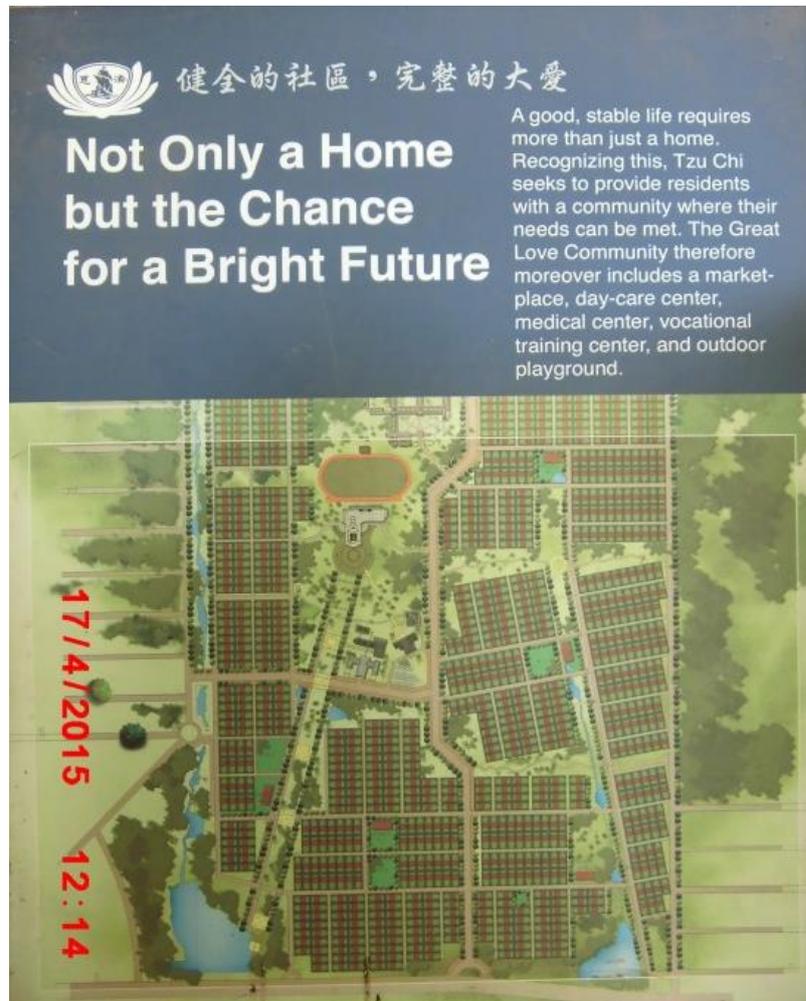


Figure 4-17 Layout plan of the TZUCHI village resettlement site Hambantota

### 4.1.4.3 Landscaping

#### 4.1.4.3.1 Policy and legislation for landscaping

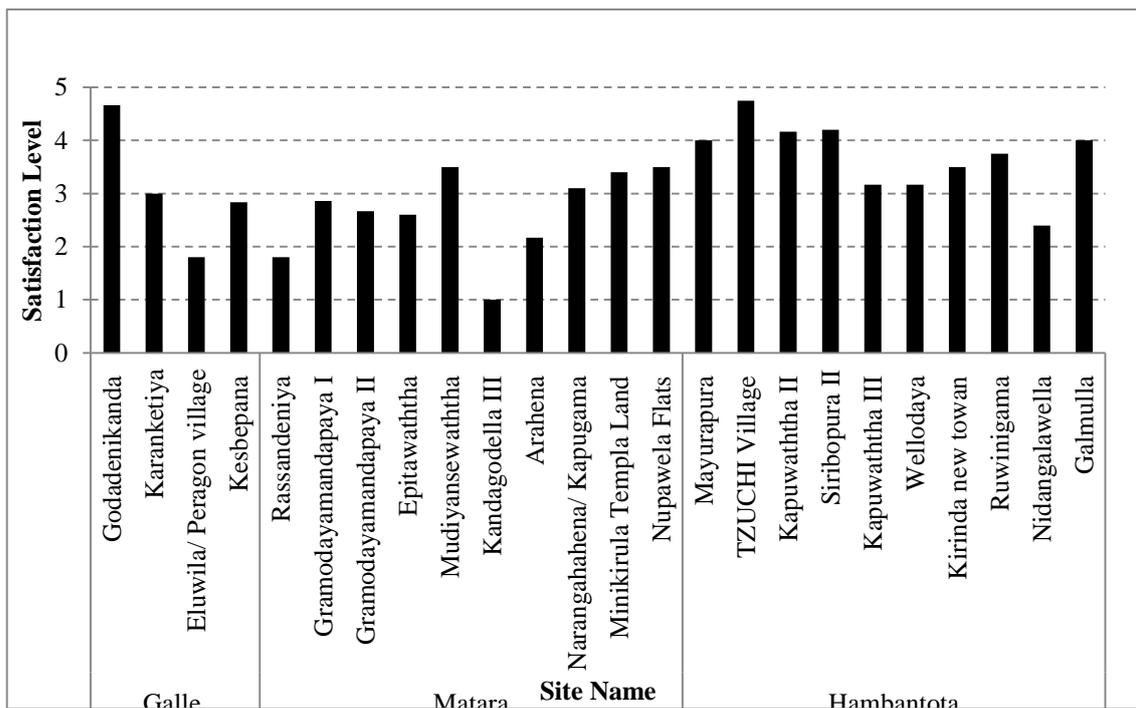
There is no specific regulation state for the landscaping factor. However it states that heat reduction has to consider in landscaping under the section of best practices. To improve the quality of environment NHDA guidelines introduced three design tools for urban physical environment quality enhancement. It suggested to practice on of the following design tool for enhance the neighborhood physical environment quality. Shading was identified as the primary controlling factor for all the strategies.

**Table 4.3 Design tools for urban physical quality enhancement**

Design Tool	Possible Form	Design Goal	Environmental Effects
Zoning Law	Sub-division size regulation, built density control, land-use control, street width & type control, specifications for bicycle lanes and pedestrian paths, promenade and neighborhood squares regulations, waterfront development controls	Energy efficiency, transportation reduction	Air Quality, Climate Quality improvements
Building Regulations	Building and site orientation guidelines, building form guidelines, building envelope control, arcade development guidelines, building height limits, shading requirements, energy audits	Energy efficiency	Climate quality improvements
Landscape Control	Type and density of green space guidelines, Water impoundment requirements, hedge and fence controls, public green space guidelines	Energy efficiency	Climate quality, Water quality improvements

However according to observation these considerations were not went to planning, implementation and practicing stages of the most of the resettlement programs.

4.1.4.3.2 Level of satisfaction: Landscaping



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

**Graph 4-12 Level of satisfaction for Landscaping**

As shown on the graph Kandagodella III shows the lowest satisfaction level with 1.0 and TZUCHI village Hambantota shows the highest satisfaction level of 4.8. In Galle district highest satisfaction level is 4.7 in Godadenikanda and lowest satisfaction level is Eluwila 1.8. Likewise in Matara district Mudiyansewaththa resettlers show the highest satisfaction level, 3.5 and in Hambantota

lowest satisfaction level for landscaping factor is 2.4, in Nidangalawella. It was observed lands were not well maintained in most of these tsunami resettlement sites.

#### **4.1.5 Services**

##### **4.1.5.1 Water Supply**

###### 4.1.5.1.1 Policy and legislation for water supply

Under the terms of the contracts, implementing agencies were required to provide internal roads and infrastructure connections within the settlement, while the GoSL undertook to provide external roads, water, power and sewerage up to the settlement boundary. On the completion of the construction, responsibility for maintaining internal roads, street lighting, garbage collection and park maintenance was to be taken on by local councils.

When considering policy and guideline coverage of the water supply to the tsunami resettlement sites, as state on NHDA guidelines, —All housing settlements should have access to safe drinking water, either by a piped water supply system or by protected well or from ground water (tube well). The supply system must have the concurrence from the water supply authority (NWS&DB or local authorities). NWS&DB is the main responsible agency for safe and adequate drinking water and proper sanitation for entire population. In areas where there is no adequate water pressure in the system NWS&DB will provide water in to a ground sump. In case developer will be required to put place a secondary pumping system.

On NHDA guidelines Followings were suggested considering water is primary requirement for satisfactory water supply.

1. The pressure head available (residual pressure) at any point of the distribution system should be more than 5m;
2. The minimum velocity in a pipe line should not be less than 0.6m/s to prevent deposition of silt;
3. A minimum of one day's requirement must be stored at site;
4. When ground and elevated storage is provided, the common practice is to provide 70% of the total storage as ground storage and the balance as elevated storage;
5. The minimum horizontal clearance of any sewer line should be 3m and the bottom of the water line should be at least 0.5m above the top of the sewer line.

According to the results of survey

All the surveyed tsunami resettlement sites have access to pipe born drinking water by NWS&DB. Piped drinking water for Nidangalawella tsunami resettlement site was supplied in year 2015. Until then people in Nidangalawella tsunami resettlement site have to rent water bowsers at the cost of Rs. 1500 and bring drinking water.

The water supply pressure at any point of distribution system is  $>5$  m at all the surveyed tsunami resettlement sites except Nupawela flats. Nupawela flats are four storied buildings. The water pressure of the distribution system is not enough to deliver water for upper floor. Therefore an additional power has to use. In Nupawela flats resettlers pressured water by a motor and store on a storage tank on top of the building. But the storage tanks capacity is not enough for the demand. Therefore either they have to bring water from ground floors or they have to go ground floors for bathing and other water requirements. Especially elder people and women face difficulties due to this. Other than that there are water leaks from the rooftop tanks and pipes and in many places dampness has entered walls and roofs, evident from blistering and peeling of paint and plaster.

Considering the velocity of the drinking water supply all the resettlement sites have the velocity of  $>0.6$  ms<sup>-1</sup> except Nupawela flats in Matar district. Velocity is low due to the height. According to the guidelines at least one day water requirement must be stored at site. Below present the survey I results on water storage facilities.

**Table 4.4 Water storage facility of resettlement sites**

<b>District</b>	<b>Site Name</b>	<b>Water storage facilities</b>
Galle	Godadenikanda	Half day Use
	Karanketiya	Half day use
	Eluwila/ Peragon village	Half day use
	Kesbepana	No
Matara	Rassandeniya	Half day use
	Gramodayamandapaya I	One day use only for some houses
	Gramodayamandapaya II	One day use
	Epitawaththa	Half day use only some houses
	Mudiyansewaththa	Half day use only some houses
	Kandagodella III	Half day use
	Arahena	No
	Narangahahena/ Kapugama	No
	Minikirula Templa Land	No
Nupawela Flats	Yes common storage but insufficient	
Hambantota	Mayurapura	Two day use
	TZUCHI Village	Half day use
	Kapuawaththa II	Half day use
	Siribopura II	One day use
	Kapuawaththa III	No
	Wellodaya	Half day use
	Kirinda new towan	No
	Ruwinigama	No
	Nidangalawella	No
Galmulla	No	

As shown on table 4.4 three tsunami resettlement sites in Galle district have water storage facility but sufficient only for half day use according to discussion with resettlers in Kesbepana, water storage facility was not provided. In Matar district Gramodayamandapaya II and some houses of Gramodayamandapaya I have water storage facility for one day use, Rassandeniya in Matara district have water storage facility for half day use and Epitawaththa and Mudiyansewaththa have

water storage facility for half day use but only for some houses. Arahena, Narangahahena and Minikirula temple land resettlers do not have water storage facility. Likewise in Hambantota Mayurapura tsunami resettlement site houses have water storage facility for two days, Siribopura II houses have one day requirement water storage facility, TZUCHI, Kapuwaththa II and Wellodaya have half day use water storage facilities and Kapuwaththa III, Kirinda New Town, Nidangalawella and Galmulla tsunami resettlement sites do not have water storage facilities.

Moreover it was observed that there are conflicts among residencies for uneven distribution of water storage tanks. Some families in Gramodayamandapaya I complained that only some families got water storage tanks with Grama Niladaris' favoration.

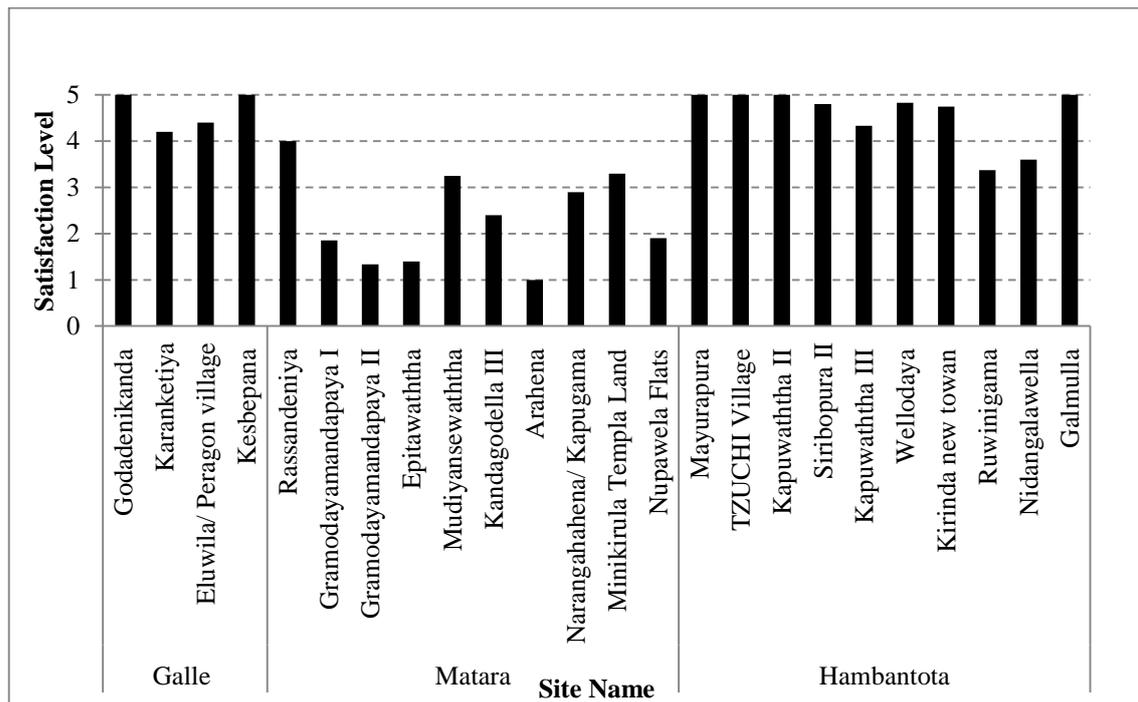
According to the discussion with the resettlers they state that there are frequent pipe water block outs especially in Matara district, Gramodayamandapaya I, Gramodayamandapaya II, Epitawaththa, Mudiyansewaththa, Kandagodella III, Arahena, Kapugama, Munikirula temple lands and Nupawela flats resettlers complained on the frequent water block out. In Epitawaththa tsunami resettlement site there is a 3-4 hour water block out daily. In Matara only Rassandeniya resettlement site gets frequent water supply. None of the resettlement sites in Galle and Hambantota districts are experiencing frequent water block outs.

Moreover visual observations taken and taste testing were done for drinking water at all the surveyed tsunami resettlement sites, Gramodayamandapaya I, Mudiyansewaththa, Kapugama and Minikirula Temple land in Matara district mud recorded with pipe water. As well as in Hambantota district Kapuwaththa II and Kapuwaththa III resettlement sites salinity is high in drinking water therefore people has to water boil before drinking. Furthermore there were some other factors that contribute to the satisfaction or dissatisfaction of water supply.

By the survey I availability of alternative water sources were surveyed; as of the results only Eluwila and Kesbepana resettlement sites in Galle district have alternative water sources except the water supply from NWS&DB. In Eluwila and Kesbepana tube wells are available. None of other tsunami resettlement sites have alternative water supply in emergency situation.

Considering the water conservation practices exercise in tsunami resettlement sites the rain water harvesting tanks were built in sites but none of them are in function.

#### 4.1.5.1.2 Level of satisfaction: Water supply



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

**Graph 4-13 Level of Satisfaction for Water Supply**

As shown on graph 4-13 it can clearly see that satisfaction for water supply is considerably low in Matara district than Galle and Hambantota districts. In Matara district only Rassandeniya resettlement sites ‘residencies are satisfied with satisfactory level of 4.0 and all the other tsunami resettlement sites ‘beneficiaries are unsatisfied or strongly unsatisfied with water supply. In Arahena tsunami resettlement site resettlers in Matara district satisfaction level for water supply is 1.0. In Galle district Godadenikanda and Kesbepana resettlers are strongly satisfied with the water supply. In Hambantota district tsunami resettlement sites all the residencies of resettlement sites are satisfied with water supply with a satisfactory level of 4.0 or above except 3.6 in Nidangalawella and 3.4 in Ruwinigama.

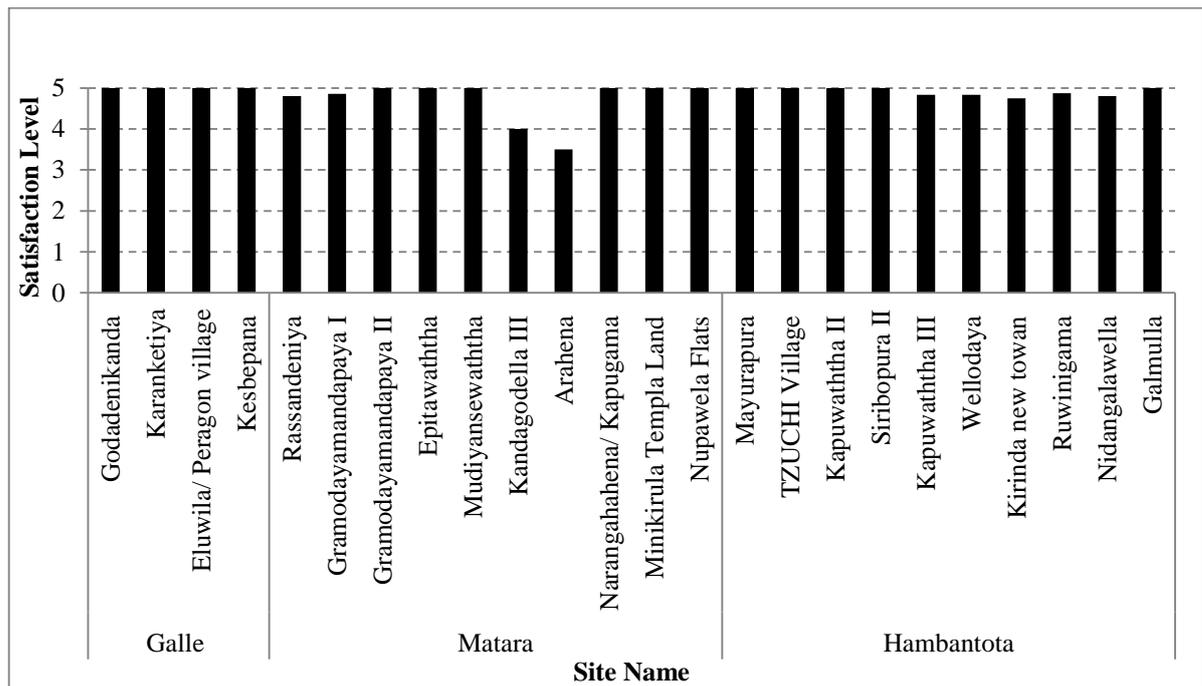
#### 4.1.5.2 Electricity

##### 4.1.5.2.1 Policy and legislation for Electricity

According to the NHDA guidelines each and every tsunami resettlement house have right to access electricity supply, depending on the location of the site electricity can obtain by either the CEB or LECO via new service connections.

Also NHDA guidelines state that entire site access roads, foot paths, streets should be illuminated with street light.

#### 4.1.5.2.2 Level of satisfaction: Electricity



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

**Graph 4-14 Level of Satisfaction for Electricity**

Each and every surveyed tsunami resettlement site has electricity for each house. Electricity supply is a most satisfied factor for all the tsunami resettlement houses (Graph 4-14). Even though Kandagodella III and Arahena resettlement sites residencies satisfactory levels are 4.0 and 3.5 respectively. Resettlers in these two sites are experience occasional electricity blocks outs. However incomplete and unsafe internal wiring in houses were observed many of the tsunami resettlement sites (section 4.1.3.5).

#### 4.1.5.3 Solid waste management

##### 4.1.5.3.1 Policy and legislation for solid waste management

According to the NHDA guidelines,

“All households should be provided with a proper garbage disposal system”.

Sorting of bio-degradable and non-bio-degradable materials at domestic level should be encouraged and communities should be directed towards domestic composting methods.

Proponents of large housing schemes are strongly encouraged to introduce and establish a commercial level waste re-cycling center to ensure the reduction of the accumulation of garbage at site. In order to facilitate the timely removal of garbage, adequate access must be made available in the design for collection and disposal of garbage by the Local Authority.”

According to the results of survey I, how the residencies of surveyed resettlement sites handle solid waste present below table 4.5.

**Table 4.5 Solid waste management methods of surveyed tsunami resettlement sites**

<b>District</b>	<b>Site Name</b>	<b>Solid waste management method</b>
Galle	Godadenikanda	Disposed to solid waste collection point or disposal yard
	Karanketiya	Disposed to solid waste collection point or disposal yard
	Eluwila/ Peragon village	Garbage dump on own home garden
	Kesbepana	Collect by local authority
Matara	Rassandeniya	Garbage dump on own home garden
	Gramodayamandapaya I	Garbage dump on own home garden
	Gramodayamandapaya II	Garbage dump on own home garden
	Epitawaththa	Garbage dump on own home garden
	Mudiyansewaththa	Collect by local authority once per two days
	Kandagodella III	Garbage dump on own home garden
	Arahena	Dumping to nearby abandoned land
	Narangahahena/ Kapugama	Garbage dump on own home garden
	Minikirula Templa Land	Garbage dump on own home garden
	Nupawela Flats	Collect by local authority once per two days
Hambantota	Mayurapura	Garbage dump on own home garden
	TZUCHI Village	Garbage dump on own home garden / non degradable materials collect by site developers
	Kapuwaththa II	Garbage dump on own home garden
	Siribopura II	Dump and burn along road side
	Kapuwaththa III	Garbage dump on own home garden
	Wellodaya	Garbage dump near by empty land and burn or dump on home gardens
	Kirinda new town	Disposed to solid waste collection point or disposal yard/ garbage dumps individually at home gardens
	Ruwinigama	Garbage dump on own home garden
	Nidangalawella	Disposed to solid waste collection point or disposal yard/ garbage dumps individually at home gardens
Galmulla	Garbage dump near by empty land and burn or dump on home gardens	

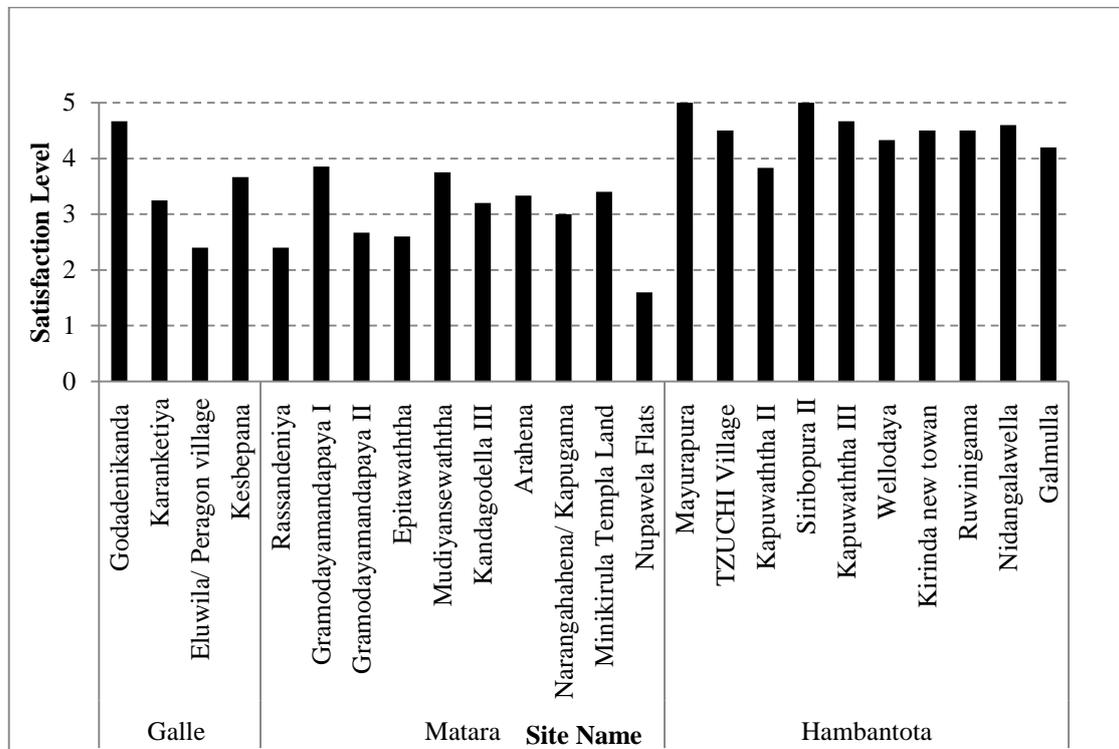
As a summary of above table there are 5 main methods that use for solid waste management in tsunami resettlement sites;

1. Disposed to solid waste collection point or disposal yard
2. Garbage dump on own home garden
3. Collect by local authority
4. Dump and burn along road side
5. Garbage dump near by empty land and burn

As per the observations none of the settlement sites practice on composting or bio gas generation or any other solid waste management method. Only TZUCHI village resettlement site in

Hambantota district non-degradable materials collect by site developers. However for some resettlement sites composting bins were provided to the houses by the developers at the beginning but no one is maintain or practicing composting.

#### 4.1.5.3.2 Level of satisfaction: Solid waste management



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

**Graph 4-15 Level of satisfaction for solid waste management**

Graph 4-15 illustrate the level of satisfaction for solid waste management of surveyed tsunami resettlement sites. Satisfaction level for solid waste management in Galle district, Godadenikanda shows the highest satisfaction level of 4.7 and Eluwila resettlers are least satisfied with solid waste management factor in Galle district. Likewise in Matara district Gramodayamandapaya I show the highest satisfaction level of 4.8 and Mudiyansewaththa shows 4.7 satisfaction levels. Nupawela flats residencies are least satisfied with solid waste management factor 1.6. As well in Hambantota district Mayurapura and Siribopura II residencies are strongly satisfied with the solid waste management factor, 5.0 and Kapuwaththa III residencies show the satisfactory level of 3.8.



**Figure 4-18** Garbage dump nearby road at  
**Godadenikanda**



**Figure 4-19** Garbage dump and burn on an empty land  
**Galmulla Hambantota**



**Figure 4-20** Waste burned along the road side Siribopura II

As shown on graph 4-15 resettlers of tsunami resettlement sites in Hambantota district are considerably satisfied with the solid waste management factor than Galle and Matara districts. In Hambantota district plot size of the houses is 17 – 20 perches while in Galle and Matara districts 6-8 perches. Therefore in Hambantota district residencies have enough space to manage solid waste by their own. Furthermore dumping solid waste to next land became a severe social issue in some resettlement sites such as Kapugama, Matara district.

#### **4.1.5.4 Waste water management**

##### **4.1.5.4.1 Policy and legislation for waste water management**

###### **A). Grey water discharge**

There was no specific policy or guideline highlighted for grey water discharge in tsunami resettlement sites.

###### **B). Sewage discharge**

NHDA guidelines, waste water disposal addressed in three ways of treatments,

- i. On-plot waste water disposal;
- ii. On-site waste water treatment and disposal;
- iii. Off-site waste water treatment and disposal

The primary mechanism of on-plot waste water disposal system is a septic tank followed by a soakage pit. Popular size of the tanks available in Sri Lanka for a single family unit consisting 5 members are:

0.6 m (2'-0") Diameter and 2.4 m (8'-0") length;

1.0 m (3'-3") Diameter and 2.4 m (8'-0") length

High absorption capacity in the soil and low water table are the prime requirements to introduce this type of soakage pits. Other systems of on-plot waste water disposal are, double pit compost toilets and a pour flush pit latrine.

Soakage Pits should be located in an open area and satisfy the following requirements;

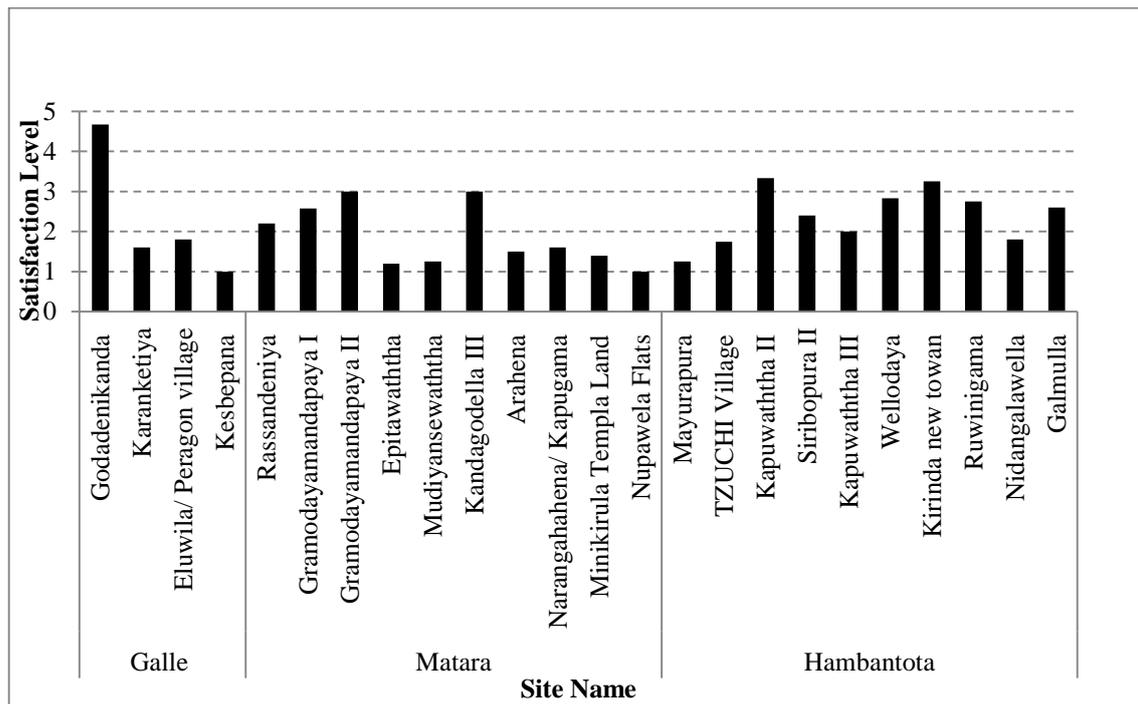
- i. At least 18m away from the nearest well or other drinking water sources;
- ii. At least 5m away from the nearest building.

However only on plot waste water mechanism is practicing all the surveyed sites.

### **C). Storm water management**

Onsite drainage network has to be designed to dispose all the storm water (i.e. water which runs-off the buildings and land as a result of rain fall). Site drains are constructed on the side/s of internal roads, foot paths, streets, backyards etc., and convey the accumulated water into the secondary drains, which sometimes disposes water into a near-by stream or canal. Most of the secondary drains are off-site drains, the maintenance of which comes under the purview of the respective Local Authority. Sizes of the storm water drains are governed by factors such as rainfall intensity, ground slope and the drain type.

#### 4.1.5.4.2 Level of satisfaction: Waste water management



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

**Graph 4-16 Level of satisfaction for waste water management**

#### A). Grey water disposal Mechanism in resettlement sites

As per the observations all the sites are practicing on plot waste water discharge mechanism. Grey water flow just outside the kitchens and bathrooms to the back yards or sometimes directed to nearby water flow or storm water drains.



**Figure 4-21 Bathing water contaminated with soap flow to the canal flow on back yard.**

**The canal run to the nearby marshy land in Eluwila, Galle**



**Figure 4-22 Grey water flow openly on the back yards of the houses Kapuwaththa II, Hambantota**

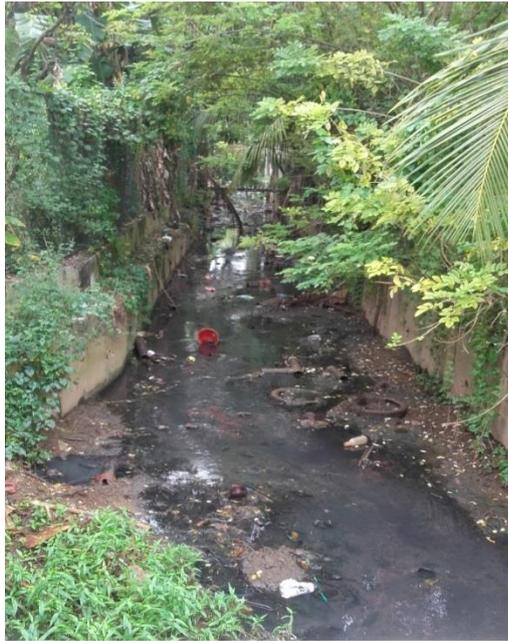


**Figure 4-23 Grey water flow through a poorly constructed drain and little kid play nearby, Mayurapura, Hambantota**

Most of housing settlements does not have any drainage plan. Low areas have not been elevated and land slopes not leveled, nor has land been compacted. In the rainy seasons water flows from higher areas to those at lower elevation, washing away topsoil, silting the drains and inundating gardens and homes. In some cases flowing water found to have exposed and undermined the foundations of houses by scouring, greatly weakening the structure and making the house eventually liable to collapse in flash floods and storms.

There is a very high threat of contaminations and diseases due to these improper waste water dischargers. As observed the factor was neglected or given very minor attention in the construction and not properly addresses. None of the tsunami resettlement sites surveyed were practicing proper grey water discharge method.

Nupawela flats in Matara is located in the core of the Matara city and highly urban area. There are 64 houses on five story buildings. There is no proper waste water disposal mechanism in the housing scheme and waste water discharge to a canal flow nearby the scheme and that make very unhealthy and unpleasant environment not only for the residencies but for the people who visit the city as well.



**Figure 4-24 Polluted canal adjacent to Nupawela flats due to waste water disposal**

Constructed wetlands were built in Kesbepana, Galle district and Mudiyansewaththa in Matara with collecting system for gray water recycling. Even though both are not functioning currently and filled up with weeds and wild plants grow over the structures. Constructed wetland in Kesbepana became a mosquito bed due to improper maintenance.



**Figure 4-25 Constructed wetland in Kesbepana, Galle**



**Figure 4-26 Drain outs from constructed wetland Kesbepana**



**Figure 4-27 Constructed wetland at Mudiyansewaththa, Matara**



**Figure 4-28 structures covered with weeds in constructed wetland Mudiyansewaththa, Matara**

### **B) Sewage disposal Mechanism**

Septic tank followed by soakage pit is the mechanism that uses for discharge sewage at all the surveyed tsunami resettlement sites. And the most common size of the tank is 1.0 m (3'-3") Diameter and 2.4 m (8'-0") length. As mentioned on the policy and legislation apply for the sewage disposal in tsunami resettlement sites, 1.0 m (3'-3") Diameter and 2.4 m (8'-0") length size was for 5 members in a family. Even though the average house hold size in surveyed tsunami resettlement sites is 4.5 there are some sites which have family members more than 5. Such as Rassandeniya, Matara and in Godedenikanda, Galle district there are shared septic tanks for two houses. Furthermore it is decade after the residence in those houses not once these tanks were cleaned. Therefore overflow of septic tanks were observed lots of tsunami resettlement sites surveyed that make very unpleasant and unlivable conditions especially in rainy seasons. Poorly constructed septic tanks and soakage pits create the situation verse, bad odor spread to all over the house. There are conflicts among residencies due to overflow of septic tanks flow to adjacent lower lands with rain water.

Normally this septic tank followed by soakage pit method can be engaged when the ground water table is in lower levels with a permeable soil condition. Even though Eluwila, Galle tsunami resettlement site was built on a part of developed marshy land and ground water level is high. As well Epitawaththa in Matara district located close to a stream that flow to Nilwala ganga. Ground water level in Epitawaththa also very high. Therefore toilet pit over flow can be seen most of the houses in those sites even at a small rain fall. As well Eluwila, Galle and part of Epitawaththa tsunami resettlement site face frequent floods that make high threat of fecal contamination on those sites.

As mentioned above NHDA guideline, septic tank should be located at least 5 m away from the nearest building. However septic tanks located around 1.5 m away from the kitchen form the house back side edge. Main reason for that are small land sizes especially in Galle and Matara districts.

At the rainy season water table goes above soakage pit. Then through the connected pipe, water with fecal compounds flow back to the scouting pan and leaked in to the bathroom and spread inside the home also.



**Figure 4-29 Unsealed soakage pits in Epitawaththa, Matara**



**Figure 4-30 Nearby canal and marshy land in Eluwila, Galle**

### **C). Storm water disposal**

Both side and one side drainages were constructed on internal roads of the resettlement sites. However as per the observation most of those drainages are blocked with debris and soil. Resettlers view is it is governments or donors responsibility to clean up drainages for them.



**Figure 4-31 Drainages blocked in Arahena Matara and Godadenikanda, Galle**

## 4.5 Level of Satisfaction for Social Factors

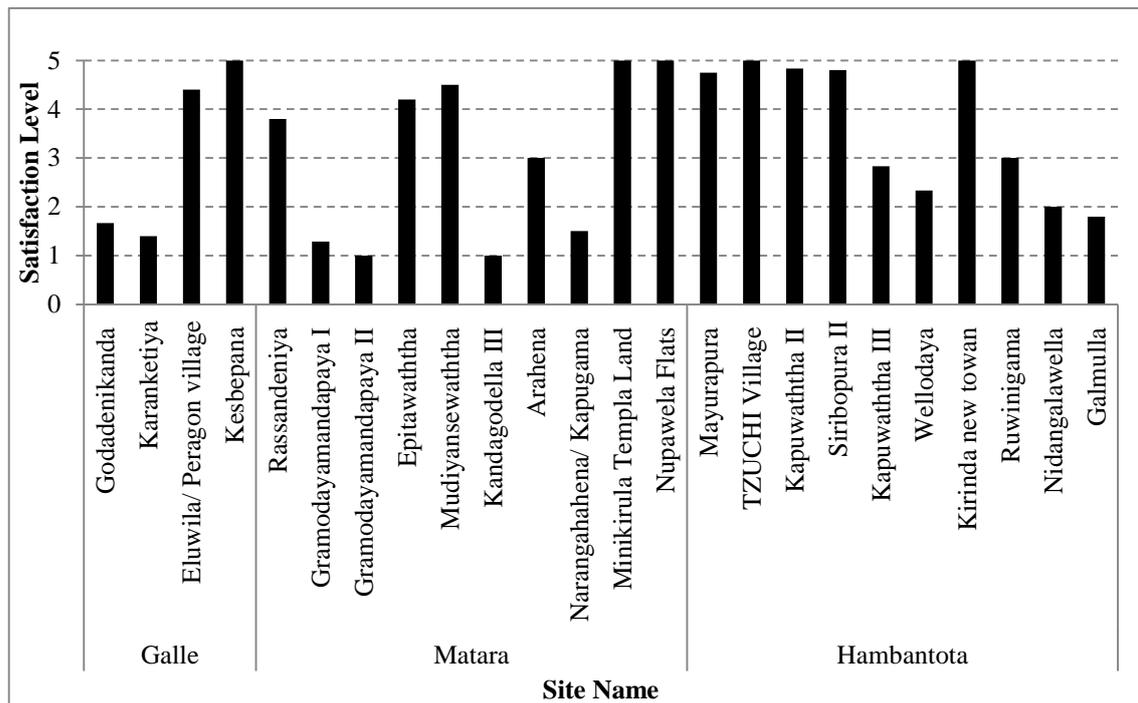
### 4.1.6 Infrastructure facilities

#### 4.1.6.1 Roads and Public transport

##### 4.1.6.1.1 Policy and legislation for Roads and Public transport

There are no specific policies or regulation on provision of road and transport facilities to the resettlement sites.

##### 4.1.6.1.2 Level of satisfaction: Roads and Public transport



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

**Graph 4-17 Level of satisfaction for Public transport**

Kesbepana tsunami resettlement site resettlers, show the highest level of satisfaction for the public transport, 5.0. Godadenikanda and Karanketiya tsunami resettlement sites have least satisfaction for the public transport factor, 1.7 and 1.4 in Galle district. Approximate distance to Godadenikanda and Karanketiya from Galle which is the closets main town is 15 km and only two buses run per day. People have to adjust their all the work according to that time schedule. Fishermen are facing more difficulties because they have to go to the shore early in the morning for sail. Residencies of these two sites face great difficulties due to this inefficient public transport. Most of the people use alternative methods such as three wheels or bicycles. Residencies who cannot afford such methods walk to the city by foot.

In Matara district, Minikirula temple land, Nupawela flats have the highest level of satisfaction or public transportation with the satisfaction level of 5.0. Nupawela flats located very close to the Matara town center and Minikirula temple land tsunami resettlement site is in walking distance to Matara- Tissamaharama main road. Even though Gramodayamandapaya I, II and Kandagodella tsunami resettlement sites in Matara districts show low satisfaction level for the public transport factor 1.3, 1.0 and 1.0 respectively.

Considering the internal roads in sites are not paved and become muddy and prone to potholes during the rainy season make significant constraint to the residencies. During the dry season, because of the sandy nature of the topsoil and clearing of trees and vegetation, dust from unpaved roads blow into houses and is a serious nuisance. In Kapuwaththa resettlement site, Hambantota dust from the roads has become a severe problem and people cover all the open spaces in the road side of the house to prevent from dust.



**Figure 4-32 Dust in road and sealed louvers**

However external and internal road network in TZUCHI resettlement site is in good condition and properly maintaining.



**Figure 4-34 Internal roads and shades in TZUCHI village Hambantota**

**Figure 4-33 Road from TZUCHI village to Hambantota town**

#### 4.1.6.2 Parking spaces

##### 4.1.6.2.1 Policy and legislation for parking spaces

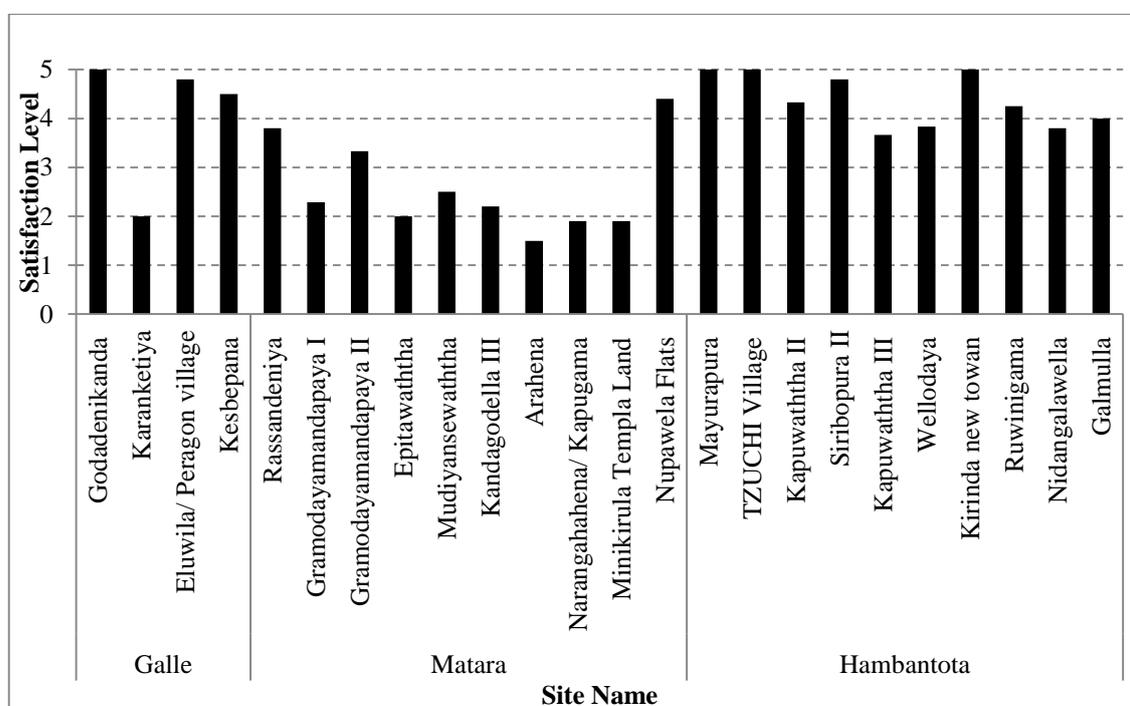
According to the NHDA guidelines each and every resettlement house entitle with the parking spaces. Each parking bay should be of a minimum size of 2.4m x 4.8m (8'-0" x 16'-0").

**Table 4.6 NHDA Guidelines for parking requirements**

Housing Category	Parking Requirement
Flats, dwelling units (excluding individual housing units) and terraced houses having a floor area up to 50m <sup>2</sup> (538ft <sup>2</sup> )	1 for every 3 housing units
Flats with gross floor area between 50-75m <sup>2</sup> (538-807ft <sup>2</sup> )	1 for every 3 housing units
Flats with gross floor area less than 100m <sup>2</sup> (1,076ft <sup>2</sup> )	1 for each housing unit
Flats exceeding a gross floor area of 200m <sup>2</sup> (2,152ft <sup>2</sup> )	2 for every 3 housing units*
Dwelling units exceeding floor area of 200m <sup>2</sup> (2,152ft <sup>2</sup> )	1 for each housing unit

\* Recommended parking = 3 for every 3 housing units.

##### 4.1.6.2.2 Level of satisfaction: parking spaces



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

**Graph 4-18 Level of satisfaction for Parking spaces**

Even though the policies and guidelines were established as above it was observed that parking spaces are unavailable to some of the resettlement sites. According to the policies and guidelines parking spaces have to provide to the houses with respect to the floor area. As observed during the field visits parking spaces were provided if the land is available. Parking bays were observed on some of the tsunami resettlement sites.

As shown on the graph karanketiya tsunami resettlement sites' resettlers are most unsatisfied with the parking spaces factor in Galle district. None of the houses in "Karanketiya" do not have parking space. According to the survey motorbikes and three wheels are the vehicles that owned in this site, even though people do not have space to parks their three wheels. They park along the road side.

Godadenikanda resettlement site which is adjacent to the Karanketiya have parking spaces for each houses and parking bays also constructed according to the policies. Part of the Kesbepana resettlement site is flat. Parking spaces were constructed in front of the flats and other houses have individual parking spaces.

In Matara district tsunami resettlement sites, resettlers of the most of the tsunami resettlement site are dissatisfied with the parking spaces. Arahena site resettlers are least satisfied with the factor, satisfaction level is 1.5. in Matara district 7 out of 10 tsunami resettlement sites shows the satisfaction level of 2.5 or less with the parking spaces. All of those sites residencies use road sides for parking requirements. Nupawela flats in Matara district shows, the highest level of satisfaction for the parking spaces, 4.4.

In Hambantota district parking space factor is highly satisfied than the other districts. All the sites have satisfactory level 4 or above 4. The reason of land availability in Hambantota district, directly influence this behavior.

#### 4.1.6.3 Distance to Services and Infrastructure facilities

##### 4.1.6.3.1 Policy and legislation for Distance to Services and Infrastructure facilities

According to the survey I below table present the distance from surveyed tsunami resettlement sites to the above institutes.

**Table 4.7 Approximate distance to the institutions from the resettlement sites**

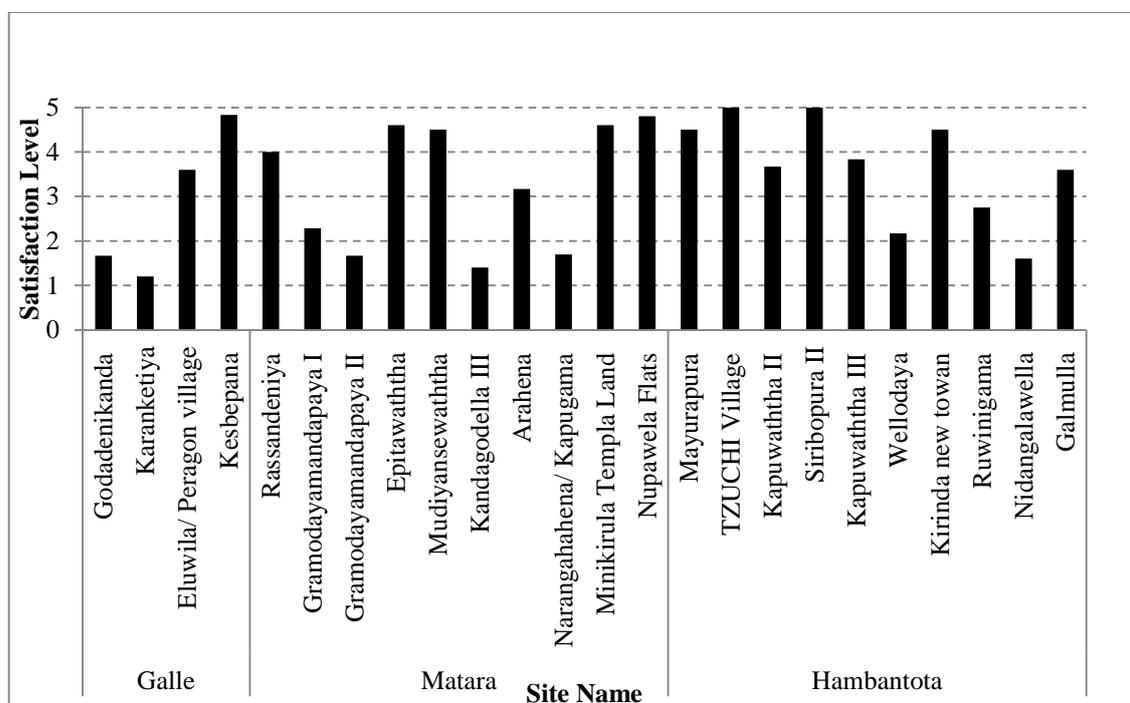
	Approximate distance to the following institutions (km)	School	Hospital	Market	Religious place	Public offices
Permitted distance		< 1	< 2	< 2	< 1	
Galle District	Godadenikanda	>2	>2	>2	>2	>2
	Karanketiya	>2	>2	>2	>2	>2
	Eluwila	=<1	>2	=<1	=<1	=<1
	Kesbepana	=<1	=<1	1 - 2	1 - 2	=<1
	Rassandeniya	=<1	>2	1 - 2	<1	>2
	Gramodayamandapaya I	1 - 2	>2	1 - 2	=<1	=<1
	Gramodayamandapaya II	1 - 2	>2	1 - 2	=<1	=<1
	Epitawaththa	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2
	Mudiyansewaththa	=<1	=<1	=<1	=<1	=<1
	Kandagodella	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2
Matara District	Arahena	=<1	=<1	>2	=<1	>2
	Narangahahena/ Kapugama	=<1	1 - 2	1 - 2	=<1	=<1
	Minikirula Temple Land	=<1	=<1	=<1	=<1	=<1

	Nupawela Flats	<1	1 - 2	=<1	=<1	1 - 2
	Mayurapura	1-2	>2	>2	>2	1 - 2
	Siribopura I (TZUCHI Village)	<1	>2	>2	>2*	1 - 2
	Kapuwaththa II (Hydramani)	>2	>2	>2	<1	1 - 2
	Siribopura II	<1	>2	>2	<1	1 - 2
	Kapuwaththa III (Orit)	>2	>2	>2	<1	1 - 2
	Wellodaya	>2	>2	>2	<1	>2
	Kirinda New Town	<1	>2	<1	<1	1-2
	Ruwinigama	>2	>2	>2	<1	>2
Hambantota District	Nidangalawella	>2	>2**	1-2	1 - 2	>2
	Galmulla	>2	>2	>2	1 - 2	1 - 2

\*- to the mosque

\*\* - nearest hospital is Debarawewa base hospital it is about 15 km from the site

#### 4.1.6.3.2 Level of satisfaction: Education facilities

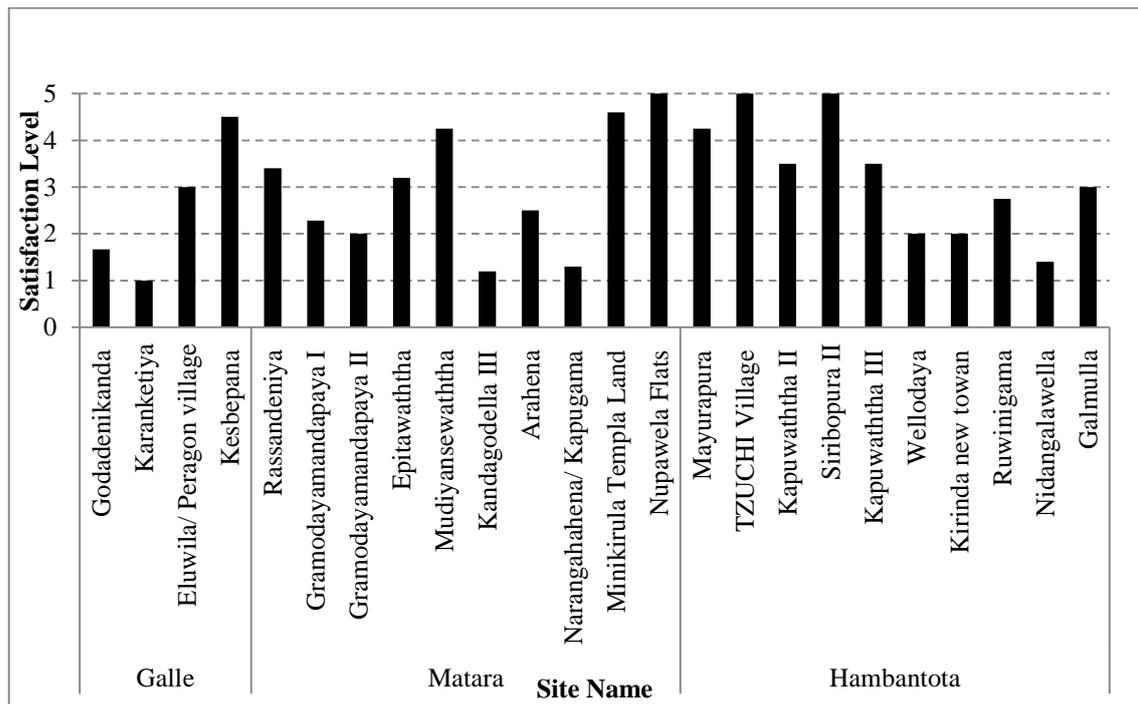


(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

**Graph 4-19 Level of satisfaction for education facilities**

In Galle district, Karanketiya tsunami resettlement site resettlers are most dissatisfied with the education facilities. As observed during the field visits the nearest school for the site located more than 2 km away from the site public transportation is inefficient. Therefore parents have to hire a three wheel or school children have to walk the distance for education. Kesbepana tsunami resettlement site is located very near to a school therefore residents are satisfied with the school facilities.

#### 4.1.6.3.3 Level of satisfaction: Hospital facilities



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

**Graph 4-20 Level of Satisfaction of Hospital facilities**

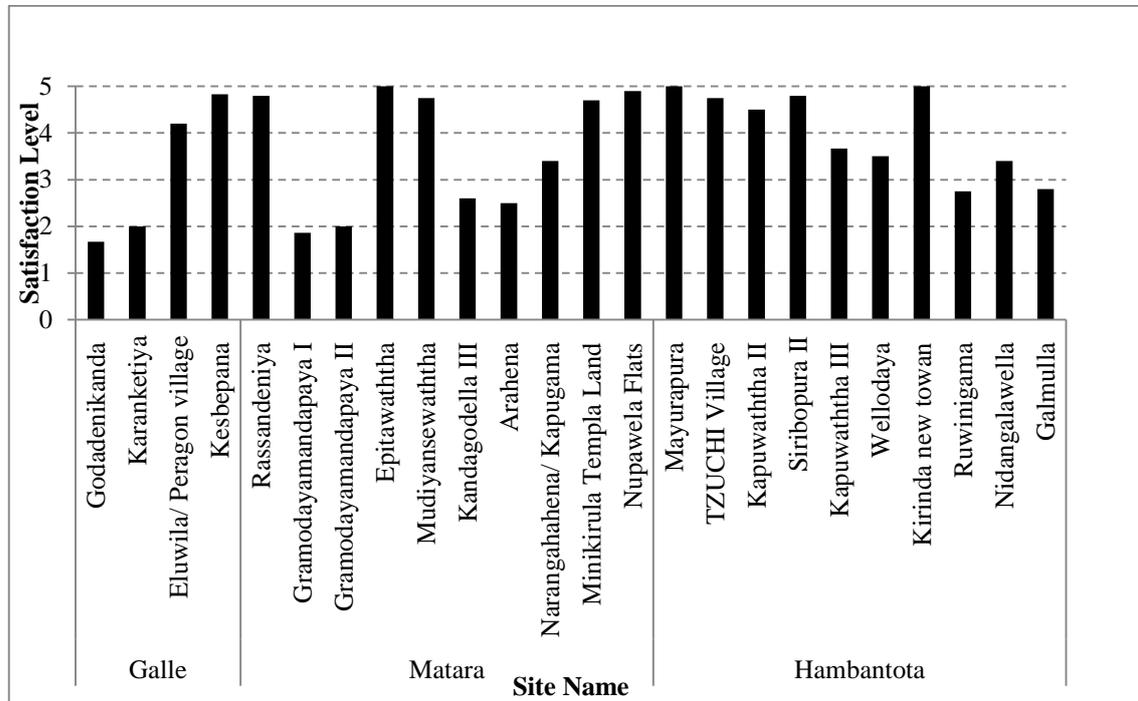
Karanketiya tsunami resettlement site in Galle district, resettlers are strongly unsatisfied with the hospital facilities and Godadenikanda tsunami resettlement sites' satisfaction level is 1.7. With reference to table 4.7 approximate distances to the hospital is more than 2 km for those two sites. Kesbepana resettlement sites beneficiaries are satisfied with the hospital facilities factor, with the level of 4.7. The reason for that is Mahamodara hospital, Galle is in easy access to the Kesbepana.

Considering Matara district Kandagodella III is least satisfied tsunami resettlement site for the hospital facilities. According to the table 4.7 approximate distances to the hospital from the site is 1-2 km. However the site is located on a hill and it is difficult to access to the main road. Internal roads are in very poor condition. Nupawela flats are strongly satisfied with the factor which is located close proximity to the Matara town.

Considering Hambantota district Nidangalawella tsunami resettlement site residencies are unsatisfied with the hospital facilities. The nearest hospital for the Nidangalawella is Debarawewa base hospital and it is about 15 km away from the site. Other than that residencies have to walk about 2 km to take a bus to go to the hospital. However there are private medical centers and a private hospital in Tissamaharama about 7-8 km distance from the site. TZUCHI village and Siribopura in Hambantota district are strongly satisfied with the hospital facilities with the satisfaction level of 5.0. As presented on table 4.7 approximate distance to the site to hospital for,

Mayurapura, TZUCHI village and Siribopura II are more than 2 km. However condition of the internal and external roads and transport facilities in very good condition.

4.1.6.3.4 Level of satisfaction: Shopping and other daily facilities



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

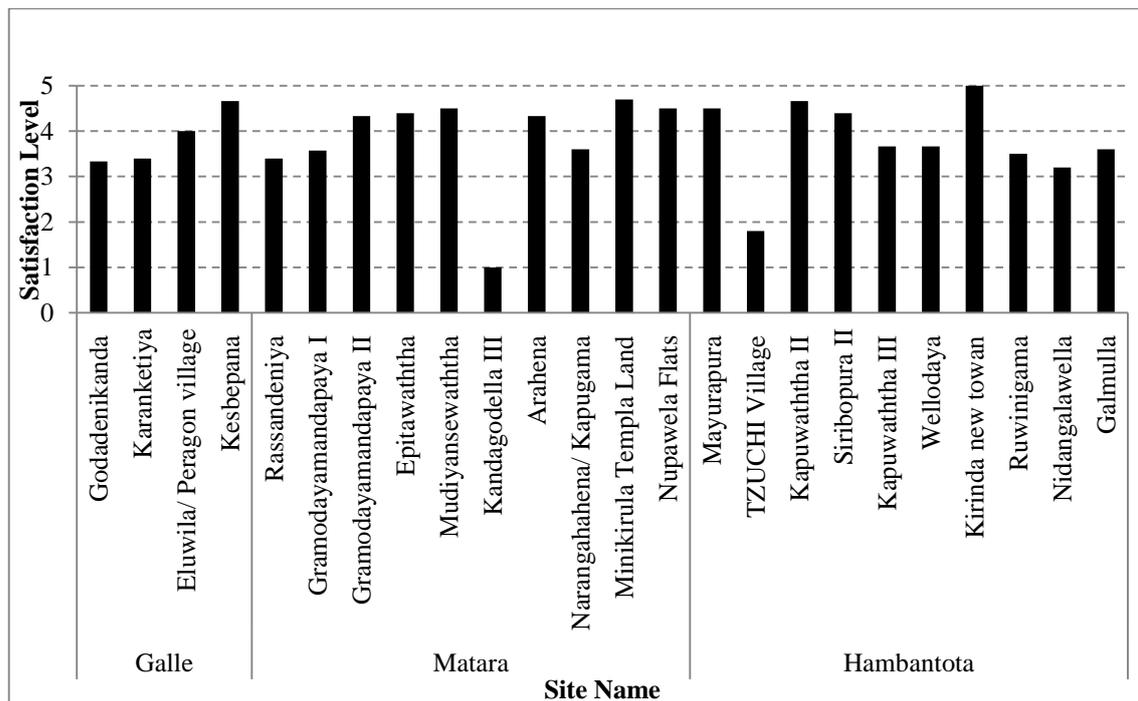
**Graph 4-21 Level of Satisfaction of Shopping and other daily facilities**

As presented on graph 4-21 level of satisfaction for the shopping and other daily facilities for Godadenikanda tsunami resettlement site is 1.7 which is the least for Galle district. As of the field observation there was no shops or market places in close proximity to the site and residencies have to walk long distances or travel by bus for shopping. Kesbepana tsunami resettlement site in Galle district located close to the Galle-Matara main road and area is an urban commercial area. Therefore residencies have no issue for the shopping and daily facilities and the satisfaction level is 4.8. In Matara district Gramodayamandapaya I shows the least satisfaction level for shopping and other daily facilities factor, 1.9. As presented on the table 4.7 approximate distance to the market place from the Gramodayamandapaya I is 1-2 km. However public transportation was not provided to the site or any close. Therefore residencies have to walk or travel by bicycle or three wheels to the main road for shopping and other daily facilities. Considering Hambantota district tsunami resettlement sites all the sites are satisfied with the factor except Ruwinigama and Galmulla. For the both sites approximate distance to the market place is more than 2 km and public transportation is not provided to the sites. It was observed that small shops are open by the residencies of some resettlement sites at their homes as a business.



**Figure 4-35 Small shops at houses to sell day to day goods at Rassandeniya Matara**

4.1.6.3.5 Level of satisfaction: Facilities for religion practices



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

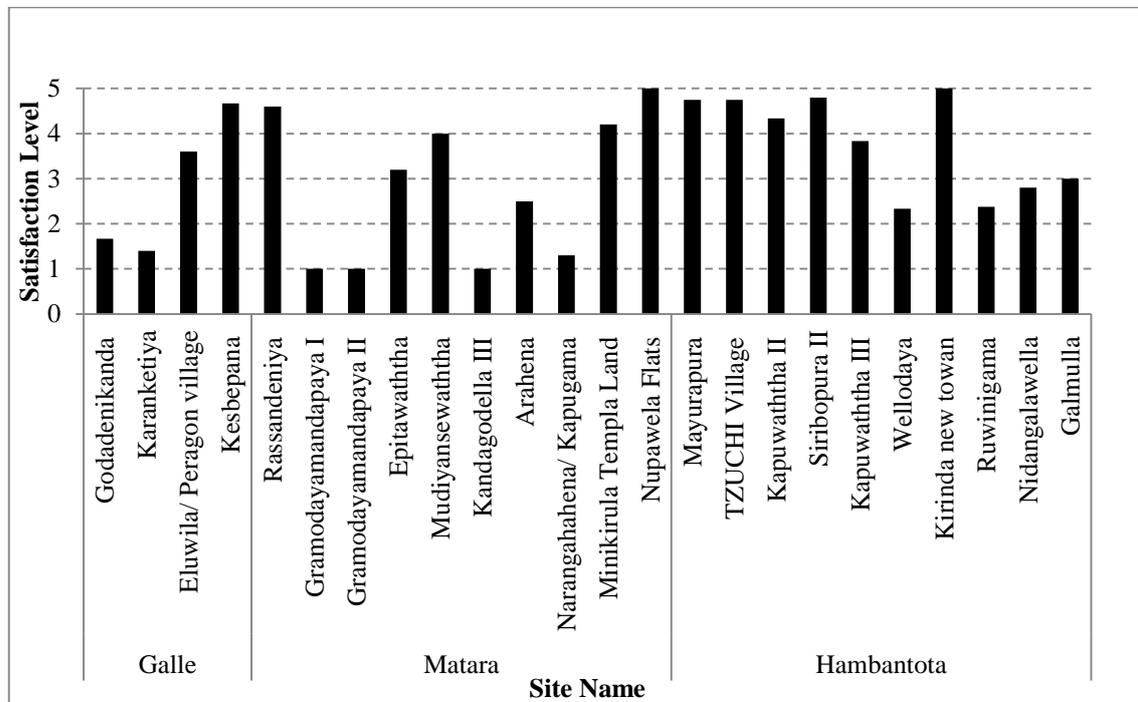
**Graph 4-22 Level of Satisfaction of Facilities for religion practices**

Considering the facilities provided for the religion practices it was observed that there are small temples or Bodhi established on most of the sites where majority Buddhist residencies. Galle district tsunami resettlement sites all the sites are satisfied or strongly satisfied with the facilities for religion practices.

In Matara district all the resettlement sites are satisfied or strongly satisfied with the facilities for religion practices except Kandagodella III. In Kandagodella III there is no religion place in the close proximity.

Hambantota district residencies are satisfied or strongly satisfied with the religion practices factor except TZUCHI village. Majority of the residencies in TZUCHI village are Muslims and approximate distance to the closest mosque is approximately 4-5 km.

4.1.6.3.6 Level of satisfaction: Average distance to administration matter



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

**Graph 4-23 Level of Satisfaction for Average distance to administrative matter**

Karanketiya resettlement site in Galle district, is least satisfied with the average distance to the administration offices, with the satisfaction level of 1.4. Administration offices are located in or near the towns. Therefore resettlement sites located close to the towns or which have easy access to the towns are satisfied with the administrative matters. Kesbepana tsunami resettlement site in Galle district is highly satisfied with the administrative matter with the satisfaction level of 4.7. Considering Matara district Gramodayamandapaya I, II and Kandagodella III tsunami resettlement sites are strongly unsatisfied with the satisfaction for the administrative matter. Nupawela flat which is in the Matara town is strongly satisfied with the average distance to the administrative matter. In Hamantota district Wellodaya tsunami resettlement site resettlers show the least satisfaction for the average distance for the administrative matter, 2.3. Reference to the table 4.4 approximate distance from the Wellodaya to administrative offices is more than 2 km. Highest satisfaction level shows the Kirinda new town in Hambantota district with the satisfaction level of 5.0.

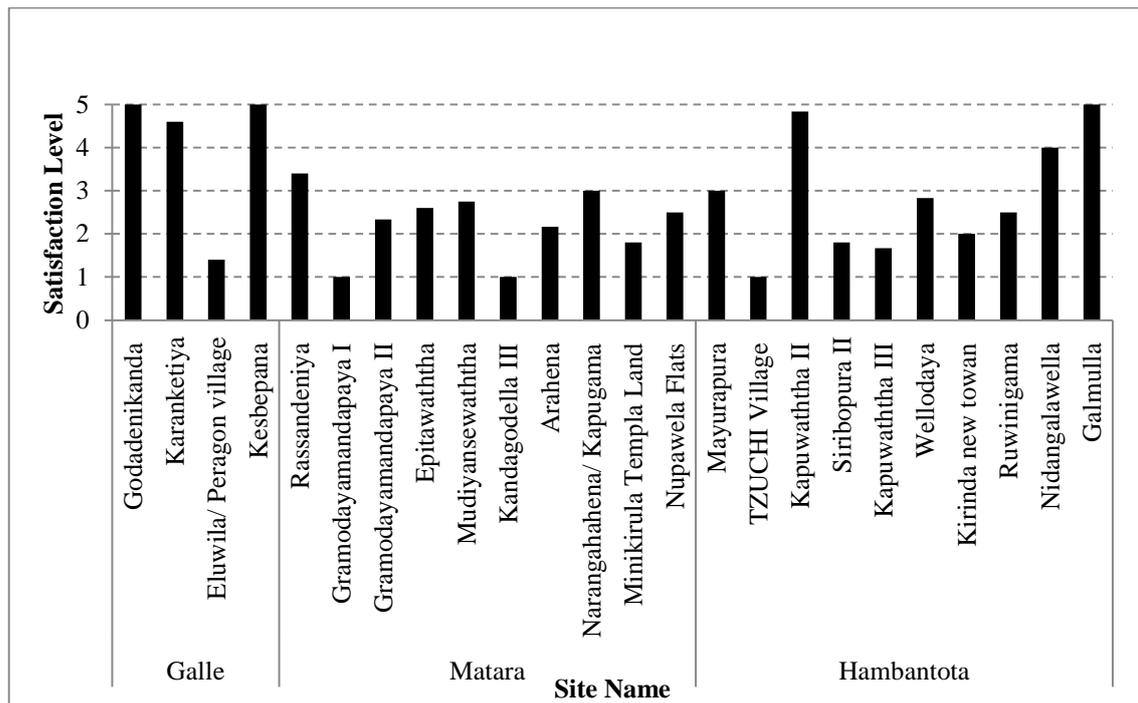
As per the observation and analysis of the results satisfaction level for the distance for above institutions depends on the closeness to the towns and the provision of good transportation system and good condition internal and external roads.

#### 4.1.6.4 Land tenure

##### 4.1.6.4.1 Policy and legislation for Land tenure

There is no specific policy or legislation addresses the stage or time of provision of land tenure.

##### 4.1.6.4.2 Level of satisfaction: Land tenure



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

**Graph 4-24 Level of Satisfaction for Land tenure**

As state by Shawn et al., 2010 in Sri Lanka occupants received a limited form of title which restricts transfer of land for a period of seven to ten years, after which dull freehold title conferred. Transfers to family members are permitted during the interim period. Also houses cannot be used as collateral for a bank loan during the interim period, a significant constraint on enterprise development, given the difficulties faced by small businesses in accessing credit.

Some of the resettlement sites, resettlers received land title, however still there are some resettlement site who do not received lad title more than decade of the disaster. Therefore, beneficiaries' sense of ownership for the resettlement site has weaken.

## 4.1.7 Leisure and Neighborhood

### 4.1.7.1 Leisure and sport facilities

#### 4.1.7.1.1 Policy and legislation for Leisure and sport facilities

As state on NHDA Guideline, according to UDA settlement planning requirements 5% settlement land should be allocated for public or semipublic social infrastructure and 10% of settlement land should be allocated as common area of the total settlement land. However at resettlement construction before the introduction of UDA guidelines, there were no requirement for construction of playgrounds, parks and community meeting centers. It was up to implementing agency to incorporate these items to their master plan of the scheme (Shaw et al., 2010 and interviews).

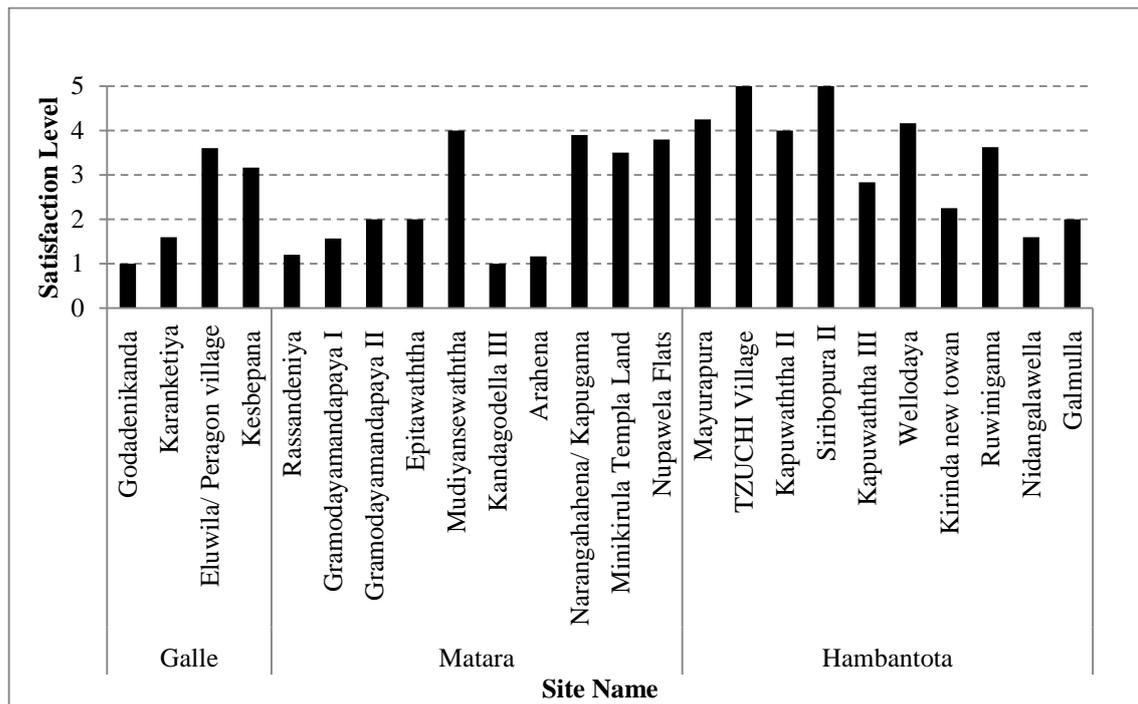
**Table 4.8 Settlement planning requirements by the UDA**

<b>Utilization</b>	<b>Coverage of Settlement Land</b>
Housing-Neighborhood facilities	65% (Maximum)
Common Area	10% (Minimum)
Road, Streets, footpath and drains	20% (Minimum)
Public and semipublic (social infrastructure)	5% (Minimum)

As per the results of survey I all the surveyed resettlement sites in Galle district have play grounds except Kesbepana. There is an open space in Kesbepana which was originally allocated for construction of a “praja shala” (Community center) which was not taken place and small kids use it as a playground and for common activities.

In Matara district all the resettlement sites have playgrounds except Kandagodella III and Arahena, no space has allocated for a playground or any common purposes when designing the Kandagodella III and Arahena resettlement sites. However in most of the play grounds in resettlement sites are currently using for cattle grazing due to poor maintenance and community centers were abandoned.

#### 4.1.7.1.2 Level of satisfaction: leisure and sport facilities



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

**Graph 4-25 Level of Satisfaction of Leisure and Sports facilities**

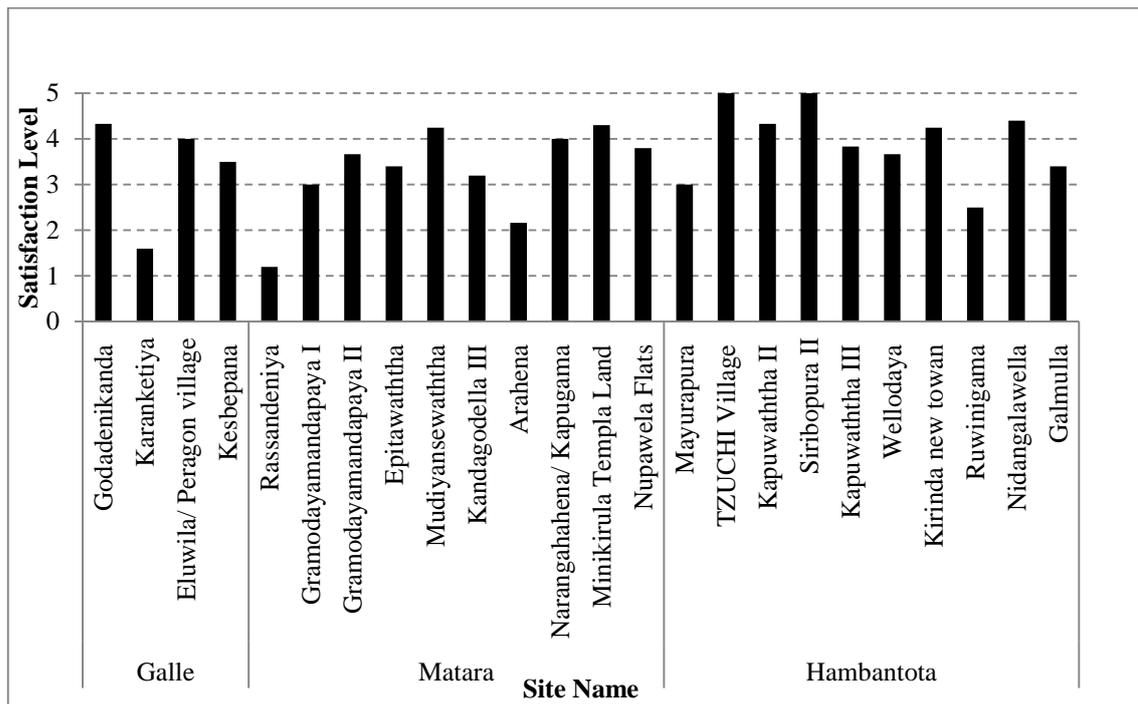
According to the graph 4 - 25 of level of satisfaction of leisure and sports facilities of beneficiaries of tsunami resettlement sites surveyed, Godadenikanda in Galle district and Kandagodella III in Matara districts have the lowest satisfaction level of 1.0 and TZUCHI village and Siribopura II in Hambantota district has the highest satisfaction level of 5.0 for leisure and sports facilities. In district wise consideration Galle district highest satisfaction level is 3.6 in Eluwila or Paragon village. As well as in Matara highest is 4.0 in Mudiyansewaththa and in Hambantota lowest level of satisfaction shows in Nidangalawella and the level is 1.6.

#### 4.1.7.2 Neighborhood Safety

##### 4.1.7.2.1 Policy and legislation of Neighborhood safety

There is no specific policy or legislation address for the neighborhood safety.

#### 4.1.7.2.2 Level of satisfaction: Neighborhood safety



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

**Graph 4-26 Level of Satisfaction for Neighborhood safety**

Karanketiya tsunami resettlement site in Galle district resettlers shows the least satisfaction level with the neighborhood safety factor, 1.5 and the Godadenikanda shows the highest satisfaction level of 4.3. In the Karanketiya tsunami resettlement site people from different communities were settled on the same land. According to the residencies there are families belong to different occupation types and social classes. In the Godadenikanda people who lived in a same community before the disaster were resettled together. Therefore residencies feel safe and trusted with their neighbors. In Matara district Rassandeniya tsunami resettlement site has the lowest satisfaction level for the neighborhood safety factor, 1.2 and Arahena 2.2. Host community who are living close to the resettlement site became neighbors to the resettlers after the settlement. It was observed that in some resettlement sites host community is not welcome the resettled community. According to the resettlers in Rassandeniya tsunami resettlement site frequent conflicts occur among host community and resettled community. Even during the time of interview a gang of boys from the host community ride motorbike through the resettlement site. A police check point is established and a policeman was appointed 24 hour service in the site by the authorities for control the situation. However resettlers claim that it is not functioning very well and threatening to the resettled community is still happening.



**Figure 4-36 Policeman was on duty for 24 hr at the Grama Niladari office and now not functioning at Rassandeniya, Matara**

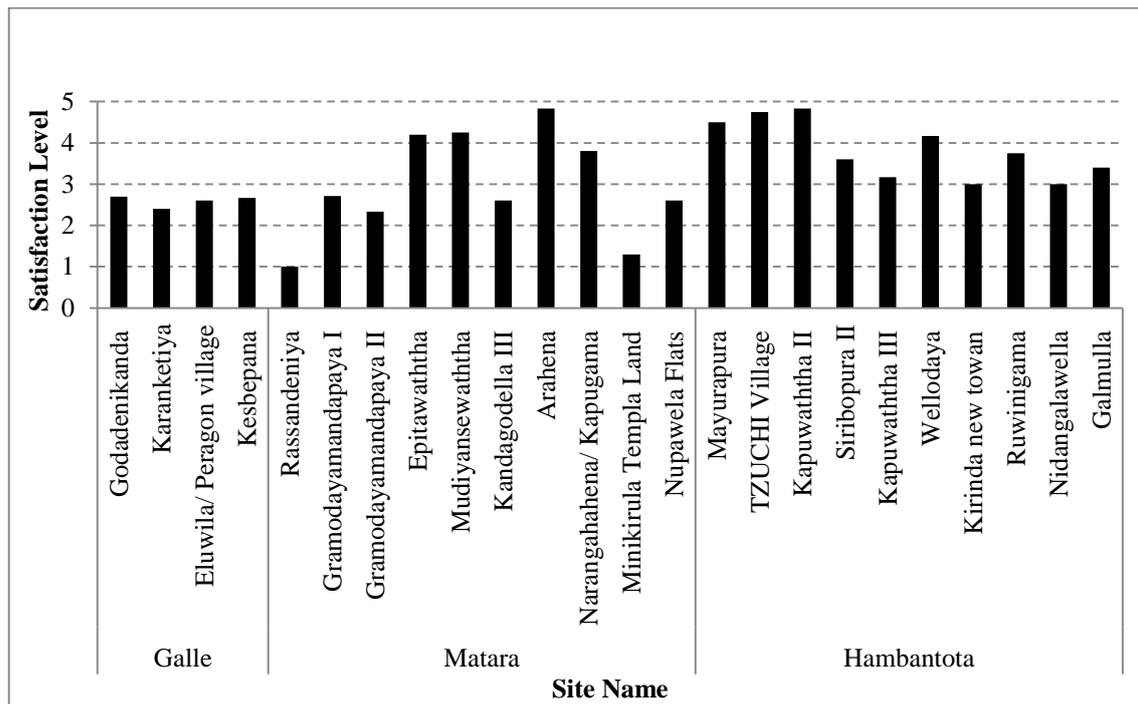
Minikirula temple land and Mudiyansewaththa, show the highest satisfaction level for this factor, 4.3. As in the Galle district tsunami resettlement sites, same reason was pointed out at the discussions with the residencies for the satisfaction and dissatisfaction for the neighborhood safety. As they state if same communities who lived together earlier resettle together they already knew the roots of every person. If people from different communities put together they said they do not from whether the other person came from. In Hambantota district most of the resettlement sites are either satisfied or highly satisfied with the factor of neighborhood safety. 5.0 is the highest satisfaction level in TZUCHI village and Siribopura II. Ruwinigama shows the least satisfaction level 2.5.

#### **4.1.7.3 Privacy**

##### **4.1.7.3.1 Policy and legislation for privacy**

There is no specific policy or legislation state for the privacy factor.

#### 4.1.7.3.2 Level of satisfaction: privacy



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

**Graph 4-27 Level of satisfaction of privacy**

The factor of privacy was identified as important factor during the preliminary field visits. Most of the resettlers' complain on the privacy factor. There were three main reasons that effect on the privacy, which are distance between two houses, boundaries between two houses and people from different communities settled together. It was observed that distance between two houses is very narrow and hoses are very close to each other in some resettlement sites. In that sense privacy is less. However it was observed that Godadenikanda resettlement site houses are very close to each other even though they are satisfied with the privacy factor. Godadenikanda resettled people are fishermen who lived in same community before the disaster. They lived on the shore on share basis of the land therefore this living style is familiar to them and they even appreciate it. Boundary wall were built only in some resettlement sites and some houses those who can afford.

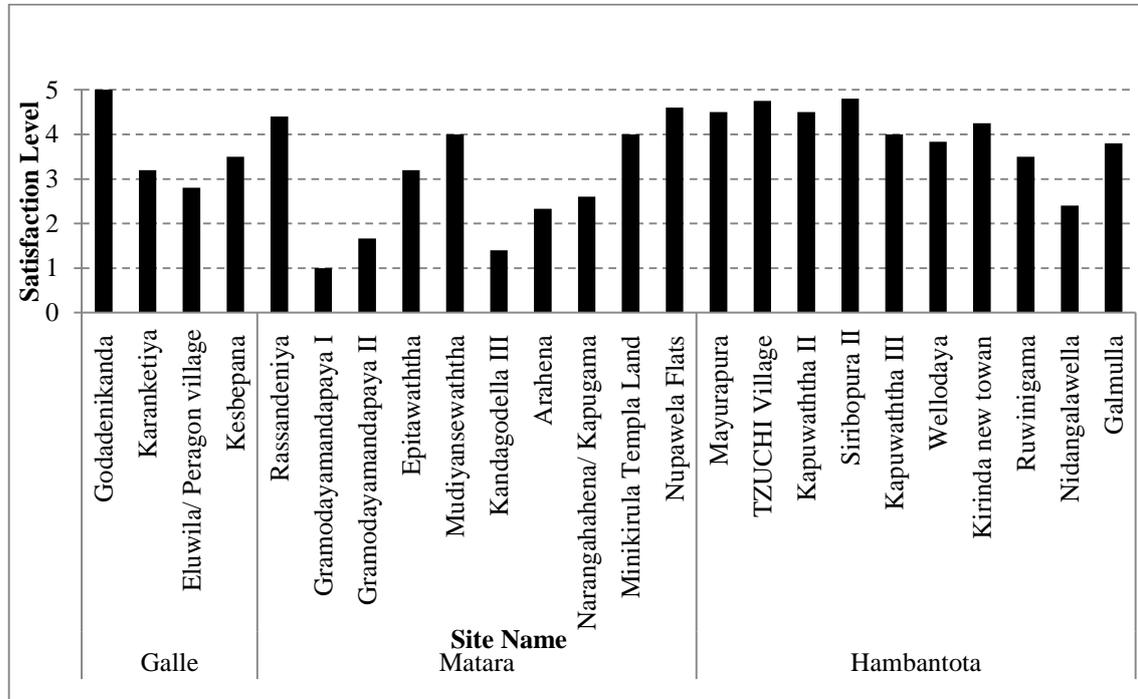
Karanketiya resettlement site in Galle district, satisfaction for the privacy factor is 2.4. However Godadenikanda has highest satisfaction level, 5.0. In Matara district Rassandeniya tsunami resettlement site shows the lowest level of satisfaction, 1.0 and Arahena in Matara district shows the highest satisfaction, 4.8. In Hamabantota district most of the resettlement sites residencies are satisfied with the privacy factor. As state above residencies were awarded lager land plots and houses are not much close to each other. All the resettlement sites in Hamabantota district show the satisfaction level of 3.0 or above for the privacy factor, TZUCHI village and Kapuwaththa are the highest, 4.8.

#### 4.1.7.4 Time for family commitments

##### 4.1.7.4.1 Policy and legislation for Time for family commitments

There is no specific policy or legislation for the time for family commitment factor.

##### 4.1.7.4.2 Level of satisfaction: Time for family commitments



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

**Graph 4-28 Level of satisfaction for Time for family commitments**

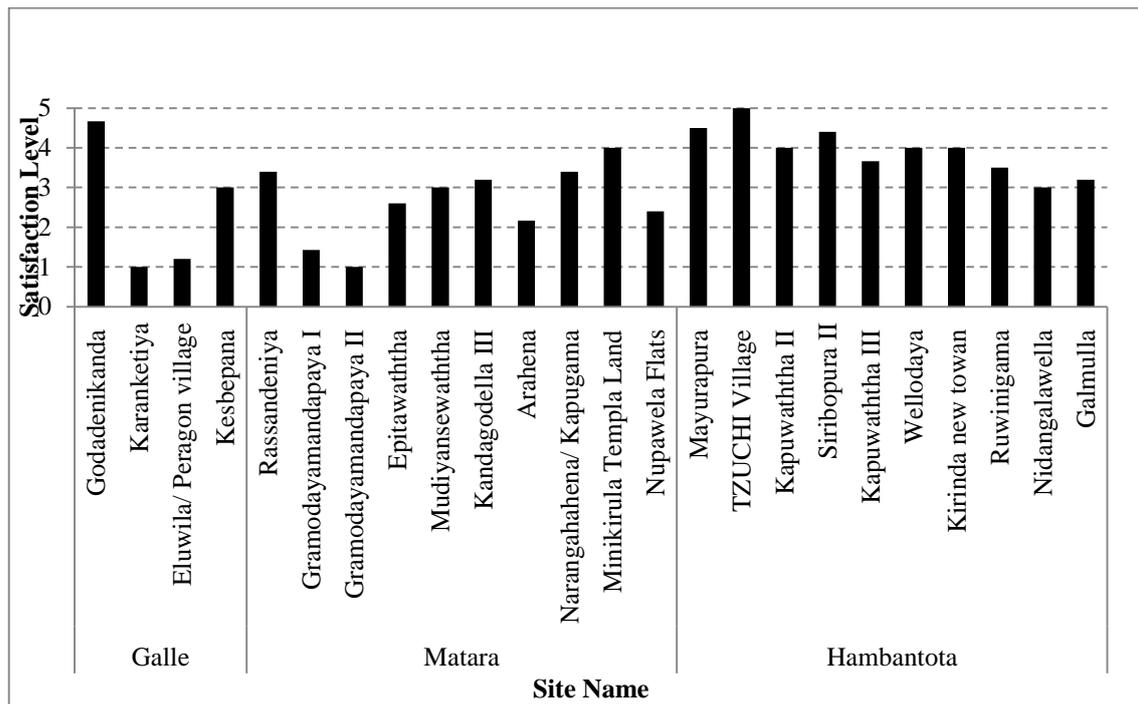
Satisfaction level for the time for family commitment in Galle district, Godadenikanda is the highest, 5.0 and Eluwila is the lowest. As in Matara district Gramodayamandapaya I is the lowest and Nupawela flats is the highest and in Hambantota district most of the resettlers are satisfied with the time for family commitment factor. This factor was identified during the preliminary field visits and discussions with the expertise. As per the observations, time for family commitment factor is mostly related to the convenience to livelihood facilities factor.

#### 4.1.7.5 Community development programs

##### 4.1.7.5.1 Policy and Legislation for Community development programs

There were no specific policies or guidelines state on this regard however under the section of good practices of NHDA guidelines, construction of community resource centers and other facilities to launch common activities and training.

#### 4.1.7.5.2 Level of satisfaction: Community development programs



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

**Graph 4-29 Level of satisfaction for community development programs**

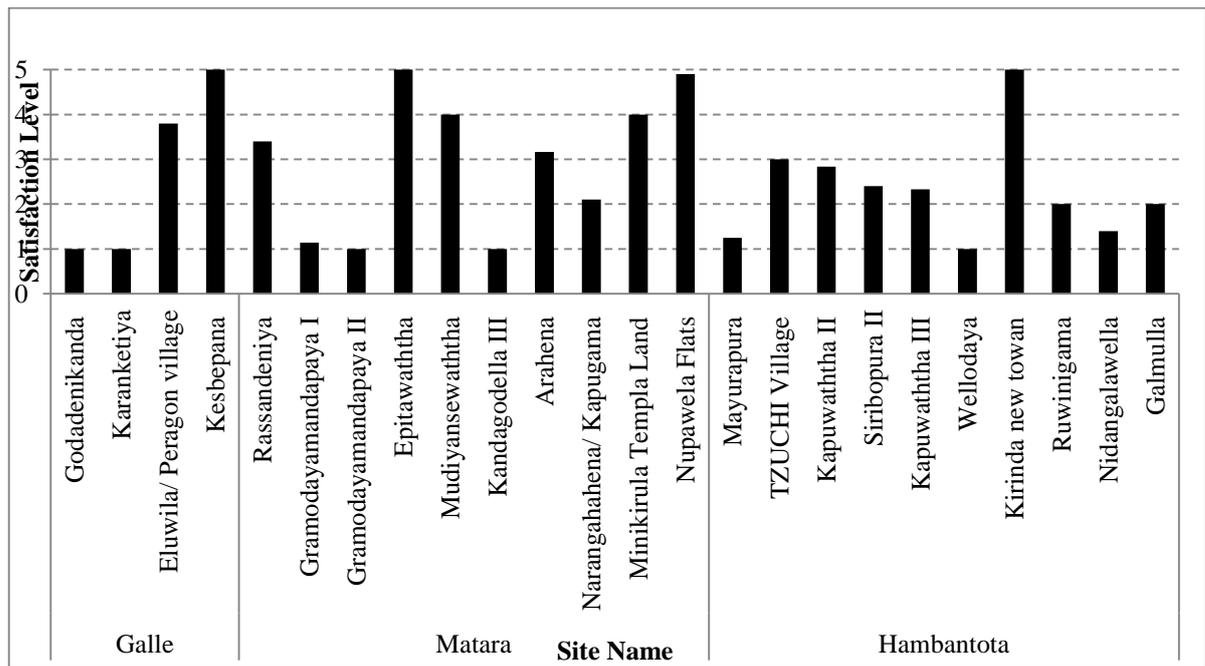
As per the survey II results presented above graph 4-28 level of satisfaction for the community development programs in Galle district and Matara district is considerable low than Hambantota district. In Galle Karanketiya shows the lowest satisfaction and Godadeniknada shows the highest satisfaction. In Matara district, Gramodayamandapaya II shows the lowest satisfaction and Minikirula temple land shows the highest satisfaction and in Hambantota all the resettlers are satisfied or strongly satisfied with the community development programs. The community development program factor is totally decided by the developer of the resettlement sites. It is more than a decade of the establishment of resettlement sites, however still there are community development programs going on in some sites. However some of these programs were started on the beginning and stopped in 2, 3 years.

#### 4.1.7.6 Convenience to livelihood

##### 4.1.7.6.1 Policy and legislation of Convenience to livelihood

NHDA Guidelines does not state clearly on the convenience for the livelihood, however it state that participatory initiatives should be considered to improve the living environment and re-establishing livelihood options in the section of good practices.

#### 4.1.7.6.2 Level of satisfaction: Convenience to livelihood



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

**Graph 4-30 Level of satisfaction for Convenience to livelihood**

Convenience to the livelihood factor is depending on three main factors.

1. Closeness to the working place
2. Transport facilities
3. Availability of new livelihood opportunities in new resettled areas

This is a critical factor that has to consider in the settlement planning, that influence on the abundance of the resettlement sites. It was observed that resettlement sites which were established in close proximity to the previous site or in easy access are more satisfied with the factor. However there are some critical situations. Fishermen who were settled in Godadenikanda and Kanranketiya resettlement sites in Galle district are facing great difficulties due to the reason the sites are located more than 10 km away from the harbor points and there are no proper transport facilities. They have to use their private vehicles or hire three wheels or walk by foot early in the morning to sail. However it is really difficult to these fishermen by its all the means, physically and economically. In the other hand these two settlement sites are located in rural areas where there are very low job opportunities. In Galle district resettlers in Kesbepana resettlement site shows the highest satisfaction level which is located near to their prior settlement areas and easy access to main city, Galle. In Matara district resettlers in Epitawaththa are highly satisfied with the convenience to livelihood factor, where Gramodayamandapaya I and Kandagodella III are strongly unsatisfied. Gramodayamandapaya I and II are situated in close proximity. In Gramodayamandapaya II most

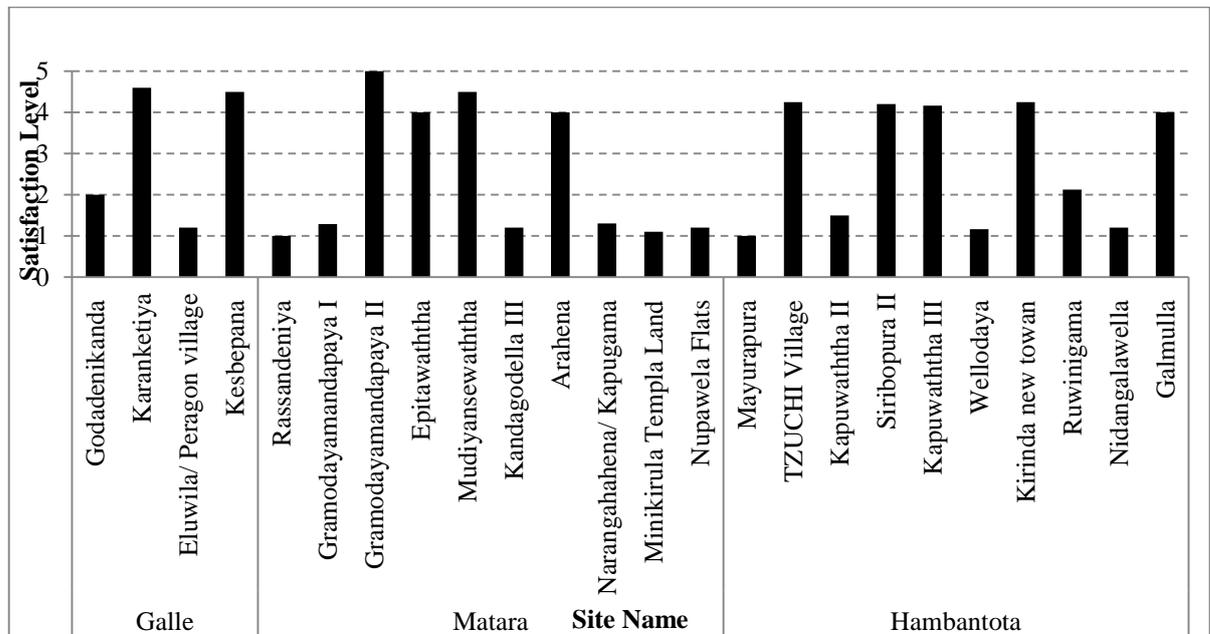
of the resettlers are fishermen where Gramodayamandapaya I most of the resettlers are farmers or retired government workers. Eventhough Kandagodella III resettlement site situated in close proximity to shore in spatially, there is no proper access. In Hambantota district resettlers in Kirinda New town resettlement site shows the highest satisfaction level, 5.0 for convenience to livelihood factor. Those people were resettled in the same place where they lived before the tsunami therefore their livelihoods can be continued. Wellodaya resettlers are strongly unsatisfied with the convenience to livelihood factor.

#### 4.1.7.7 Conflicts and Social Issues

##### 4.1.7.7.1 Policy and legislation for Conflicts and social issues

There were no specific policy or regulations for control conflict and social regulations in the resettlement sites, general low is apply as in other parts of the country.

##### 4.1.7.7.2 Level of satisfaction: Conflicts and social issues



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

**Graph 4-31 Level of satisfaction of conflicts and social issues**

Following were identified as the main reasons for the conflicts and social issues:

1. Variances of the resettlers social and economic classes
2. Conflicts due to unequal distribution of benefits
3. Conflicts due to environmental factors
4. Conflicts among host population and resettlers

It was observed that kinshiptions and neighborhood factors were not consider at all for some resettlement sites, affected people from different areas and belong to different occupations were

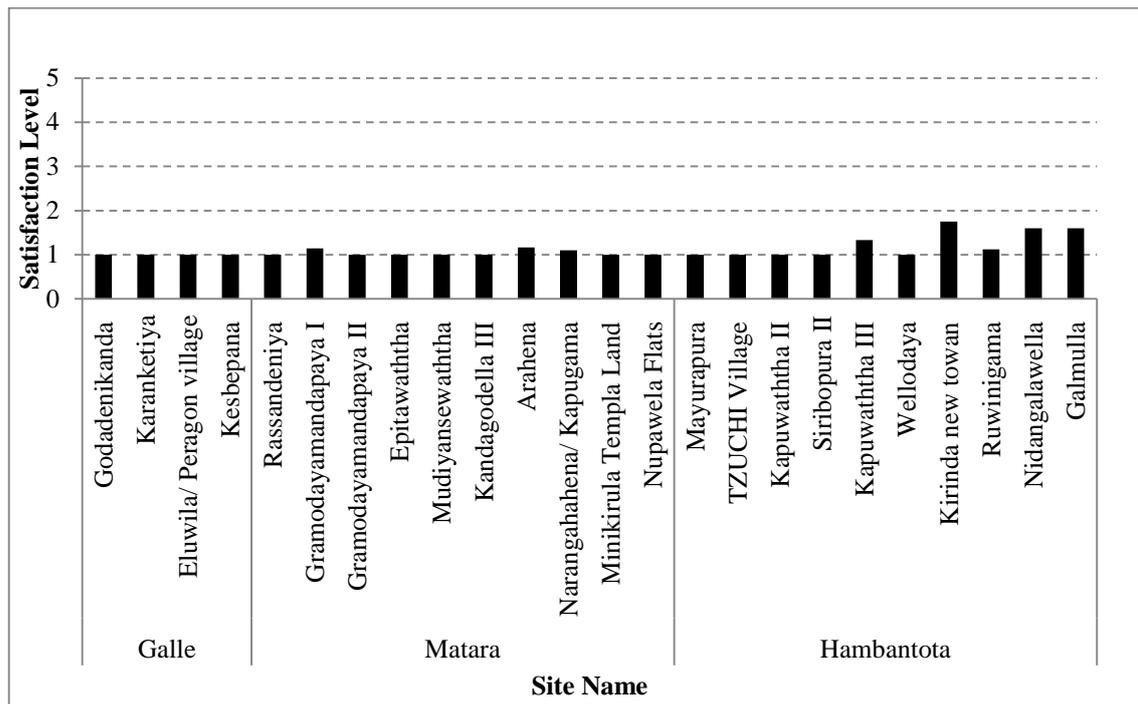
resettled together. In Sri Lanka fishermen are marginal group and most of them live on or near shore. In some resettlement sites, as an example Nupawela flats in Matara a group of fishermen are resettled with government workers. There are severe conflicts among two group even they are living in same land. However there are some resettlement sites, resettlers were lived together before the disaster and mostly peaceful environment can be observed in those sites, such as Karanketiya and Kesbepana in Galle district. Unequal distribution of benefits became social issues in some resettlement sites. In the post tsunami disaster period affected people were compensated by many donor agencies and lots of aids programs were conducted. However there were no clear procedure for aid distribution and beneficiary selection. As explained above some resettlement sites experiencing solid waste management, storm water management and erosion issues and those became sever social issues. In Gramodayamandapaya I in Matara district storm water drainage are blocked and storm water flow over the low lands and in Minikirula temple land there is severe issues due to soil erosion. Even some houses were abandoned due to those issues. In Rassandeniya Matara district larger resettlement community were settled in small host community and there are severe conflicts among the two parties. As explain in 4.5.2.2.

#### **4.1.7.8 Participation for planning**

##### 4.1.7.8.1 Policy and legislation for Participation for planning

NHDA Guidelines had identified community centered planning as a best practice. It state that the affected families and communities will take ownership of the process and the results only if they are involved in the decision-making and implementation process. When the community takes ownership of the process and the results, there is a greater likelihood of short and long-term project success and the minimization of the concomitant risks. However as per the observations this was not thoroughly practiced during the implementation.

#### 4.1.7.8.2 Level of satisfaction: Participation for planning



(1 – Strongly dissatisfied, 2 – Dissatisfied, 3 – Neutral, 4 – Satisfied, 5 – Strongly satisfied)

**Graph 4-32 Level of satisfaction for Participation for planning**

It clearly shows that beneficiaries' satisfaction for the factor of participation for planning is strongly unsatisfied for all the surveyed tsunami resettlement sites. During the interviews beneficiaries strongly state that any of them were not involved with the planning or implementation process of the resettlement programs. Houses were awarded under fully or partial completion conditions. One recipient in Kirinda New town said that some of the beneficiaries were taken to show a sample housing design in Kirinda new town tsunami resettlement site. He said that it seems different therefore we liked it, which found number of difficulties living in that houses after a decade of the disaster (4.3.1.1.1).

#### 4.6 Overall satisfaction of Environmental and social factors

Considering the overall satisfaction levels of environment factors of the all the surveyed tsunami resettlement sites, following were identified as critical.

**Table 4.9 Satisfaction Level of Environment Factors**

Satisfaction Level	Environment Factors
Strongly unsatisfied	0
Unsatisfied	Dwelling size
	Interior design
	Light and ventilation
	Building quality

	Fire and other safety facilities
	Waste water management
Neutral	Noise
	Level of completion house
	Site Selection
	Layout of the property
	Landscaping
	Surrounding Environment
Satisfied	Water supply
	Solid waste management
Strongly satisfied	Electricity

As shown there is no “strongly unsatisfied” environment factor in overall satisfaction level analysis. However dwelling size, interior design, light and ventilation, building quality, fire and safety facilities and waste water management factors are unsatisfied.

- In the regulation the size of the dwelling was not consider the size of the family.
- In the interior designing at the planning stages the social class, cultural views and economic status were not considered
- Light and ventilation factors were not considered in the planning stages
- During the tsunami reconstruction period there was high demand for construction materials, therefore unit price of the construction materials went high. The implementation agencies had to reduce the cost of construction by any way to achieve the target number of houses. Therefore some low quality materials were used in some sites.
- Fire and safety factor was not considered and properly addressed in policy and regulation guidelines.

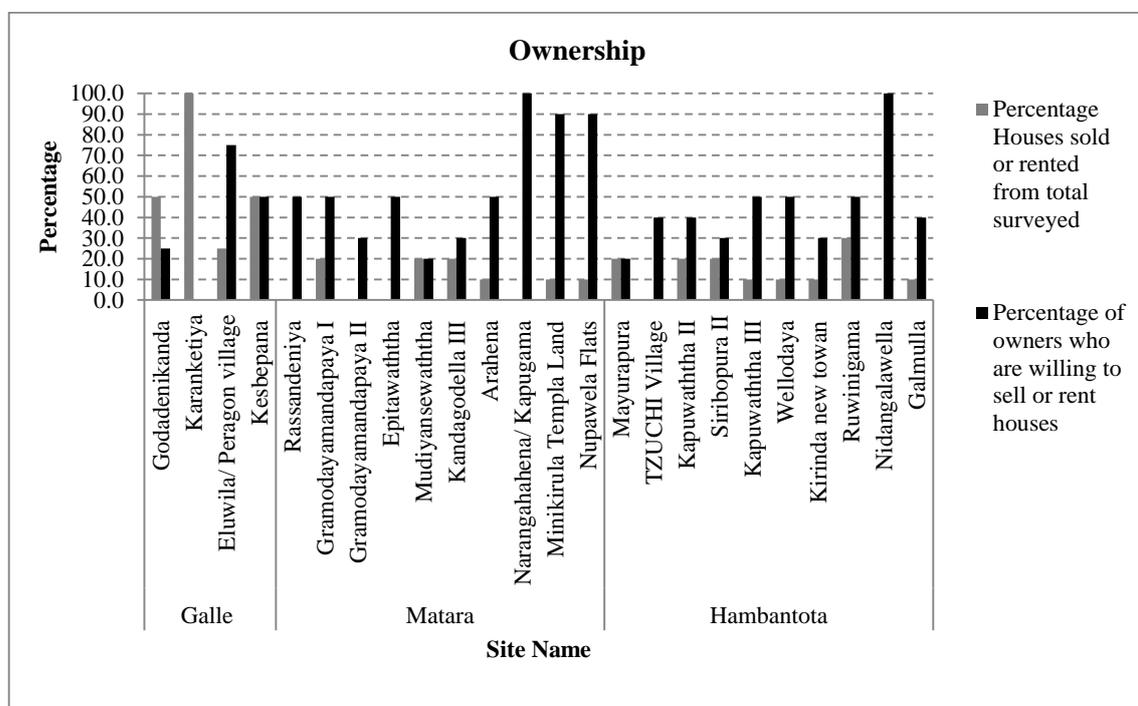
Considering the overall satisfaction for the social factors, in all the surveyed tsunami resettlement sites participation for the settlement planning factor is strongly unsatisfied. However there is no unsatisfied or strongly satisfied social factor considering the overall satisfaction level. All the other social factors are either neutral or satisfied.

**Table 4.10 Satisfaction level of social factors**

<b>Satisfaction Level</b>	<b>Social Factors</b>
Strongly unsatisfied	Participation for planning
Unsatisfied	0
Neutral	Leisure and sport facilities
	Convenience to livelihood
	Community development program
	Conflicts and Social Issues
	Privacy
	Average distance to administration matter

	Land tenure
	Public transport
	Education facilities
	Hospital facilities
Satisfied	Neighborhood safety
	Time for family commitments
	Parking space
	Facilities for religion practices
	Shopping and other daily facilities
Strongly satisfied	0

#### 4.7 Level of Ownership and percentage of owners who are willing to sell or rent houses



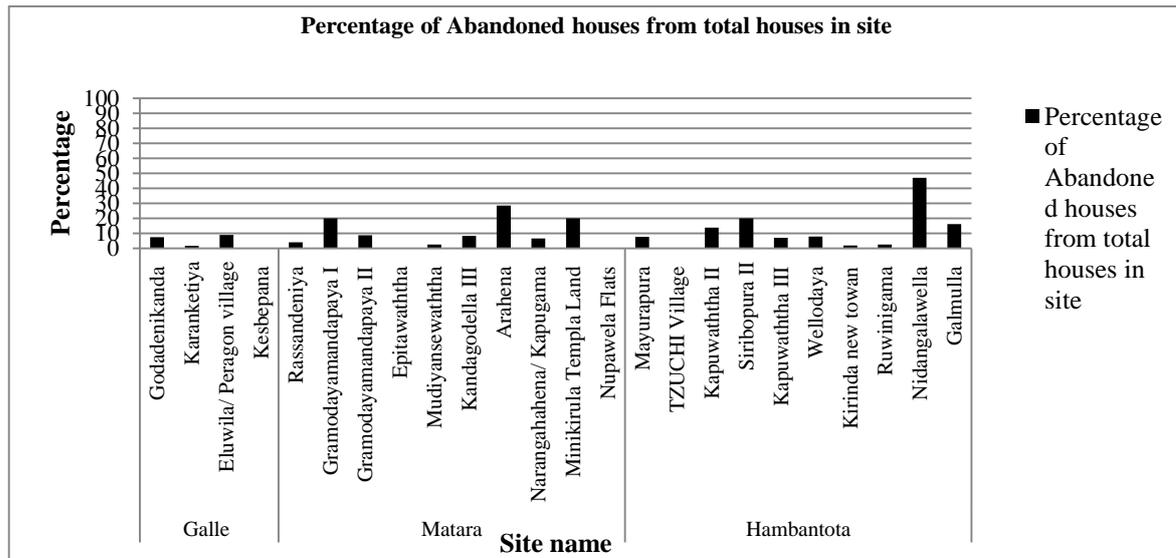
Graph 4-33 Ownership and willing to sell or rent houses

The level of ownership and willingness to sell or rent houses were surveyed and analyzed as percentage of the total surveyed houses. Rent or sell the houses directly related to the demand for the land plot however in the other hand it also emphasis on they have loosen their interest on the benefited houses and more valued the economic benefit of that. However this factor is directly rely on the land tenure. Even though some houses were rented out or sold under mutual understandings, without legal documents. In Galle district, Karanketiya resettlement sites all the surveyed houses are rented or sold by first owner. In Matara and Hambantota districts, most of the owners of houses are willing to sell or rent their houses. According to the discussion with resettlers in Nupawela

flats, Matara there is high demand for their houses due to the factor of most popular schools are located in close proximity to their houses. Therefore most of the people rent the houses and live somewhere else.

#### 4.8 Abandoned Houses

Numbers of abandoned houses in surveyed resettlement sites were analyzed as a percentage of total houses in the resettlement site. The information was taken by the discussion with grama niladari or community leader or group discussions with the beneficiaries.



**Graph 4-34 Percentage of abandoned houses from total number of houses**

As per the results in Nidanagalawella resettlement site in Hambantota district 47% of houses were abandoned by the beneficiaries. Nidanagalawella is located in very remote area in Tissamaharama and there was no water supply to the site until year 2015 also frequent wildlife attack is occurring in the site. The heat and dust problem made site is unfavorable conditions specially for kids, pregnant mothers and elderly. People who can afford to find other places for living and those who cannot afford are only remaining. However as per the survey result and observations, the unsatisfaction of the social and environmental factor had led to rejection of those resettlement sites those which had to address in policy, planning and implementation stages.

Abandonment, sell or rent houses and willingness to sell or rent houses are indication of the peoples' disappointment of the resettlement programs.

## 5 CHAPTER CONCLUSION

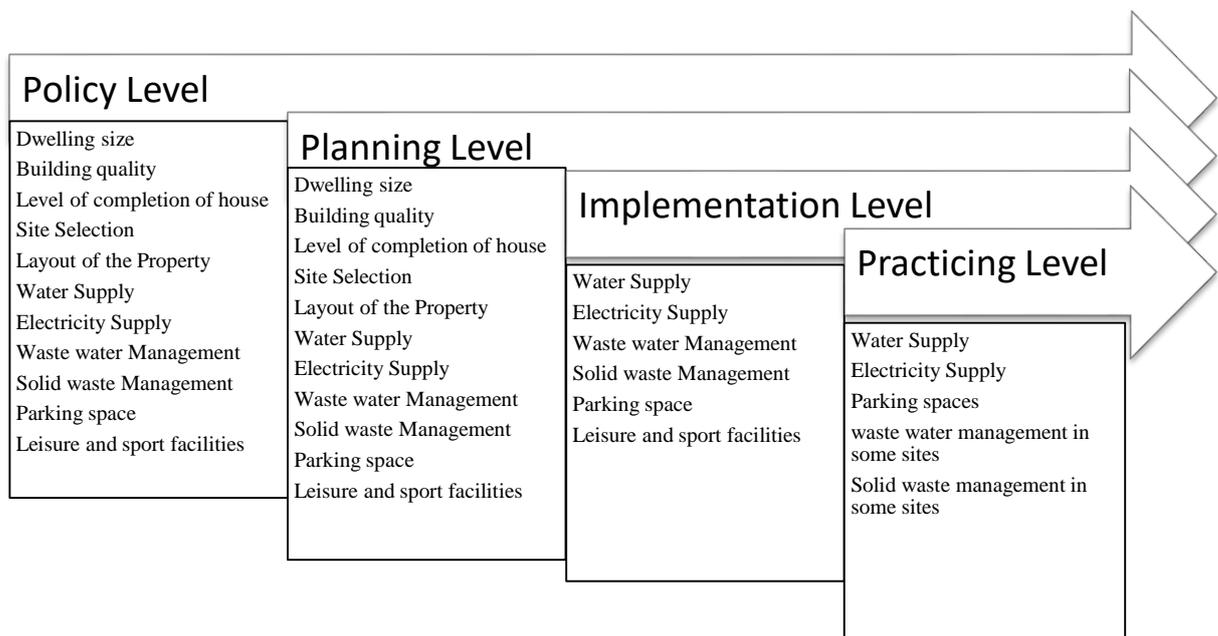
Evolution of the resettlement subject is taking place every day with the experiences of the different resettlement programs world widely. However with all these differences it is no arguable that the resettlement programs has to consider Physiological, Psychological, Economical and Social vulnerabilities of affected people and increase the resilience of the community and at the same time it has to be development oriented.

Resettlement process consists of four major phases; policy, planning, implementation and practicing. Successes of all the four stages are crucial for success of a resettlement program. Identification of all the stakeholders and managing them to one direction is a challenge. Very first large scale natural disaster induced resettlement program in Sri Lanka, tsunami resettlement critically disapprove by resettlers and other communities. The tsunami resettlement program was conceded in number of districts and regions in the country. Success level of the tsunami involuntary resettlement programs is different with each other due to their unique features of land, type of the communities and benefits received. However the overall process was controlled under the government and agencies, organizations worked under the government umbrella.

In tsunami resettlement in Sri Lanka it was clear that absence of policies, continues changers of policy decisions and lack of communications of those decisions taken had led to serious negative impacts on resettlement. At the time of tsunami resettlement there was no existing policy that can be readily adopted for handle resettlement program in this scale. Moreover institutional capacities were inadequate and officials were inexperience. Policies were implemented after the disaster and during the resettlement program. However numbers of practical difficulties were raised with these policies, therefore several revisions were taken place. Firstly within weeks of the tsunami disaster buffer zone policy was strictly enforced. It was a challenge to find suitable lands for entire population that had been relocated due to the buffer zone policy. Majority of the country's population is concentrated in the coastal belt. Furthermore government allowed hotels and restaurants to allow remaining on the coast even they were within the buffer zone. That made sever public opposition and letter on government allowed rebuilt houses within the buffer zone. These changers were impacted to the resettlement programs in many ways, affected people became more vulnerable with not knowing where to go, donor agencies also face difficulties on rebuilding houses and more over that government officers had to find suitable lands for resettlement programs. Some of the affected people were given houses in resettlement sites and latter with the relaxation of the buffer zone policy they were allowed to rebuild and settle in the previous places where near to the shore. Therefore some of the affected people received more than one house. There was no clear guideline for the beneficiary selection and according to interviewed government officer in Hambantota, donor agencies were claimed that beneficiary list was not

available even at the finishing level of the resettlement programs. Some people received more than one house in different resettlement sites. Therefore people had loose the interest of the houses and either they abandon and rented out or sold out where it has demand.

As state above resettlement process has four main phases; Policy, Planning, Implementation and practicing. As well as the identification of the critical factors it is important to ensure that affected people get the benefit of them. Below figure illustrates what are the factors that were considered at each level. It shows that some of the factors were not address in lower levels. Therefore the real ground situation is different what have had planned.



As well as following were identified as critical issues in the resettlement sites:

1. Inconvenience to livelihood activities – livelihood activities has to be consider in the site planning
2. Distance to schools and other institutions – distance to institutions has to consider in the site planning
3. Beneficiary selection – social status and host population opinions has to consider
  - a. Social classes or kinshipties were not considered in the beneficiary selection
  - b. Host population opinions were not consider in the site planning
4. Housing planning without considering cultural and social status of the affected people- social and cultural understanding has to be consider for planning
  - a. Size of the house does not match with the family size
  - b. Kitchen design is inappropriate for fuel wood cooking
  - c. Toilets constructed attached to the houses
  - d. Front door design without considering architectural believes

5. Poor building quality – in long term it became unlivable
6. Provision of drinking water - drinking water is an essential need, planning and implementation stages has to consider
  - a. No continuous supply of drinking water in some sites
  - b. In some sites mud are contain and bad smell on water
  - c. Some sites were provided storage tanks however some were not provided
7. Waste water management- proper planning and practice
  - a. Drainages were not properly constructed in most of the sites
  - b. Toilet pits were filled and some have leakages overflow on rainy seasons
  - c. Storm water drainages were blocked by sand and debris therefore there are flooding incidents recorded in some resettlement sites
8. Some of the sites are unsuitable by itself – Planning
  - a. Soil erosion and there were cutting failures
  - b. Absence of prevention methods
  - c. Soil erosion due to storm water run off
  - d. Dust problem
  - e. Wildlife attack in some of the sites
9. Infrastructure provision – Planning
  - a. Proper transportation, roads were not provided to some of the resettlement sites

The host community is as important stakeholder that has to consider in planning the resettlement program. Mismatches in social, economic classes of the host community and resettled communities and large community introduce to small host community conflicts can be happened, which was observed in Rassandeniya, Matara. As well as it was observed that the identification of the factors to be consider in the resettlement program in the policy and planning stages are critical, because a small issues can be worsen and make reasons for un-satisfaction or abandonment. Nonetheless these reasons were interlinked, most of the environmental issues became social problems.

Therefore satisfaction level of balance on two factors, either government or donor has to provide all the compatible with beneficiary's requirements or government has to create the environment with the opportunity of rebuilding by them self.

Therefore following reasons were identified as the reasons for abandonment of rent or sell the houses.

1. With the relaxation of the buffer zone policy some affected people who already received houses in resettlement sites went back to their previous place and rebuilt the house, the house they got in resettlement sites were rented out, sell or abandoned.
2. Benefited with more than one house in different resettlement sites.
3. Kinship ties were not considered at all. Some people had moved to their relatives.
4. Incomplete houses were observed in some resettlement sites that made occupants to abandon the houses.
5. Dissatisfaction on the resettlement site.

Creation of opportunities to rebuild is a critical factor that determined the satisfaction and dissatisfaction on the resettlement program. To make resettlement a successful story it is important to identify the failure factors too. Economic, social, environment and even physical factors are different from the region to region. Therefore it is important to identify unique features and critical factors that have to properly address. Resettlement is a process that interlinked series of steps and involve number of types of stakeholders. However at the end of the program affected people have to be satisfied in long term.

## REFERENCES

- Asian Development Bank, (1998a), *Handbook on Resettlement, A guide to Good practice*. Manila: Office of Environment and Social Development, ADB.
- Asian Development Bank, (1995), “Involuntary Resettlement Policy”
- Asian Development Bank. (2005). *Sri Lanka: Post-Tsunami Recovery Program: Preliminary Damage and Needs Assessment*. Manila: Asian Development Bank.
- Badri A S., Asgary A, Eftekhari A. R and Levy J.,2006, “Post-disaster resettlement, development and change: a case study of the 1990 Manjil earthquake in Iran”,
- Birkmann, J., & Fernando, N. (2008). Measuring revealed and emergent vulnerabilities of coastal communities to tsunami in Sri Lanka. *Disasters*, 32(1), 82–104.
- Cernea Michael M. (1995). Understanding and preventing impoverishment from displacement: Reflections on the state of knowledge. *Journal of Refugee Studies*, 8(3), 245–264.
- Cernea Michael M. (1997), “Impoverishment Risks, Risk Management and Reconstruction: A model of Population displacement and Resettlement” UN Symposium on Hydropower and Sustainable, Beijing, October, 27-90.
- Carnea Michael M, (1999), “Mutual Reinforcement: Linking Economic and Social Knowledge about Resettlement.” In Michael M Cernea (ed) *The Economics of Involuntary Resettlement: Questions and Challenges*, Washington, DC, The World Bank.
- Cernea, M. (2000). Risks, safeguards, and reconstruction: A model for population displacement and resettlement. *Economic and Political Weekly*, 35(41), 3659–3678
- Commitments and the Global Plan of Action., *The Habitat Agenda Goals and Principles, Commitments and the Global Plan of Action.*, 2003
- Correa E, Ramírez F & Sanahuja H., (2011), *Populations at Risk of Disaster A Resettlement Guide*, The World Bank, Washington, DC 20433, U.S.A.
- Danarab O. R. & Pushpalala D., (2014) *Building Community Resilience: Conceptual Framework and its Application in Post Tsunami Resettlement*, *Procedia Economics and Finance*, Volume 18, 2014, Pages 489-496
- Davidson, C. H., Johnson, C., Lizarralde, G., Dikmen, N., & Sliwinski, A. (2007). Truths and Myths about Community Participation in Post-Disaster Housing Projects. *Habitat International*, 31(1), 100–115
- Department Census and Statistics, (2012), Population census data,
- Dias, N. T., Keraminiyage, K., & De Silva, K. K. (2016). Long-term satisfaction of post disaster resettled communities: The case of post tsunami - Sri Lanka. *Disaster Prevention and Management: A'n International Journal*, 25(5), 581–594.
- Theodore E. Downing., 2002, “Avoiding New Poverty: Mining-Induced Displacement and Resettlement”, International Institute for Environment and Development, World Business Council for Sustainable Development.,
- Duyne Barenstein, J. (2012). Towards sustainable post-disaster housing and building technologies. Issues and challenges with special reference to India. In: J.C. Bolay, M. Schmid, G. Tejada & E. Hazboun (Eds.), *Technologies and Innovations for Development: Scientific Cooperation for a Sustainable Future*. Paris: Springer-Verlag, pp. 102–34.
- Fernando N & Punchihewa A., (2010), *Relocating the Displaced: Strategies for sustainable relocation*, Friedrich Ebert Stiftung
- Godamunne N., (2013), “Development and displacement: the national involuntary resettlement policy (NIRP) in practice”, *Development and displacement: the national involuntary resettlement*, Centre for Poverty Analysis (CEPA), No. 29, Gregory's Road, Colombo 07
- Gunawardena, A., & Wickramasinghe, K. (2010). *Targeting and Distribution of Post-Tsunami Aid in Sri Lanka: A Critical Appraisal*, SANDEE Working Paper No. 55 – 10, Kathmandu: South Asian Network for Development and Environmental Economics (SANDEE).
- Involuntary Resettlement Large Dam experiences., 2000
- Jayasuriya, S., Steele, P., & Weerakoon, D. (2006). *Post-tsunami recovery: issues and challenges in Sri Lanka*, ADBI Research Paper Series No. 71. Tokyo: Asian Development Bank Institute.
- Kennedy J, Ashmore J, Babister E, Kelman I, (2008), “The Meaning of ‘Build Back Better’: Evidence From Post-Tsunami Aceh and Sri Lanka”, *Journal of Contingencies and Crisis Management*. Belgium
- Karunasena G. and Rameezdeen R, 2010, “Post-disaster housing reconstruction: Comparative study of donor vs owner-driven approaches” *International Journal of Disaster resilience in the built environment* Volume 1, Issue 2 Post-Disaster Housing Reconstruction

Manatunge, J., Nakayama, M., & Contreras-Moreno, N. (2001). Securing ownership in aquaculture development by alternative technology: A case study of the Saguling Reservoir, West Java. *International Journal of Water Resources Development*, 17(4), 61–631.

Manatunge, J., Takesada, N., Miyata, S., & Herath, L. I. (2009). Livelihood rebuilding of dam-affected communities: Case studies from Sri Lanka and Indonesia. *International Journal of Water Resources Development*, 25(3), 479–489.

Manatunge, J., & Takesada, N. (2013a). Long-term perceptions of project-affected persons: A case study of the Kotmale Dam in Sri Lanka. *International Journal of Water Resources Development*, 29(1), 87–100.

Manatunge, J., & Takesada, N. (2013b). Long-term perceptions of project-affected persons: A case study of the Kotmale Dam in Sri Lanka. In: M. Nakayama & R. Fujikura (Eds.), *Restoring Communities Resettled After Dam Construction in Asia (Routledge Special Issues on Water Policy and Governance)*, Oxford: Taylor and Francis, pp. 78-89.

Muggah R., (2000), “*Through the Developmentalist's Looking Glass: Conflict-Induced Displacement and Involuntary Resettlement in Colombia*”, *Journal of Refugee Studies*, Volume 13, Issue 2, 1 June 2000, Pages 133–164,

NHDA (National Housing Development Authority) (2005). Guidelines for housing development in coastal Sri Lanka, Ministry of Housing and Construction, Colombo

Oliver-Smith, A. (2007). Successes and failures in post-disaster resettlement, *Disasters*, 15(1), 12-23.

Oliver-Smith, A. (2007). Successes and failures in post-disaster resettlement, *Disasters*, 15(1), 12–23.

Ophiyandri, T. (2011). Community-based post-disaster housing reconstruction: examples from Indonesia, In: Amarathunga, D. and Haigh, R. (Eds.), *Post-Disaster Reconstruction of the Built Environment: Rebuilding for Resilience*. Retrieved from <http://onlinelibrary.wiley.com/book/10.1002/9781444344943>.

Operational Manual - OP 4.12 - Involuntary Resettlement

Patricia F, (2000), “*Globalization and accountability: the corporate sector in involuntary displacement and resettlement*”, *Forced Migration Review*, Refugee Studies Centre, Oxford Department of International Development, University of Oxford

Perera, T., Weerasoori, I., & Karunarathne, H. (2013). An evaluation of success and failures in Hambantota, Siribopura Resettlement Housing Program: Lessons Learned, *Sri Lanka Journal of Real Estate*, 6, 1–15.

Ratnayake, R. M. G. D., & Rameezdeen R. (2008). A comparative study of donor driven vs. owner driven post disaster housing reconstruction. Proceedings of the CIB International Conference on Building Education and Research, held from 11-15 February, 2008 at Kandalama, Sri Lanka. pp. 192.

Ruwanpura K, 2009, “*Putting houses in place: rebuilding communities in post-tsunami Sri Lanka*”, *Disasters*, School of Geography, Shackleton Building 2065, University of Southampton, Southampton,

Reconstruction and Development Authority (RADA) (2007). *Mid-year Review: Post-tsunami Recovery and Reconstruction*, RADA, Colombo.

Scudder T & Gray J., (1986), *A comparative survey of Dam-induced Resettlement in 50 cases*.

Scudder T. & Colson E. (1982), *From Welfare Development: A conceptual framework for the analysis of dislocated people*. In: *Involuntary Migration and Resettlement*, pp 267-87, Colorado.

Scudder, T., & Colson, E. (1982). From welfare to development: A conceptual framework for the analysis of dislocated people, In: A. Hansen & A. Oliver-Smith (Eds.), *Involuntary Migration and Resettlement: The problems and responses of dislocated people*, 267–87. Boulder, USA: Westview Press.

Seneviratne, A. D. (2015). *Comprehensive guideline for sustainable involuntary resettlement – special case study on problematic tsunami resettlement sites in Galle district*, MSc Thesis submitted to University of Moratuwa, Sri Lanka.

Shaw, J., & Ahmed, I. (2010). *Design and Delivery of Post-disaster Housing Resettlement Programs: Case Studies from Sri Lanka and India*. Report 6. Monash Asia Institute, Melbourne: Monash University.

Sherbinin A, Castro M, Gemenne F, Cernea M.M, Adamo S, Fearnside P.M., Krieger G, Lahmani S, Smith A.O, Pankhurst A, Scudder T, Singer B, Tan Y, Wannier G, Boncour P., Ehrhart C, Hugo G, Pandey B, Shi G 2010, “Preparing for Resettlement Associated with Climate Change”, *Science* 28 Oct 2011: Vol. 334, Issue 6055, pp. 456-457

Smith A. O., (2001), “*Success and Failure in Post Disaster Resettlement*”, *Disasters*, Vol. 15, Disaster Management Center, Oxford.

Smith A. O., (2001), “*Displacement, Resistance and the critique of Development: From the grass root to the Global*”, Oxford University press, London.

TAFREN. (2005). *Housing and township development: Assistance policy and implementation guidelines*. Colombo: TAFREN

Takesada, N., Manatunge, J., & Herath, I. L. (2008). Resettler choices and long-term consequences of involuntary resettlement caused by construction of Kotmale Dam in Sri Lanka. *Lake & Reservoirs Management*, 13(3), 245–254.

The World Bank, GFDRR., 2011

Thiruppugazh, V. (2011). “When people are involved. In: M. Aquilino (Ed.), *Beyond Shelter. Architecture and Human Dignity*”. New York: Metropolis Press, 70–82. United Nation High Commissioner for Refugees (UNHCR) Resettlement Handbook., 2011

Urban Development Authority, (2005a), *Physical Planning Guidelines and Project proposals for the vulnerable Coastal Zone of Sri Lanka*.

Urban Development Authority, (2005b), *Rehabilitation and Reconstruction of Tsunami affected areas*.

UoM. (2006). *Rapid Environmental Assessment (REA) on Tsunami Permanent Housing Sites in Sri Lanka*. Unpublished Report, Moratuwa: University of Moratuwa, Sri Lanka.

Uyangoda, J. (2005). Post-Tsunami Recovery in Sri Lanka, *Polity*, 2(3). Social Scientists’ Association of Sri Lanka, Colombo.

Weerakoon, D., Jayasuriya, S., Arunatilake, N., & Steele, P. (2007). *Economic Challenges of Post-Tsunami Reconstruction in Sri Lanka*. Colombo: Institute of Policy Studies.

Viratkapan Vichai, Ranjith Perera (2006), “*Slum Relocation projects in Bangkok: What has contribute to their success and failure?*”, Asia Institute of Technology, Elsevier. Ltd, Thailand

Vijekumara I. P.A, Karunasena G., (2016), “*Analysis on Resettlement Process: Landslide Disasters in Sri Lanka*”, National Building Research Organisation, Colombo, Sri Lanka.

WCD Thematic Review., 2000, *Displacement, Resettlement, Rehabilitation, Reparation and Development*, Cape Town, South Africa

World Bank, 2004, *Involuntary Resettlement Source Book: Planning and Implementation in Development projects*.

World Commission on Dams (WCD), (2000), *Dams and Development, A New framework for Decision Making*, Earthscan, London.

<http://www.unhcr.org> - logging date 22nd July 2017

<https://unhabitat.org/> - logging date 4<sup>th</sup> August 2016

#### Interviews

V. K. Nanayakkara, Former Secretary to Prime Minister and Secretary to many government ministries and External Resource Person, Ministry of Public Management Reforms, Institutional Specialist, Colombo Water Supply Service Improvement Project. Discussion Dates – 7<sup>th</sup> March 2017 and 18<sup>th</sup> September 2017

Thilak Hewawasam, Institutional Specialist, Colombo Water Supply Service Improvement Project, Sri Lanka Program Coordinator Water and Sanitation Program, World Bank, Team Leader / Social Impact Assessment Specialist, Water Sector Restructuring Project, India The World Bank, Senior Water and Sanitation Advisor – ECO- ASIA Sri Lanka Program, ECO-Asia – Discussion dates – 25<sup>th</sup> May 2017, 3<sup>rd</sup> January 2018 and 6<sup>th</sup> January 2018