

**The Impact of Landslides on Settlement Development
Process in Sri Lanka. (Spatial reference on
Haldummulla Divisional Secretariat.)**

By

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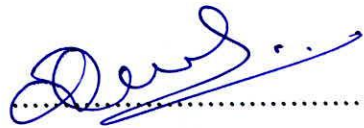


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Degree of Science in GIS and Remote Sensing on 20th March 2016**

DECLARATION OF THE CANDIDATE

I do hereby declare that work described in this thesis was carried out by me under the supervision of Professor R.M.K.Ratnayake and Senior Lecturer Shirantha Heenkenda, and report on this thesis has not been submitted in whole or in part to any University or any other institution for another Degree/Diploma.

Date 20.03.2016



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Abbreviations

APCICT	-Asian and Pacific Training Centre for Information and Communication Technology for Development
CCOHS	- Canadian Centre for Occupational Health and Safety
CRED	- Center for Research on the Epidemiology of Disasters
DDR	- Disaster Risk Reduction
DMC	- Disaster Management Centre
DSD	- Divisional Secretariat Division
EM-DAT	- Emergency Disaster Database
GEOSS	- Global Earth Observation System of Systems
GND	- Grama Niladhari Division
IDNDR	- International Decade for Natural Disaster Risk Reduction
IDPs	- Internally Displaced Persons
IFRC	- International Federation of Red Cross
IFRCWDR	- World Disaster Report
ISRD	- International Strategy for Disaster Reduction
Km	- Kilo Meters
Mm	- Millimeter
NBRO	- National Building Research Organization
NCEI	- National Centers for Environmental Information
NGV	- Natural Ground Vibration

- UNDP - United Nations Development Programme
- UNCHR - United Nations High Commissioner for Refugees
- UNDRO - United Nations Disaster Relief Office
- UNHABITAT - United Nations Human Settlement Programme
- UNHDR - Human Development Report
- UNISDR - United Nations Office for Disaster Risk Reduction
- USGS - United States Geological Survey
- WMO - World Meteorological Organization

The Impact of Landslides on Settlement Development process in Sri Lanka with Spatial reference to Haldummulla Divisional Secretariat.

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ABSTRACT

Landslides are major natural disaster in Central highlands of Sri Lanka that affect on losses of human lives, agricultural activities, economic activities and infrastructures. Massive movements of landslide are losses settlements' physical structures due to many reasons. Landslide attacks damaged settlement, removing settlement due to landslide risk; relocating new settlements nearby former settlements are mainly occurred as a result of landslide. These processes are generating development gaps between settlements in post disaster period. Assessment the impact on settlements due to landslide is the main consideration matter of this research. Otherwise landslide distribution pattern, changes of settlement forms identification is very significant to study development of impact in study area. Development failures of relocation and human priorities that affect on successful relocation also very significant throughout keep both development strategies between former settlement and new settlement. With consideration all objectives can be access to the most suitable area for relocation and keep their origin with development agenda by using effective application of GIS and Remote Sensing. Spatial analyst application combined with theoretical knowledge, filed information and geo spatial analyst techniques matched to find solution for create suitable safer lands associated with interaction between minimum risk and human need to keep development of Haldummulla Division.

Key Word: Landslides, Settlements, Developments,

Chapter One

INTRODUCTION

1.1. Introduction

Different types of indexes and measurement can be applied to study on Development of a Settlement. Physical development indexes, human development indexes are using to measure multi components. Such as Mortality rate, Fertility rate, Literacy rate, unemployment rate, Gross Domestic Product can be used to measure the development. Otherwise availability of disasters recently might be an important factor that effect on development of settlement. Study of the relationship between disasters, settlement development patterns and world trends become a good entrance for this study.

The disaster definition of United Nations Office for Disaster Risk Reduction (UNISDR) proves the relationship between disasters and settlement. A disasters is defined as “a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources”(UNISDR, 2007). It is disrupting the normal condition of existence and casing a suffering level of the affected community. By the passing of time world is rapidly changing with accretion of human vulnerability. Human vulnerability on disasters is not a new thing to the world. After the worst disaster recorded in 2004, it was popular theme among the world community. On Sunday 26th December 2004, an earthquake occurred in “`Sumatra” and some 230,000 people had been died in 14 countries with the Tsunami. (Human Development report 2014.). It was changed existing human settlement structures in affected countries. According to the World Disaster Report-2014, can be seen worldwide number of reported disasters by the level of human development categories.

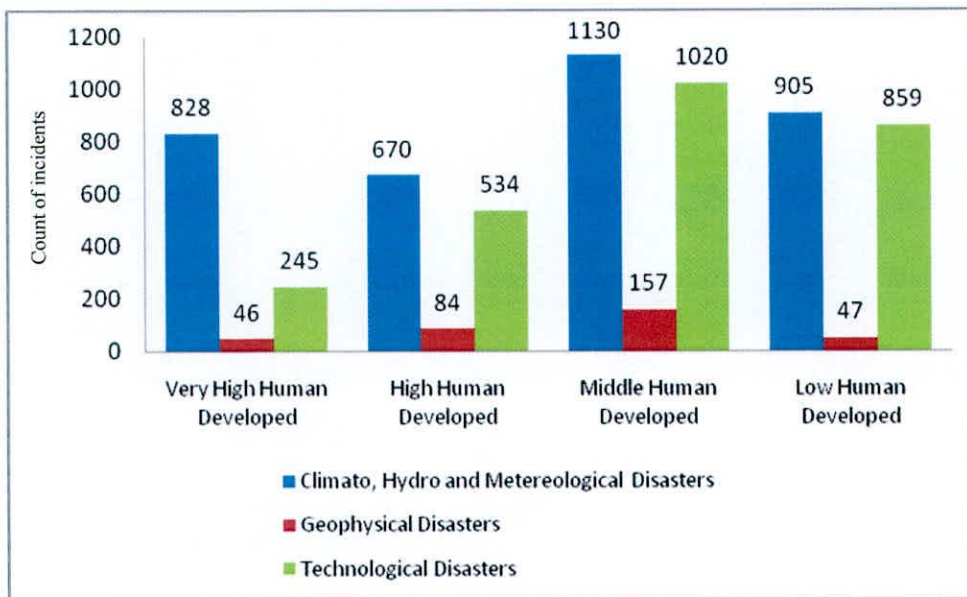


Figure No 1.1: Total Number of globally reported Disasters by level of Human Development (2004 – 2013)

Source: World Disaster Report, (2014)

World disaster data have divided in to 3 categories under the Figure No: 01. Drought or Food insecurity incidents, Extreme temperature, Floods, Forest or Scrub Fires, insect Infestations, Mass Movement –Wet and Windstorms incidents inserted to the “Climato, Hydro and Meteorological Disasters”. “Geophysical” Category is consisting with Earthquake or Tsunamis, Mass movement- Dry and Volcanic Eruptions. Industrial Accidents, Miscellaneous Accidents and Transport Accidents defined as “Technological Disasters”. The high values of total types of disasters had been happened in Middle Human development countries. Natural disasters are very higher than technological disasters in the world. But higher values of all types of disaster incidents recorded in Middle human Development countries.

2000 and 2012 more than 200 million people were hit by natural disasters in every year. Most of victims were living in developing countries (Human Development Report, 2014). During 2004 to 2013 numbers of disasters by continent level of human development have been reported in Asian countries. 2651 total number of disasters have been inserted on

World Disaster Report 2014 by using Emergency Disaster Database (EM-DAT) data. 1,616,640 people affected on disaster by continent level of human development of Asian Countries. (World Disaster Report, 2014). Basically settlements are frequently affected by disasters such as Earthquake, Tsunami, Flood, Hurricanes and Cyclones in globally. United Nations have been introduced seven risks disasters to house damages. Those are Earthquake, Flood, Windstorm, Volcano, Waves, Slides and fire (United Nations, 2008). Vulnerability of settlements is increasing with the growth of population in both rural and urban sectors. Most of shanty settlements, slums and marginal settlements mostly affected to the natural disasters. Eg: in 1988, 3.6 million houses were destroyed or severely damaged in Bangladesh due to flood situation (International Federation of Red Cross and Red Crescent Societies, 1989).

Sri Lanka is prone to disasters. Landslides, floods, high winds, Cyclones, drought have been major disasters in this country. These situations directly affect for changing demography, socio-economic conditions. It has had a great impact on human development, human properties, infrastructures and environment. Normally Flash flood and drought introduced as major types of disasters common occurrence in this country after the Tsunami attack on 2004. Normally flash flood, cyclones or high wind attack to settlements in vulnerable areas. But pattern of settlements is not change due to that kind of natural disasters. Landslide cannot be introduced as such type of disaster which attack on settlements in Sri Lanka. Landslides have been changed structural changes of existing settlements in landslide vulnerable areas.

In past decades Landslide had been traditionally considered as a minor type disaster in Sri Lanka. But today its behavior totally changed. The first documented incident of the earth slip was recorded on 27th October, 1906 in Watawala area. After that another was recorded on 1947. At present this pattern was changed (NBRO, 2013, "Engineers in Disaster Resilience"). It was not commonly occurring until 2002. The annual average number of landslide incident records had not exceeded 50. But during 2003 to 2014, annual disaster incident data has shown a sudden increase of Landslide in Sri Lanka (Disaster Management Centre, 2007).