DISASTER RISK REDUCTION IN EDUCATION AND THE SECONDARY HIGH SCHOOL SCIENCE CURRICULUM IN INDONESIA

Nurmalahayati Nurdin

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I, Nurmalahayati Nurdin confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

ABSTRACT

This research has overviewed the relationship of Disaster Risk Reduction (DRR) education in terms of its meaning and application from global into the Indonesian context, with Banda Aceh as a place for a case study. It covers five key issues; weak and disintegrated policies, institutional support, sustainability of SSB, teacher's knowledge and capacity and integration process for DRR knowledge at the school level in Indonesia.

The research has used Focus Group Discussion, questionnaires, interview, and content analysis. Significant gaps were identified between the disaster policy outlined at the national level and in the implementation in schools. The study reveals that even there is the significant progress of DRR education in government policy and institutional networks, it has not yet been effectively applied in schools. It lacks dissemination of DRR education policy from the national to local level that has hindered the implementation of DRR education in schools. Equally the development of DRR education in terms of the school based disaster preparedness (SSB) programme, despite showing some positive progress, has shown a lack of effectiveness because of institutional network constraints and the absence of disaster knowledge development and methodological transformation in the school system.

Additionally, this research shows that teachers as key factors for delivering DRR knowledge do not have sufficient knowledge of DRR, and furthermore, lack the creativity and enthusiasm, which has led to progress in schools being slow. This research introduced a model for a DRR-Science integrated curriculum in classroom teaching and evaluated the students' knowledge of risk. The teaching intervention shows that embedding disaster education into science lessons can be an effective approach to enhancing the disaster knowledge of secondary high school students in Indonesia.

It is concluded that a new and consolidated effort is required from all stakeholders to maintain sustainability of DRR education in Indonesia.

Keywords : Disaster Risk Reduction Education, Science Curriculum, Case Study, Senior High School, Indonesia

IMPACT STATEMENT

Improving disaster knowledge and skills may save many more lives and equip the younger generation with the ability to respond, reduce disaster risk and impact. This research has contributed to the development of knowledge, skills and the model of DRR integration in the senior high schools' curriculum in Indonesia. These outputs have primarily benefited school communities, in particular teachers and students, DRR education stakeholders and academia.

This study has contributed to promoting a greater role for teachers as a key point in relation to DRR education at schools and making schools less dependent on external support. It is demonstrated by the willingness of teachers to continue and replicate the intervention model adapted in this study. The study has also changed the paradigm of the school community to see the importance of DRR education and the shift in attitude towards disaster risk and impacts.

Additionally, this study provides critical information and recommendations for governments, especially in Aceh Province, and other local governments in Indonesia together with central government, as regards the importance of disaster education in schools. The insight might help in reformulating policies and redesigning programmes on disaster education at the school level.

Accordingly, the impact could be brought about by means of disseminating these outputs either in scholarly journals, policy development and engaging with DRR education stakeholders at national and local levels. This study significantly contributes to introducing DRR in more practical and closely related ways to students' daily life and also promoting the teacher as the focal point for DRR integration in schools. Thus, this research has been part of the development of DRR education in the science curriculum and for it to be a model for larger audiences in Indonesia and other countries which face similar situations to Indonesia.

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Abbreviations

APBD	Anggaran Pendapatan dan Belanja Daerah/ The Regional Government Budget
APBN	Anggaran Pendapatan dan Belanja Negara/The National budget
BAKORNASPB	Badan Koordinasi Nasional Penanggulangan Bencana/ National Disaster Management Coordinating Board
BAPPEDA	Badan Perencanaan Pembangunan Daerah / Regional Development Planning Agency
BAPPENAS	Badan Perencanaan Pembangunan Nasional / National Development Planning Agency
BOS	Bantuan Operasional Sekolah/School Operational Funds
BPBA	Badan Penangulangan Bencana Aceh/ Aceh Disaster Management Agency
BNPB	Badan Nasional Penanggulangan Bencana/National Disaster Management Agency
BPBD	Badan Penangulangan Bencana Daerah
BPKKP	Badan Penolong Keluarga Korban Perang/Agency for welfare of war victims and their families
BP2BAP	Badan Pertimbangan Penanggulangan Bencana Alam/ National Consultative Board for Natural Disaster Management
BPS	Badan Pusat Statistik/ Indonesian Central Bureau of Statistics
BRR	Badan Rehabilitasi dan Rekonstruksi Aceh-Nias/ Agency for the Rehabilitation and Reconstruction of Aceh and Nias
BSNP	Badan Standar Nasional Pendidikan/ National Education Standards Board
CCA	Climate Change Adaptation /Adapatsi Perubahan Iklim

CDE	Consortium for Disaster Education /Konsorsium Pendidikan bencana
CL	Circular Letter
COMPRESS	Community Preparedness
CSS	Children Science Support
DAK	Dana Alokasi Khusus/ Special Fund Allocation
DRR	Disaster Risk Reduction/ Pengurangan Resiko Bencana
EMDAT	Emergency Events Database
FGD	Focus Group Discussion
GA	General Assembly
GAD3RES	Global Alliance for Disaster Risk Reduction and Resilience in the Education Sector
GHG	Greenhouse Gases
GFDRR	Global Facility for Disaster Reduction and Recovery
HFA	Hyogo Framework for Action
IDPs	Internally displaced people
IPA	Ilmu Pengetahuan Alam/ Natural science subject
IPS	Ilmu Pengetahuan Sosial/Social subject
INEE	Inter-Agency Network for Education in Emergencies
ISCED	International Standard Classification of Education
K13	Kurikulum 2013/ Curriculum 2013
KD	Kompetensi Dasar/ Basic Competencies
KHD	Ki Hajar Dewantara
KI	Kompetensi Inti/ Core Competencies
KTSP	Kurikulum Tingkat Satuan Pendidikan/ School based Curriculum
LCC	Local content Curriculum
LIPI	Lembaga Ilmu Pengetahuan Indonesia/Indonesia Institute of Sciences
LPMP	Lembaga Penjaminan Mutu Pendidikan/ Quality assurance of education institutions

MA	Madrasah Aliyah/ Islamic Senior High School
MI	Madrasah Ibtidaiyah/Islamic Elementary School
MDMC	Muhammadiyah Disaster Management Centre
MTs	Madrasah Tsanawiyah/ Islamic Junior High School
MoEd	Ministry of Education
MORA	Ministry of Religious Affairs
MPBI	Masyarakat Penanggulangan Bencana Indonesia/Indonesian Society for Disaster Management
NGO	Non-Governmental Organisation
OECD	Organisation for Economic Co-operation and Development
ORF	Official Re-contextualising Field
Perka BNPB	Peraturan Kepala BNPB/Regulation head of BNPB
PPKLK	Direktorat Pembinaan Pendidikan Khusus dan Layanan Khusus/ Sub division of special education
PRF	Pedagogic Re-contextualising Field
RPJM	Rencana Pembangunan Jangka Menengah/ (Indonesia Medium-Term Development Plan)
REDD	Reducing Emissions from Deforestation and Degradation
RKAS	Rencana Kegiatan Anggaran Sekolah
SEAMEO	The Southeast Asian Ministers of Education Organization
SCDRR	Safer communities through Disaster Risk Reduction
SDG	Sustanainable Development Goals
SEKNAS PRB	Sekretariat National Penanggulangan Resiko Bencana/National Secretariat for Safe Shools
PU	Pekerjaan Umum/ Public work
SFDRR	Sendai Framework for Disaster Risk Reduction
SD	Sekolah Dasar/Elementary School
SMP	Sekolah Menengah Pertama/Junior Secondary High School/Middle School
SMA	Sekolah Menengah Atas/Senior Secondary High School

SMTI	Sekolah Menengah Teknologi Industri/ Industrial Technology High School
SSB	Sekolah Siaga Bencana/ School-based disaster preparedness program
TDMRC	Tsunami and Disaster Mitigation Research Center
TK	Taman Kanak-Kanak/Kindergarten
UN	United Nation
UNESCO	The United Nations Educational, Scientific and Cultural Organization
UNDP	United Nations Development Programme
UNGA	United Nation General Assembly
UNICEF	United Nations International Children's Emergency Fund
UNISDR	United Nations International Strategy for Disaster Reduction

Glossary

BNPB	Badan Nasional Penanggulangan Bencana/National Disaster Management Agency	The National Disaster Management Authority of Indonesia (Badan Nasional Penanggulangan Bencana or called BNPB) is the lead government agency on disaster management in Indonesia. BNPB is responsible in providing guidelines and directions on all aspects of disaster management, including related to disaster resilient education.
BPBD	Badan Penangulangan Bencana Daerah (BPBD)	The BPBDs are the main agency at the provincial level and some district levels concerning disaster management. They coordinate with other government agencies at local, provincial and national levels on DRR activities in their areas.
CDE	Consortium for Disaster Education /Konsorsium Pendidikan bencana	The Consortium for Disaster Education is a coordination platform among DRR education practitioners that worked to support DRR education practices at national and local levels through formal and informal approaches by improving the capacity, coordination among different parties and relevant stakeholders to improve resilient on the school level in Indonesia.
LIPI	Lembaga Ilmu Pengetahuan Indonesia/Indonesia Institute of Sciences	LIPI is a government institution which focus on the research development in Indonesia.
MoEd	Ministry of Education	The Ministry of Education supervises the operation as well as ensuring education standards for elementary, junior and high schools across Indonesia.
SEKNAS PRB	National Secretariat for Disaster Education	The National Secretariat on Safe Schools is a multi-stakeholder platform that coordinate the integration of disaster risk reduction programming in schools in Indonesia. The platforms include the government and non-government organisation. This secretariat is actively promoting the integration of disaster risk reduction in schools across Indonesia.

CHAPTER ONE
INTRODUCTION

1.1. Introduction

This chapter sets out an appropriate research framework to understand Disaster Risk Reduction (DRR) from both global and national education perspectives in relation to the Indonesian system. It will specifically describe the theoretical background of this research covering DRR from a global context, and its logical transfer to an Indonesian context. Subsequently, the research questions and research objectives are formulated, whilst the assumption, limitations and scope of the study are introduced. Finally, the significance of this study is highlighted along with the thesis structure.

1.2. General Background

Indonesia is an archipelago which experiences earthquakes, tsunamis, volcanic eruptions, landslides, floods, droughts, forest fires and coastal erosion. In recent times, the causality rate and cost of natural disasters have significantly increased (BAPENNAS, 2010; EMDAT, 2016). Over the last decade, Indonesia together with China, the United States, India and the Philippines have been listed as the top five countries that are most frequently affected by natural disasters (EMDAT, 2016). Among the well-known occurrences to have affected Indonesia are the earthquake and tsunami in Aceh in 2004, the earthquakes in Yogyakarta in 2006, in West Java and Sumatra in 2009, the flash flood in Wasior, Papua and the Mt. Merapi eruptions in Yogyakarta in 2010 (DIBI, 2015). These disasters killed thousands of people and affected many more, destroyed their properties and caused environmental damage.

Over a century from 1900-2015, Indonesia experienced 435 natural disasters, the most frequently occurring have been floods (40%), earthquakes and tsunamis (27%), volcanic activity and landslides (13%), storms (3%) and wildfires and droughts (2%) (EMDAT, 2016). The impact of these disasters resulted in 238,492 deaths, affected more than 29 million people and caused

economic losses amounting to more than 29.2 billion US$.

Analysis of disasters suggests that flood and earthquake events have the greatest impact on people. These data include the 2004 Indian Ocean tsunami which claimed 168,372 lives, while flooding caused the majority of disasters, affecting nearly 10 million people across Indonesia (see Table 1.1 below). A recent report confirmed that Indonesia along with China are two countries that are most affected by floods (EMDAT, 2016). Additionally, special circumstances applied to wildfire events which cost more than 10 billion US$ in ten separate occurrences. Indonesia is therefore highly exposed to many types of disaster and people's lives and livelihoods are heavily affected by them (see Table 1.2).

Disasters have also been shown to have a long-lasting impact on children, resulting in interruptions to school activities, exposure to traumatic situations, increased economic deprivation, increased school dropout rates, reduced enrolment, widening of the gender gap in achievement and increased child malnutrition (Durkin et al., 1993; Seballos et al., 2011; Rianawati et al., 2015). Save the Children reported that about 250 million children are predicted to be affected by weather-related disasters connected to climate change each year. It is because children are vulnerable to injury and their ability to cope with disaster is low and they have less access to humanitarian aid (Save the Children, 2010). Therefore, education is the key mechanism through which students can engage in mainstream DRR (Save the Children, 2010)

Table 1.1 Summary of data on disasters in Indonesia (1900-2015), including the number of human casualties and the economic impact (EMDAT, 2016).

Disasters	Number of events	People killed	People affected	Economic losses ('000 US$)
Drought	10	9,340	4,804,220	160,200
Earthquake	115	198,487	9,129,169	11,695,926
Flood	172	7,427	9,973,887	6,657,047

Landslide	53	2,631	397,952	146,745
Storm	12	1,978	18,248	1,000
Volcanic activity	55	18,310	1,321,528	530,390
Wildfire	10	319	3,444,142	10,329,000
Total	427	238,492	29,089,146	29,520,308

Indonesia has long suffered from the impacts of disasters caused by natural events. High-risk exposure to these hazardous events is exacerbated by economic weaknesses and the political complexities associated with the country, making the population of Indonesia even more vulnerable to the adverse impacts of natural disasters (Sassa and Canuti, 2008). Earthquakes, tsunamis and floods are among the deadliest types of disasters in Indonesia (EMDAT, 2016). The greatest shock was when the Aceh earthquake and tsunami on the 26th December 2004 led to the deaths of more than 200,000 people, where thousands of houses were destroyed and the infrastructure collapsed. Moreover, even the local government in Aceh was unable to help as many of its officers had been killed or injured and the infrastructure had collapsed (BRR, 2005). It is an ongoing concern that many disasters in Indonesia have involved severe risks and had an impact on physical and non-physical objects. Furthermore, it has been demonstrated that the lack of disaster preparedness is a consequence of the lack of disaster risk reduction (DRR) knowledge at every level of the community and in particular schools.

The term ‘DRR’ has been interchangeably used with ‘disaster risk’, ‘disaster prevention’, ‘disaster mitigation’ and ‘disaster preparedness’, which all have a similar meaning. DRR is the concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events (UNISDR, 2009).

The concept of DRR in the Education system is defined as a formulation of long term activities by using knowledge, innovation and science and a development of preventive activities, disaster mitigation and disaster preparedness in order to establish a safe and resilient culture in all of the Education system (Ministry of Education, 2010). Selby and Kagawa (2012), suggested that "DRR education is about building students' understanding of the causes, nature and effects of hazards while also fostering a range of competencies and skills to enable them to contribute proactively to the prevention and mitigation of disasters". It is a process of learning linked to the community and the family. It can help foster an understanding of risk drivers and how hazards can become disasters, so it enables the transfer of knowledge to reduce the impact of disasters by protecting learners and teachers, assuring educational continuity, protecting Education sector investments; and strengthen climate disaster resilience (Shaw et al., 2009; Shiroshita, 2013; UNESCO, 2014).

The point above is relevant to the Hyogo Framework for Action (HFA) 2005–2015, which states that DRR knowledge should promote safety and resilience at all levels through: (1) including relevant sections of DRR in school curricula at all levels, (2) local risk assessments and disaster preparedness programmes in schools and, (3) learning about minimising the effects of hazards. Incorporating disaster risk-related issues into existing education curricula and considering indigenous knowledge and traditional practices for risk reduction and mitigation reinforces learning and knowledge about DRR (Ronan, 2014). Shaw et al. (2004), indicated that DRR education, both for children and adults, should serve to: (i) convey both an understanding of the natural and environmental conditions and the human actions and inactions that lead to disasters, in order to stimulate changes in individual and group behaviours and, (ii) motivate advocacy and raise expectations of social policy change in order to reduce disaster risks.

DRR education is one area of a comprehensive school safety programme that compromises three main pillars, which are:

First, safe learning facilities that involves education authorities, planners, architects, engineers, builders and school community members to provide safe site selection, design, construction and maintenance (including safe and continuous access to the facility), as a safe place for children when conducting learning activities. Second, School Disaster Management involves education authorities and engages students', teachers' and parents' involvement in order to maintain safe learning environments and plan for educational continuity. Third, Risk Reduction and Resilience Education is the space where Disaster Risk Reduction Education has been designed to develop a culture of safety and resilient communities. On the school level, with teachers and students as the core constituents, the focus is mainly about DRR learning. However, it is mostly conducted as an occasional co-curricular activity, but lacks representation in the curriculum. Integration of DRR into the curriculum is still rarely achieved. These three pillars form the foundation for building an institutional culture of safety and resilience at school level **(**UNESCO/UNICEF, 2014).

Nevertheless, this thesis will mainly focus on the third aspect and elaborate this issue and its complexities, to develop the scope and sequence for teaching about critical thinking for all hazards, infuse risk reduction throughout the curriculum and provide guidelines for the integration of risk reduction into main school subjects. In particular this research aims to develop strategies to scale-up teacher involvement for effective integration of DRR issues in the science curriculum in Senior High Schools in the Indonesian context. As it becomes a wide subject, this thesis mainly focuses on developing an understanding of the science and mechanisms of natural hazards, such as cause and effect, the physical impacts, as well as the trends and patterns in their occurrence, within the senior high school curriculum in Indonesia, which is in line with the Ministerial Circular letter 2010 about Mainstreaming Disaster Risk Reduction in Schools, which is still limited to natural hazards, as stated:

> "The vision of the national strategy for mainstreaming DRR education in schools is to realise a disaster awareness culture,

> preparedness, safety and resilience at school level to prevent and reduce potential losses caused by the natural disaster" (Circular letter/2010).

According to a World Bank report, 34 provinces are at risk from natural disasters, such as earthquakes, tsunamis, floods, landslides and volcanic eruptions. In addition, there are approximately 250,000 schools located in these areas (Amri, 2017). From these facts, DRR education in schools is considered essential. At an international level, the 2004 earthquake and tsunami triggered the World Conference on Disaster Reduction, held in Kobe, Japan, that led to the 2005 Hyogo Framework for Action (HFA), as a framework for risk reduction. The framework was ratified by 168 nations which agreed to promote DRR Education as part of global education. The framework seeks how DRR Education can be applied to preparedness and the mitigation of disaster risks, and for the discipline of education itself, through an exploration of the links between disaster risks, science and education.

It should be noted that disaster related knowledge and skills have frequently been viewed as critical tools for Indonesian communities, yet there has been limited discussion on this matter. Since the 2005 HFA, the development of DRR Education has gained momentum, coinciding with the increasing number of victims of disasters and globalised information. In an era increasingly subjected to global processes and which is preoccupied with transactional issues regarding environmental problems, i.e. the climate change issue, vulnerability and inequality and the ability to cope with many types of disaster risks, the consequences of decades of DRR Education marginalisation have been identified as a common issue in a post-colonial world. The concept of vulnerability as a global component is a powerful analytical tool for describing states of susceptibility related to harm, powerlessness and the marginality of both physical and social systems, and for guiding normative analysis of actions to enhance well-being through risk reduction (Adger, 2006).

Humanitarian workers, policy makers and educators have looked to DRR Education to offer students a better understanding of the issue. This has

contributed to a rise in the subject's standing, both on a national and global scale (UNESCO/UNICEF, 2014, Standish 2012). The emergence of resilience science through various methods and the conceptualisation of the disaster processes lead to threshold changes, particularly those involved in the social and institutional networks of socio-political systems' dynamics. Clearly natural disasters refer to scientific processes, while social systems are made up of rules and institutions that mediate human use of resources, as well as systems of knowledge and ethics that interpret natural disaster systems from a human perspective (Adger, 2006).

A starting premise is that the paradigm has changed either nationally or globally, which has led to DRR issues comprising part of a science education being more essential. In terms of socio-political transformation, the connections to a more globalised world and the national context are obvious ones to draw. Therefore, it is vital to explain how these changes are impacting on education stakeholders' perceptions. Nevertheless, a second premise is that a more fundamental change is occurring and so to that extent, it is not the only significant change taking place, as DRR from local knowledge subsequently became a global occurrence. Hence, it was anticipated that DRR Education has influenced social change during this period. This is because globalisation and the political transformation in Indonesia have influenced the importance of DRR Education.

It is essential to examine how plans and strategies in DRR Education are implemented in the schools; how the process of knowledge transfer is conducted; how the schools and local government adapt to the process and finally, what are the critical issues which necessitate more attention to the development of DRR Education in Indonesia. In particular, the integration process of DRR into the school curricula in Indonesia, focusing on the science curriculum in secondary schools because of its importance in delivering DRR in formal education. The rationale of doing this through formal education is that it is more effective, since lessons can be part of the learning process and are likely to have a far-reaching impact.

The results of this study contribute to our understanding of how both DRR Education and the science curriculum are changing. While many educators have welcomed and advocated an enhanced DRR role for the science curriculum, none have looked at how this marriage has come about through changes to the content of DRR Education and the meaning of disaster. It will also be significant to learn more about the historical scales from which people understand their roles and the meanings they attach to different levels (local, national, international) of DRR Education. However, limited research has been conducted on this subject; hence, this thesis will explore more about this issue to understand how far it goes and what constraints it has. There are five key variables to be examined here: 1) the nature of DRR in global education; 2) DRR in policy; 3) institutional networks; 4) School-Based Disaster Preparedness (Sekolah Siaga Bencana-SSB); and 5) the school curriculum. Taking the 2005-2016 periods as a time frame to explore these variables, the nature of the DRR Education issue has changed.

1.3. Research Questions

This thesis will answer several research questions about the transformation of DRR Education, from global into national policies, the development of the School-Based Disaster Preparedness (Sekolah Siaga Bencana/SSB) and the integration of the DRR concept within the high school's curricula in Indonesia. This question is subsequently divided into five separate questions:

a) How has the national curriculum been developed to sufficiently promote DRR knowledge for students in secondary high schools in Indonesia?
b) What are the origins of DRR Education within the processes of transformation in the global and the national educational system in Indonesia?
c) How is DRR knowledge developed in terms of policies and institutional networks, and its constraints in Indonesia?
d) What is the meaning of School-Based Disaster Preparedness (SSB)? What challenges does it face? And, are students in high schools in

Indonesia enrolled in the SSB programme acquiring better knowledge of disasters than non-SSB students?

e) How can DRR knowledge be integrated into the science programme of the 2013 curriculum for better improvement of students' understanding of disaster risks in Indonesia?

1.4. Research Objectives

The specific research objectives are:

a) To examine whether curriculum development and basic competencies in the science syllabus in high schools in Indonesia promote students' knowledge on the science of disaster.

b) To investigate the transformation of DRR knowledge from both global and national policies in Indonesia.

c) To evaluate the development of DRR Education in terms of policies and institutional networks in Indonesia.

d) To assess the development of SSB in terms of promoting DRR knowledge and its sustainability in Indonesia.

e) To test the proposition that the integration of DRR knowledge into the science subjects in secondary high schools improves students' understanding of disaster risk in Indonesia.

1.5. Research Hypotheses

a) The development of the national curriculum and the basic competencies of the science curriculum have not sufficiently promoted DRR knowledge for students in secondary high schools in Indonesia.

b) The transformation of global DRR Education into Indonesia's national system has been based on the development of scientific knowledge of disasters.

c) The policies and institutional networks have been able to form the foundations for the development of DRR Education in Indonesia.

d) SSB has been a manifestation of DRR Education in the school systems in Indonesia, in which students enrolled in the SSB programme acquire better knowledge of disasters than non-SSB students.
e) The integration of DRR knowledge into the science curriculum is successful in improving students' understanding of disaster risks in Indonesia.

1.6. Significance of the Study

This research will contribute to knowledge development related to DRR Education at a global and national level, in particular the implementation of the SSB programme and the dissemination of DRR knowledge through school science lessons at the secondary high school level. It can be illustrated as a model and a lesson for other schools across Indonesia to learn in relation to developing their curricula to improve students' awareness on disaster risks, preparedness and mitigation. From that point, the benefits will expand to communities who live in disaster-prone areas and are affected by climate-related disasters. Additionally, they can be adapted by other countries, which have similar issues to Indonesia. This study is significant in three key aspects:

a) To provide knowledge on the implementation and development of DRR Education in Indonesia and its enrichment at a local, national and international level.
b) To provide critical information and recommendations for governments, especially in Aceh province, and other local governments in Indonesia regarding the importance of disaster education at school. The insights might help in formulating policies and designing programmes on disaster management.
c) To benefit curriculum planners at the national and local level in strengthening DRR in the school curriculum, to build knowledge of risks, increase skills and improve students' awareness concerning disaster risks.

1.7. Disaster Risk Reduction in Education: An Overview

1.7.1. The Impact of Disaster on Education in Indonesia

Natural disasters have had a significant impact on the education sector. It is estimated that three-quarters of the schools in Indonesia are located in disaster prone areas, comprising at least 40 million students. Most of the schools were built in the 1980s, without any concept of DRR. Thus when a disaster occurred, it caused damage to school buildings and casualties amongst children**.** Conversely, since the development of DRR as part of the national strategic plan (2005 onward), new school buildings must adhere to DRR standards. However, only a few new schools have been built since then. This situation has adversely affected the quality of education, especially when there were no plans for alternative school locations and students were denied continuous schooling. Equally, psychosocial impacts occurred when students lost their hopes; depressed as their futures were destroyed (UNISDR, 2008; Suharwoto, 2014; Shaw et al., 2012). It is important to note that students can be among the most vulnerable victims of any catastrophes if they are not adequately prepared with knowledge.

Therefore, integrating DRR into the school curriculum can be one of the most effective methods to reduce such negative impacts. Due to the severity of certain hazards and resulting disasters, schools are regularly closed for significant amounts of time. At times of reduced hazard and post disaster, schools may remain open but classes are not able to operate effectively for the following reasons, i.e. students /teachers are Individually Displaced People (IDP) with their families, there are unsafe conditions for traveling to school, school buildings are damaged and not safe for teaching and the learning process, student/teachers are victims, many schools are used as evacuation points and additionally the local government may have collapsed.[1]

Natural disasters, as well as weather and climate related disasters[2], are embedded in the social life of communities in Indonesia. This high-risk

[1] The personal experiences of the researcher during the Indian Ocean tsunami in 2004.

[2] There are two major classifications of natural hazards: geophysical, which includes earthquakes, tsunamis, volcanic activity and dry mass land movements and weather and climate-related disasters, which includes hydrological (floods and landslides), meteorological (storms and extreme temperatures) and climatological (droughts and wildfires) (Below, et.al, 2009).

natural exposure is exacerbated by the economic weakness and political complexity of the country, making the population of Indonesia even more vulnerable to the adverse impacts of natural disasters (Sassa and Canuti, 2008). Earthquakes are nevertheless one of the most frequent events occurring in Indonesia, and frequently lead to devastation. Interestingly enough and supposedly by chance, almost all the earthquake events noted in the past 25 years occurred outside school hours, or occurred during holidays. Otherwise, they would have had a devastating impact on children and the young, who are amongst the vulnerable community groups noted to be at risk (see Table 1.2 below). Not to mention, there are other geological hazards that potentially trigger catastrophic events, such as floods, landslides, volcanic eruptions and tsunamis, which are names that are embedded in the daily lives of communities throughout the region. Additionally, due to the impact of global climate change, Indonesia is even more at risk. Hence, the geographical and demographic characteristics, as well as other aspects, have put Indonesia at a high level of risk. The number of disasters has increased significantly in Indonesia every year and will most likely occur on a more regular basis in the future due to climate change and environmental degradation. In general, a disaster occurs in Indonesia on a frequent basis (Ministry of Education, 2010).

Table 1.2. A partial list of the impact of disasters on the Education sector in Indonesia.

Year	Event	Impact
2004	Earthquake and Tsunami in Aceh	2,000 school buildings were damaged or destroyed. About 40,900 primary, secondary and university students went missing . 46,000 students were displaced.
2006	Earthquake in Yogyakarta	2,900 schools collapsed.
2011	Earthquake in West Sumatra	More than 2,800 schools were affected. More than 40% were heavily damaged.

2012	Earthquake and Tsunami in Mentawai	7 schools were damaged.
2013	Earthquake in Central Aceh & Bener Meriah	514 schools were damaged.
2013	Flood in Jakarta	251 schools affected. 70,270 children lost their access to education for two weeks.

DRR Education will develop an awareness of various natural disasters. Five hazard modules incorporating tsunamis, earthquakes, floods, fires and landslides were developed in the early stages of the formation of SSB. However, in the development of DRR Education in Indonesia, learning focuses more on tsunamis and earthquakes. This specific DRR Education method can assist students to gain knowledge of disasters, given that it provides valuable information related to introducing hazard studies into their subjects. Hazard studies may, however, also prepare pupils to deal with disastrous events, which are essential in the creation of a “safe society”, as well as to achieve changes in current patterns of human behaviour that increase the risk of the large-scale damaging effects of natural hazards (Tait,1996; OECD, 2010, CDE, 2011). Additionally, DRR Education priorities should be risk-based, tailored to the hazards of the region and the particular vulnerabilities and capacities of those exposed to risk. Resources, if limited, should be focused on raising awareness and improving knowledge of risk mitigation and financial protection tools for the risks that are most likely to cause significant human, physical and financial losses (OECD, 2010).

Schools should have the authority to develop their disaster related curriculum by using common language as well as considering the local wisdom. The integration should always pay attention to basic human rights and students with disabilities. The process is not a stand-alone process; it demands collaboration from different actors to gain success. The involvement of various stakeholders, both national and local government, as well as non-

governmental organisations, can reduce the challenges including the lack of teacher capacity, lack of references and teaching disaster related materials, uncertain funds and also to maintain the sustainability of the integration of DRR into the school curriculum. In the end, students and the community will be more prepared and avoid dependency on other parties (CDE, 2011).

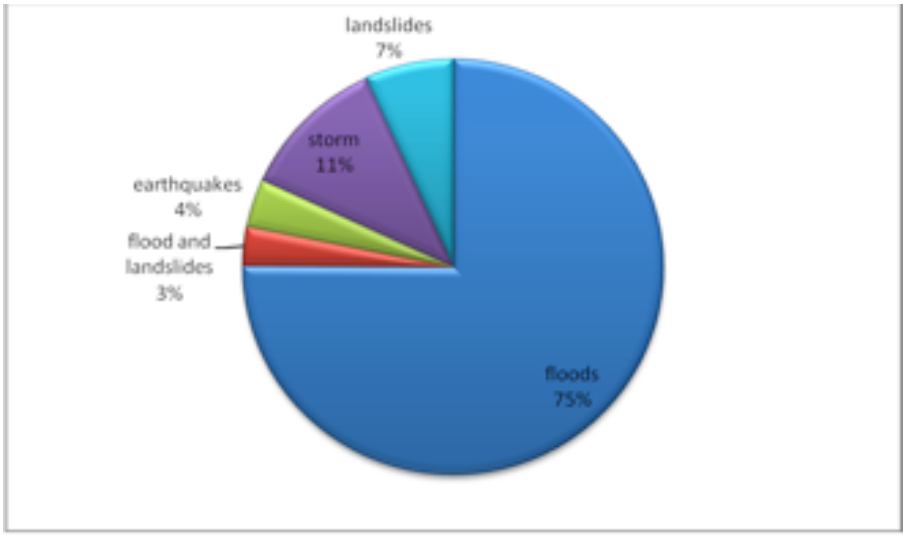
The significance of DRR Education in Indonesia, a country with such levels of cultural and ethnic diversity, underpinned by an immense distribution of hazards and socioeconomic characteristics, is irrefutable. A cultural approach towards teaching DRR is critical, especially in societies which are particularly religious like Aceh, and bearing in mind that this study is focusing on Aceh province. Changing the mind-set, primarily on issues that are tied together with traditional values, is crucial. High levels of poverty and significant population expansion, combined with the implications of climate change and rapid urbanisation, place great challenges on the management of disaster risk in Indonesia. However, DRR is not well-integrated into the school curricula at all levels in Indonesia, where DRR activities are more focused on elementary and middle school (Pandey, 2007). Hence, there is little evidence of the actual comprehensive implementation of DRR in Indonesian schools, linking the students' classroom experiences and their engagement with safe school initiatives and community efforts (Selby and Kagawa, 2014). Therefore, the idea and application of SSB schools needs to be evaluated (Djalante, 2012).

Natural hazards cannot be fully avoided, but with preparatory measures, the impact of disasters can be mitigated. Disasters in Indonesia have impacted on education because students, teachers and staff have been killed or severely affected and they can also affect school buildings and damage capital assets and facilities. For instance, the Indian Ocean tsunami in 2004 affected more than 2000 school buildings, the earthquake in Yogyakarta in 2006 destroyed 2900 schools, whereas the earthquake in West Sumatra in 2011 damaged 2800 schools (Shaw et al., 2014; GFDRR, 2014; Suharwoto, 2014). Other data from the first half of 2016 reinforced the view that flooding has been the most dominant factor (75%) affecting school

buildings, after which come storms (11%), earthquakes (4%), and the combination of floods and landslides (3%) (see Figure 1.1 below). Floods, as weather and climate related disasters, have contributed to physical impacts when students and staff are injured and killed in unsafe schools and this impacts on the quality of education, which includes loss of lesson time. This is even more severe when there are no plans for alternative locations and students are unable to continue with their education (UNISDR, 2008).

The high number of floods (see figure 1.1 below) and the impact on education has led the researcher to use the issue of climate change as a tool in teaching DRR. Even though there is no direct link between climate change and flooding, the basic physics principle that a warmer atmosphere can hold more moisture, which in turn contributes to the potential for heavy rainfall events which cause flooding, can be used to explain the phenomena of hazards. Furthermore, this selection is in line with the basic competencies in the secondary high school science curriculum, where Climate Change Adaptation is seen as a paradigm in teaching DRR, as discussed in Chapter Seven.

Figure 1.1. Numbers of school buildings damaged by disasters between January-June 2016 (DIBI, 2016).



There is, however, the current development of DRR in Indonesia's education system remains problematic (Amri et al., 2017). Despite the fact that it has been embedded in legislation, it still difficult to implement DRR strategies on the ground, as it has been considered in isolation from the mainstream school curriculum, as discussed in Chapter Three. Moreover, decentralisation, the central government and surrounding areas on the island of Java have attracted the most research in DRR, while other areas have received less attention (Djalante et al., 2012).

1.7.2. Mainstreaming DRR in the education system

As a country with various natural disasters, it is essential to include knowledge on DRR Education as part of the school curriculum in Indonesia. Students can be a core component of DRR because they can easily learn from their surroundings and can adopt new habits (King, 2011, UNESCO/UNICEF, 2014). Students can empower their families and communities with knowledge regarding disasters and moreover they can have the confidence to protect themselves, their families and their communities from potential hazards (UNISDR, 2007).

One example of the value of learning about risks at school was demonstrated by Tilly Smith, an eleven-year-old British schoolgirl, who observed a change in the sea whilst on a beach in Thailand before the tsunami struck on 26th December 2004. Tilly alerted the people on the beach because she remembered the geography lesson at school two weeks before, about the first sign of a tsunami. Her action saved many lives during this tragedy. A further example is the magnitude 9.0 earthquake and tsunami in Unosumai, Iwate Prefecture, Japan, which occurred on 11th March 2011. Almost 3000 students at Kamaishi Junior High School escaped and ran to higher ground. They were followed by the teachers and many local residents. Only five students were victims of the earthquake because these students were not at the school when the earthquake occurred. This story has since become known as "the miracle of Kamaishi" (Owen, 2005; Government of Japan, 2013). These two examples demonstrate the importance of education

for learning and understanding about disasters and providing students with basic skills for when catastrophe strikes. Educating students about disasters can help them to cope with challenging environments. It can help empower society to face the impact of natural disasters and support it to take the necessary steps to prevent further losses. As Shaw et al. (2011), argue, educational initiatives have significantly influenced families and communities.

Equally, positive outcomes for disaster education have been demonstrated through programmes in a range of countries. For instance, an initiative was introduced by Action Aid in Bangladesh to develop a learning kit in the Bangla language, as part of the curricula at primary and secondary schools to assist them and other community members build disaster-resilient communities. The kit helped children learn about natural disasters and risks and to take preventative action to reduce risk. Substantial and positive feedback was received from the children enrolled on the programme (UNISDR, 2007; Selby and Kagawa, 2012). Another example is the Caribbean nation of Grenada. In this case, the government of Grenada used an information booklet jointly developed by the UN International Strategy for Disaster Reduction (UNISDR) and UN International Children's Emergency Fund (UNICEF) entitled "Let's Learn to Prevent Disasters!". It created awareness about risk and disaster preparedness among primary school teachers and students (UNISDR, 2007). Furthermore, Cambodia also implemented "Disaster and Risk Prevention in Classrooms". These examples illustrate the growing interest in preventative culture and risk consciousness in schools (Reyes, 2011).

DRR Education is a concept and practice to reduce the risks from disasters through systematic analysis of trigger factors and moreover comprises understanding and learning to reduce the impact of disasters, like environmental conservation and readiness to respond to disaster. It includes reducing harm and vulnerabilities and enhancing the capacity of a community or society (Ariantoni et al., 2009).

To achieve this culture of safety, DRR Education should include five dimensions of learning: *the first* dimension is focused on developing an

understanding of the science and mechanisms of natural hazards, such as cause and effect, the physical impacts as well as the trends and patterns in their occurrence. *The second* dimension is to emphasise familiarity with early warning signs, including basic first aid training and safety measures. *The third* dimension is to encourage learners to act more decisively in reducing risk by following the fundamental disaster risk formula: Disaster Risk = (Hazard x Vulnerability) / Capacity of the Societal System. *The fourth* dimension aims to engage learners in the processes of building resilience in their society through various initiatives, such as vulnerability assessment and identifying hazards, community hazard mapping, as well as developing a community plan. Finally, *the fifth* dimension is focused on blending the structural and non-structural aspects, so that the school becomes a centre for learning how to build a culture of safety and resilience. To achieve this purpose, it requires the involvement of all the stakeholders in the education sector, predominantly the school's management and teachers in looking for possibilities to give a voice to students to be involved in their daily lives and in decision making processes in schools (UNESCO /UNICEF, 2014).

In the context of Indonesia there are eight values which DRR Education needs to consider:

1. Change of Culture: to create a new culture of safety and a change from safety to resilience. It has been established that DRR culture remains low in Indonesian society, as it generally refers to mystical events and superstitious views. DRR Education should consider thisaspect in order to shift the traditional paradigm towards the new scientific rationale concerning safety and resilience.
2. Empowerment-orientated: to enable schools and school elements to collectively apply DRR. Centralised policy will ordinarily lack the element of empowerment, as it should be based on a bottom up and participatory process to create a sustainable curriculum of DRR Education.
3. Independence: to optimise the utilisation of school and community resources and reduce dependency on external resources. Although it is considered time-consuming, the process of DRR Education should support

the independence of schools and their communities and reduce their dependence on external support.

4. Rights-based approach: DRR Education practice should always concentrate on basic human rights issues. This approach has globally recognised the nature of obligations and rights in terms of teaching DRR Education and its teaching process. Consequently, it is the right of every child to gain knowledge pertaining to DRR which places responsibility on the teachers and schools.
5. Sustainability: to ensure sustainability and the institutionalisation of DRR Education in the school system. This value can coincide with independence in number 3, highlighting the application and sustainability of this development.
6. Local wisdom: to explore and empower local wisdom for the DRR Educational practices. It is essential in Indonesia which has various local values to avoid any tension.
7. Partnership: involving various stakeholders from different components, sectors, social groups, government institutions, as well as non-government organisations, to achieve common objectives based on the collaboration principle and proper synergy.
8. Inclusivity: to pay attention to the needs of students, including those who have special needs (Consortium for Disaster Education, 2011).

These eight values and five dimensions have been formulated as a basic approach to DRR Education in Indonesia. The eight values are the underlying driving force of this research, particularly the sustainability issue which is a major concern of current DRR Education in Indonesia. This issue will be elaborated on in Chapter Six.

In the Indonesian context, this formulation is intended to increase the preparedness level for school communities, in order to achieve a culture of safety. The initiative aims to protect children, including children with disabilities and promotes the school as an independent system that enables the sustainability of the programme in implementing DRR Education. This can be achieved by increasing the school's capacity, including its teachers, as the

main actor in the dissemination of DRR knowledge, in accordance with local characteristics. All these aspects are essential in improving knowledge in school communities so as to reduce the vulnerability to hazards. The concept is considered as a basic formulation, one of the three pillars from the comprehensive School Safety program to improve resilience in the school community. This format of DRR Education has been translated into the form of Sekolah Siaga Bencana (SSB).

The establishment of SSB aims to create a secure and comfortable environment for students and teachers, by implementing a culture of safety so as to protect schools and the surrounding environments from disaster risks (World Bank and GoI, 2014). SSB is an explicit accumulation of DRR knowledge, transformed from global experiences into the Indonesian context. It is an umbrella for DRR Education to be implemented in the school system and primarily integrated into extracurricular spaces, including the flexible feature of 'Local Content'.

Teaching DRR is believed to prepare students with theoretical knowledge in order to assist them in understanding global problems and issues in society. The process of engaging students with the topic of natural disasters is associated with the purpose of schools to educate and prepare students with knowledge that is relevant to where they live, in this case students who are living in disaster prone areas. This is the reason why the curriculum must comprise lessons to reduce the risks of local hazards so that the associated losses and damage related to natural hazards can be reduced. Teaching about hazards in the classroom is a cost-effective method to reduce risks, and furthermore, it has a long lasting and far-reaching impact (Campbell and Yates, 2006). Thus, optimisation of DRR Education must be considered a high priority for long-term reasons.

1.7.3. Locating DRR in Aceh province

Aceh province in Indonesia has been isolated for the last thirty years due to systemic political armed conflicts. This means that the economy and the social characteristics of Aceh have been severely affected. The

earthquake and tsunami, which happened on 26th December 2004, affected the province profoundly and caused it to open up to the international community for the first time (Mardhatillah and Widjaya, 2009). The Indian Ocean tsunami in Aceh province was considered as one of the largest natural disasters in world history. The tsunami swept up to 6km inland over the shoreline of Aceh and surrounding islands, in less than half an hour. A total of 126,741 people died and an additional 93,285 people declared missing. Some 500,000 survivors lost their homes, while as many as 750,000 people lost their livelihoods. In the educational sector, almost 1775 schools, including universities and 2206 non-formal educational facilities, such as pre-schools and centres for community learning, were destroyed. Almost 2,500 teachers and 40,900 primary, secondary and university students went missing, 46,000 students were displaced and roughly 3,000 teachers and educational employees became internally displaced (Bima et al., 2009). Such a disastrous situation might call for more awareness of DRR in the Aceh community, and one in which formal education would be a potential tool to employ.

In addition, during the last five years Aceh has experienced major hazards, such as strong winds, floods, forest fires and droughts. The Aceh Disaster Management Agency(Badan Penangulangan Bencana Aceh - BPBA) claimed that approximately 31 floods had occurred in the region between 2011 and 2015. The data pointed out that floods contributed to about 47 per cent of the hazards that struck Aceh province during that period. The province is highly populated and therefore vulnerable to catastrophe (DIBI, 2015). There is the likelihood of the consequences and impacts of hazards increasing if people's understanding and awareness are not improved. In this case, DRR Education is critical.

Aceh represents a low level of knowledge and awareness of disaster risk that was evident prior to the tsunami in December 2004. As a special province with strong Islamic and cultural values, it has been occupied with the fatalistic perspective of Islam, as it considered the disaster 'God's will'. The situation of a province cut-off from the world and marginalised in development as a consequence of long periods of armed conflict against the colonial Dutch, and

the dissatisfaction with Indonesia, which then fuelled the Free Aceh Movement, suggests that the education system has had limited opportunity to develop. DRR knowledge was unknown, as the UNDP report stated that :

> '…respondents to the baseline survey on DRR awareness noted that during a disaster, 29 per cent had 'no idea' what to do, while 52 per cent 'ran away' to save themselves, without considering the exposure of the route they were taking' (UNDP, 2012, 7).

During the conflict, nine students and forty teachers were shot and killed. In 2000, two rectors from the two biggest national universities in Aceh (Syiah Kuala University and Ar-Raniry Institute) were tragically shot and killed. Furthermore, many schools were burnt down by unknown persons (BRR, 2009). Consequently, general education in Aceh has suffered as a result of the conflict and disaster and no DRR could be introduced in that situation. Hence, it can be said that DRR Education was absent prior to 26th December 2004. The implementation of DRR Education in an emergency period post-disaster, was not easily conducted, as Aceh remained under martial law instigated by the central government. The disaster became the trigger for peace talks in Helsinki in August 2005. In this situation, BRR (Badan Rehabilitasi dan Rekonstruksi/Rehabilitation and Reconstruction Agency), as an ad hoc body, was pushed to accommodate peace reconciliation within their disaster reconstruction programme (BRR, 2009).

Aceh's earthquake and tsunami were a turning point in the development of DRR Education in Indonesia. The massive losses and high mortality in Aceh at that time represents the low level of knowledge in DRR. This was the first time the Indonesian government had to admit failure and regarding its limited capacity to cope with the impact and thus international aid was required. Even in the first month of the emergency, post-disaster, international aid was the first to reach isolated people who were affected by the disaster, courtesy of the United States and Australian forces. The local government collapsed and the national government did not have the experience to cope with such a significant disaster (BRR, 2005).

Aceh province is considered as embryonic in relation to DRR Education in Indonesia. This makes it an exceptional place to do the case study for this research.

1.8. Theoretical Framework

1.8.1. Actualisation of National Culture-based Education and Learning

The concept of culture-based education promotes nationality and the responsibility of youngsters as Indonesian people. The concept emerged from the socio-political context of colonialism, injustice and discrimination created by the Dutch government in education. Access to education was limited by the Dutch government and became the privilege of the elite. The establishment of Taman Siswa College as an educational institution before the independence of Indonesia is considered the foundation of the development of the educational philosophy and system in Indonesia. Established on July 3rd 1922 (MLPTS, 1977), Taman Siswa did not only provide education based on cultural values, but also promoted Indonesian nationality as the cornerstone of independence.[3] Ki Hajar Dewantara (known forthwith as KHD), is recognised as the founding father of National Education in Indonesia. His concept was developed in Taman Siswa, based on the results of his study of the ideas and thoughts of many foreign interdisciplinary experts (Dewantara, 1994).

The national culture-based education and learning concept of KHD significantly contributed to developing the education system in Indonesia's early days but then stagnated due to issues around political pragmatism. However, this concept was revisited in the 2013 curriculum[4] (Towaf, 2016). Taman Siswa's commitment to the implementation of national education continued after Indonesia was granted independence. KHD was the first education minister to conceptualise education in Indonesia. His philosophy in

[3] The writings of H. Yonkman mentioned that in 13 years, Taman Siswa had 208 schools and branches, not only in Java, but also in Madura, Sumatra, Kalimantan, Sulawesi and Bali. Taman Siswa employed 700 teachers, who provided lessons for 17,000 students (Dewantara, 1994:10).

[4] Ki Hajar Dewantara was born in Yogyakarta on May 2nd 1889 and died on April 28th 1959 in Jogjakarta. His original name was Raden Mas Soewardi Soerjaningrat, He was the first Minister of Education from 2nd September 1945-14th November 1945 and an Indonesian Independence activist. He founded Taman Siswa College, as the first model used in the Indonesian education system. Thus, he is remembered on National Education Day and thought of as an Indonesian national hero (Harahap and Dewantara, 1980).

education has been studied, preserved and is implemented in Taman Siswa. The terms *Ing Ngarso sung Tulodo, Madyo Mangun Karso and Tut Wuri Handayani*, are the *Trilogy Values of Leadership* which mean; 'Giving an example in front, build spirit on the way, provide motivation from behind' and practiced in Taman Siswa. These values later became the benchmark of Indonesian educational policy (Towaf, 2016)

The basic conceptual ideas of KHD are that education should be based on local and regional cultures and consider local wisdom and tradition to promote the national culture. In this case, the cultural aspects of the nation are the basis and also the destination of Indonesian Education. The conceptual ideas of KHD and their embodiment in Taman Siswa are an intellectual heritage that not only needs to be preserved, but also needs to be examined as an alternative educational method and for learning to promote character and national identity. The system is expected to be an interactional system in communities, to ensure social harmony contributes to national integrity. Conceptually 'culture' meant society's way of life, comprising all aspects of human existence to reflect Indonesian identity as a free and independent nation. The attitude recommended by KHD in facing the question of national culture is the establishment of three components; specifically, continuity, concentricity and convergence. The attitude of continuity comes from what may be considered as the traditional elements and values of Indonesian culture and preserving the uniqueness of our own national culture. Nonetheless, as we confront influences from the outside world, we can take concentricity to indicate being open, but critical, creative and selective to enrich the national culture, through the assimilation of the positive elements and values of other cultures, whilst developing Indonesian identity in the correct way. The attitude of convergence aims to work with other nations toward the realisation of one world with a universal culture based on individual national characteristics, according to the pattern of 'Bhinneka Tinggal Ika' or 'Unity in Diversity'. This also involves the building of a unitary culture in which the regional and local cultures will live in harmony (Said, 1972:7-9).

The original concept of KHD as the founder of the Indonesian education system declined in the later development of the Indonesia curriculum, though recently the idea is being revisited to respond to global challenges and moral degradation (see Diagram 1.1). Subsequently, Muhammad Nuh, the Minister of Education from 2009-2014, decided to develop Curriculum 2013. However, Muhammad Nuh left the ministerial position in 2014. Anis Baswedan was then elected as Minister of Education (2014-2016) and he declared that KHD's educational concept is essential to develop a relative standard of education (National Geographic, 2016).

1.8.2. Towards a Pedagogic Re-contextualisation

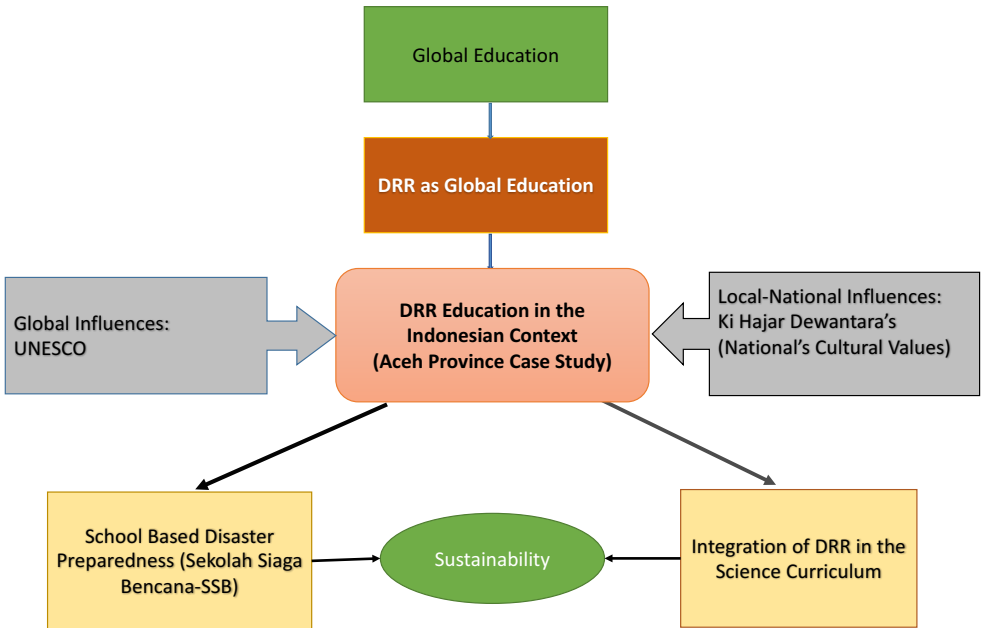
This research borrows the theoretical terms of Bernstein (1990) from the Sociology of Education, distinguishing between the primary and secondary fields of knowledge production and reproduction, called the field of re-contextualisation. This field is comprised of two sub-fields: the official re-contextualising field (ORF) and the pedagogic re-contextualising field (PRF). The ORF includes the 'specialised departments and sub-agencies of the state and local educational authorities together with their research and system of inspectors '. While the PRF is comprised of: (1) university departments of education, together with their research; and (2) the 'specialised media of education, weeklies, journals, and publishing houses together with their readers and advisers'. The PRF may also 'extend to fields not specialised in educational discourse and its practices, but which are able to exert influence both on the State and its various arrangements and/or upon special sites, agents and practices within education' (Bernstein, 1990b, 192).

Bernstein's interest lies in the way societies are reproduced and transformed. Pedagogy and transmission occur in educational institutions by way of two fundamental concepts, classification (regulation between contexts) and framing (regulation within a context). Through these sociological concepts, Bernstein allows for the possibility of the transformation of culture and society. It means that the curriculum formation and approach to learning, which are re-contextualised within institutions such as schools or universities,

need to be examined in relation to societal needs and priorities. For example, the DRR educational concept is that formulated by LIPI-UNESCO and then transformed into the school system through a relocation of pedagogic discourse. This is achieved by the embedding of these instructional discourses in regulatory discourses involving the principles of selection, sequencing, and pacing.

In this context, this study argues that current DRR Education in Indonesia has satisfied the ORF scheme, but not the PRF scheme. So this study make an effort to apply the PRF theory into DRR Education in the school system, i.e. developing integrated pedagogic methods within the formal science curriculum, as described in diagram below. This approach seeks to understand, describe the structural relations of power and control within institutions involved in DRR educational development in Indonesia, as will be discussed in Chapter Five.

Diagram 1.1. Conceptual Framework



1.8.3. Responding to 21st Century Globalisation

The implementation of DRR Education in Indonesia is not independent from global influences. The issue of disaster is not viewed as local but becomes an interconnected world, despite national boundaries.

DRR is known as a global term to express the need of human beings to prevent, respond to and mitigate disaster risks which occur in many places in the world. The issue of disasters, as well as poverty and environmental degradation, should be seen as global issues (Standish, 2012; Glen, 2017). Learning about global issues offers students and teachers knowledge about the changes in the societies and environments in which people live, while also focusing on creative and cooperative learning processes and developing positive values and attitudes and important skills. It begins by creating deeper understanding of the complexity of the underlying causes. This concept is known as global education (Singh, 1991, Glen 2017).

Global education promotes positive values and assists students in taking responsibility for their actions and to see themselves as global citizens who can contribute to a sustainable world. It aims to prepare future generations with new knowledge, experiences and skills on various global issues, which was not much of a concern before (Glen, 2017). In this context, Dewey (1986) argued that education is a life-experience and the development process to obtain knowledge and skills is something that students need to obtain to understand and deal with future situations. Anything which can be termed a study area, whether arithmetic, history, or natural science, must be derived from material which at the outset falls within the scope of ordinary life experience. In this case, Dewey asserts that the process of learning should be an everyday application. To be educational, there needs to be a connection between the subject being taught and life experiences (Dewey, 1986). Similarly, Young (2007) stated that the separation of school from life and the ineffectiveness of curricula, are matters of critical concern and when education has the responsibility of explaining the world in which we live. It then becomes necessary to bring the world into the school and take the school out into the world. The connection between school and community life

is never as convincing as when knowledge presented in the school has a direct value to the community.

1.9. Assumptions, Scope and Limitations

1.9.1. Assumptions

This research has assumed that DRR Education is one of the fundamental pillars towards reducing the impact of disasters in Indonesia. The researcher's supposition revolves around the idea that if the concept of DRR is fully integrated into the school curricula, more children will understand disaster risk reduction and work towards transforming their societies. Hence, it solves the sustainability issue regarding the current development of DRR Education in Indonesia.

1.9.2. Scope and Limitations

This research focuses on the transformation of DRR knowledge from a global level into Indonesian's educational policy and institutions, which was then established under the SSB/School-based disaster preparedness programme, its progress and challenges, along with the proposed recommendations. This research predominantly focuses on the senior high school curriculum, so other school levels such as primary and middle school are only briefly discussed. The scope of this study is to explore the notion of DRR Education amongst Indonesian secondary high schools and its application to ascertain students' understanding regarding the concept of disaster risk reduction. The lack of awareness related to DRR in schools could be one of the drawbacks in gaining students understanding of what DRR is about. The core limitation of this study is the limited timeline, scope and funds required to scale-up the research methodology and target schools to measure the impact of DRR in formal education in Indonesia.

The structure of this thesis is primarily to follow the structure of the research questions, as it is considered logical to describe the issue from the wider global context into the specific context of Indonesia. The thesis's chapters are organized thematically based on particular theories and in

order to answer different research questions in this study. Such a structure has been commonly used in social science research.

1.10. Terms Used in this Study

There are several terms used in this discussion of DRR Education that require clarification. However, a word of caution is also advised in that in different contexts, and in different periods, people use these terms to mean different things. I have alluded to this problem in places. Nevertheless, here I offer some of the meanings found in textbooks or in the literature.

Disasters are described as a result of the combination of; the exposure to a hazard, the conditions of vulnerability that are present, and the insufficient capacity or measures to reduce or cope with the potential negative consequences. The impacts of a disaster may include; loss of life, injury, disease and other negative effects on human physical, mental and social well-being, together with damage to property, destruction of assets, loss of services, social and economic disruption and environmental degradation (UNISDR, 2009). Whilst hazard is a dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage (UNISDR, 2009). Hence, hazards can be triggered by nature (such as tsunami and earthquake), and the impact can be destructive, and unavoidable (UNISDR, 2010)

Disaster risk management means a systematic process of using administrative directives, organisations, and operational skills and capacities to implement strategies, policies and improved coping capacities to lessen the adverse impacts of hazards and involves the possibility of disaster order. A comprehensive conceptual approach to reduce risks is set out in the HFA (2005-2015), which expected 'the substantial reduction of disaster losses, in lives and social, economic and environmental assets of communities and countries' (UNISDR, 2009).

The school-based disaster preparedness programme (SSB), or safe school, is a school community committed to developing a safe culture,

awareness of disaster risks and having a good plan before, during and after disasters. It comes from ensuring that a school is constructed correctly, its location and that the school community have a good understanding of the aspects of knowledge, attitude and skills toward disasters (Perka BNPB 4/2012). Equally, the Consortium for Disaster Education defined SSB as the capacity of a school to manage disaster risks in its community. Such capacity is measured by; the availability of a disaster management plan (before, during and post-disaster), a school's policy and the mobilisation of resources, which are supported by knowledge and a capacity of preparedness, standard operating procedures and the early warning system (CDE, 2011).

The term 'student' for a senior high school may be considered under the category of children as defined by the UN, and refer to anyone aged 16 to 18 years old (Ministry of Education, 2003). Save the Children estimates that on average about half the people affected by disasters are children (Save the Children, 2010).

The term 'institution' is interchangeable with 'agency' under the meaning 'organisation providing a particular service on behalf of the government, non-governmental or community group; an organisation founded for a religious, educational, professional, or social purpose (see Abdelnour et al., 2017). This research primarily refers to official institutions in relation to the development of DRR Education in the Indonesian context, whilst policy refers to a deliberate system of principles to guide decisions and achieve rational outcomes, which is implemented as a procedure or protocol. Policies are generally adopted by a governance body within an organisation (see Hodgson, 2006). In this research, policy is primarily understood as Indonesian government policies concerning the development of the DRR initiatives and education.

CHAPTER TWO
RESEARCH METHODOLOGY

2.1. Introduction

This section describes the methodology applied in this research. The first section describes the primary methodology, the research methods and the location where the study was conducted. The next section describes how the study was conducted to gain data for the purpose of the study. The methods include Focus Group Discussion (FGD) with school representatives and chemistry teachers, a survey with school representatives and high school students, content analysis of Syllabus of the 2013 Curriculum and interviews with DRR education National stakeholders and science teachers as the basis of the research process. Subsequently, the sampling procedures used for data collection as well as analysis are also described. Furthermore, concerns about validity and ethical considerations are addressed.

2.2. Study Design : Mixed Methodology

This research employed mixed method, covering both qualitative and quantitative approaches to address the research question. Mixed method is defined as research in which the researcher collects and analyses data, integrates the findings and draws inferences using both qualitative and quantitative approaches and methods in a single study or programme of inquiry. These methods can give the researcher more space to explore by combining qualitative and quantitative data. In this method, the researcher can collect qualitative data before or after the quantitative data (Creswell, 2014).

Mixed methods involve diversity of views with different rationales, combining researchers' and participants' perspectives by investigating relationships between variables through quantitative research and revealing meanings through qualitative research (Bryman, 2008). Quantitative research is generally used to measure variables to test hypothesis using quantitative data to see whether they are confirmed or not in more controlled situations.

Qualitative research is generally holistic and exploratory for purposes of understanding meaning, focusing on the exploration, description and occasional construction of theories (Johnson & Christensen, 2014; Benz & Newman, 2008). The term mixed methods refer to either data collection techniques or analysis, given that the type of data collected intertwines with the type of analysis that is used. The method can be used for many research enquiries (Tashakkori & Teddlie, 1998). According to Creswell (2015), the core characteristic of mixed methods is:

- The collection of quantitative and qualitative data and analysis to answer the research questions.
- Use both qualitative and quantitative methods.
- The combination of quantitative and qualitative data using a particular research methods design and conduct interpretation of this integration (Creswell, 2015).

The function of mixed methods is related to the fact that mixed methods lead to multiple inferences that confirm or complement each other. According to Tashakkori & Teddlie (2003) and Tashakkori & Newman (2010), it would need a variety of data sources and analyses to completely understand complex issues. By combining two or more research methods with different strengths and weaknesses in the study, it is less likely that the researcher overlooks something important (Johnson & Christensen, 2014). Equally, mixed methods is a popular design for research when the researcher wants to test an intervention in an applied setting, such as a classroom (Creswell, 2014).

Philosophically, 'mixed methods' refers to 'pragmatism', a paradigm or world views to an inquiry process that is built around combining the different strengths of qualitative and quantitative methods (Creswell, 2009; Morgan, 2017,). Even though there are some different interpretations of certain components of pragmatism among philosophers, pragmatism is seen to be compatible with mixed methods research (Ralph, 2013). Pragmatism research philosophy accept that there are many different ways of interpreting the world and undertaking research. The combination of qualitative and

quantitative data collection methods (mixed methods) can provide different perspectives to help interpreting the data as there is no single point of view can provide the entire picture (Saunders, et. al. 2009). The combination of qualitative and quantitative methods through a pragmatist paradigm allow a more comprehensive approach to answer different research questions that is based on the complexity and context of the area of study. DRR education is considered a complex issue in terms of its origins and evolution into schools' curriculum in Indonesia.

In this study, the quantitative analysis includes the result of the survey and the students' test to gain an overview of the number of schools involved in disaster education and level of student understanding pertaining to hazards. While qualitative strategies are applied in circumstances where the study variables cannot be measured. Notes from the Focus Group Discussion, transcriptions from the interviews with teachers and stakeholders and content analysis of the National Science Curriculum is used for qualitative analysis. The data collected aims to assess the use of the DRR concept in high schools' science curricula, as an integrated approach to be applied effectively in Indonesia.

2.3. Study Area

Aceh is a province in Indonesia that is classed and governed as a special territory (*daerah istimewa*). Aceh is a designated administrative area intended to give the area increased autonomy from the central government. Aceh province covers an area of 58,377 km² and based on the census in 2016 has 5,096,248 inhabitants. Administratively, the province is divided into 18 districts and 5 cities, consisting of 289 sub-districts, 779 mukims[1] and 6,474 villages. The boundaries of the territory of Aceh Province, the northern and eastern limits, borders the Malacca Straits, south of the Province of Sumatra Utara and west of the Indonesian Ocean (BPS Aceh, 2017).

In 2016, the population density of Aceh was 90 people per square km. The average population density of the cities is higher than the districts. Banda

[1] Mukim is a collection of several villages.

Aceh City has the highest population density, 4,452 people per square kilometre. Additionally, Gayo Lues District has the lowest population density with 16 people per square kilometre. The average temperature in Aceh province ranges between 26.1C-28.3C., with the highest reaching 33.8C. Average humidity in ranges between 68-86%. The average atmospheric pressure ranges between 1008mb to 1011.2mb. The amount of rain precipitation ranges between 51.0mm-487.4mm with the number of rainy days is 6-23 days/month (BPS Aceh, 2017).

The province of Aceh (see picture 2.1) is located in the western part of Indonesia, occupying a strategic position as a gateway to commerce and culture that has connected the East and West for centuries. Aceh is recognised as a haven for Chinese merchants besides Europeans, Indians, and is the place where the Arabs, originally introduced Islamic culture and religion to the archipelago, and where the first Islamic kingdom in Indonesia emerged. At that time, religion and Islamic culture played a significant part in the daily lives of the Acehnese people, which is known as 'Seuramo Mecca' or the Veranda of Mecca[2] (BPS Aceh, 2017).

Prior to the tsunami in 2004, the people of Aceh were exceedingly isolated from the world because of the protracted violence and conflicts that took place from 1976 to 2005. The people of Aceh experienced a form of government that they regarded as authoritarian, bureaucratic and centralistic, which did not respond to their demands for social justice for more than three decades and moreover, is believed to be the main cause of the long conflicts in Aceh. These specific conditions have influenced the social characteristics and economy of the Acehnese (BRR, 2005).

The systemic social and prolonged armed conflict had a negative impact on the lives of the people of Aceh both at the micro and macro level. On a micro level, the negative impact was visible in the psychological problems of individuals, causing them to be suspicious of one another, thereby creating mistrust and discontent. On the macro level, the social and economic conditions of Acehnese society were paralysed. The conflicts had

[2] Mecca is a holy city for Muslims located in the Kingdom of Saudi Arabia.

destroyed a number of economic resources, the institutional and public services, and the education system in Aceh. However, the tsunami in 2004 profoundly changed the lives of the people of Aceh. They began to start rebuilding their province by working hard within days after the earthquake and tsunami. The glimmer of hope became brighter following the signing of the Memorandum of Understanding (MoU) between the Free Aceh Movement (*Gerakan Aceh Merdeka*, GAM) and the Indonesian government in Helsinki in 2005. Peace brought new hope and optimism to the hearts of the people of Aceh for a bright and better future (Mardhatillah and Wijaya, 2009).

Picture 2.1. Map of Indonesia

Hence, Aceh province, Indonesia, was heavily affected by the 2004 Indian Ocean tsunami and earthquake and is the place where disaster management emerged and developed for wider parts of Indonesia. As a consequence of this monumental disaster in 2004, it received international attention which eventually triggered a national response that initiated various endeavours in terms of risk disaster management, including the development of DRR education. This means that this area can provide a rich source of data pertaining to the subject.

This research is using a specific place, Banda Aceh City, Aceh Province, Indonesia as a case study. Banda Aceh was selected because it is

the capital and the largest city in Aceh Province. Banda Aceh covers an area of 31,36 km2 and has a population of approximately 254,904 people. It also has the highest population density; 4,452 people per square km, which means that a disaster can have an immense impact if the people are not provided with sufficient knowledge and prepared in advance to deal with it. This can be seen by the level of destruction in Banda Aceh that reached 75% during the tsunami. Banda Aceh has a heterogenic population which compromises different ethnic groups. Additionally, it has the highest percentage of school participation among other districts in Aceh (BPS Aceh, 2017).

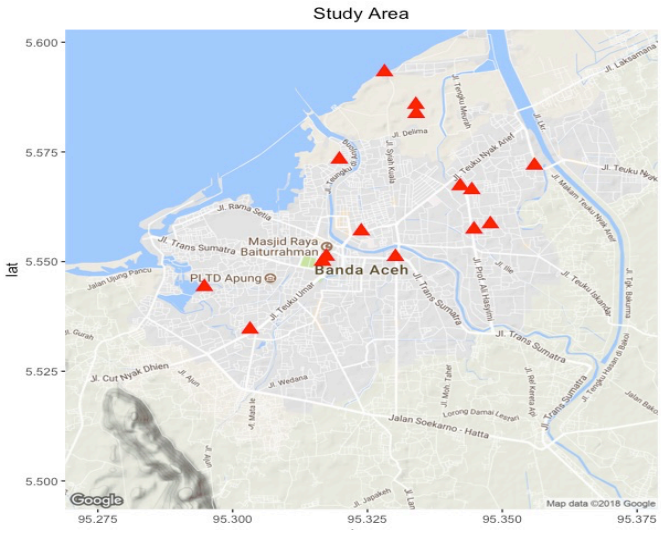
2.4. Study Population and Sample Size

The sampling strategies should stem from the conceptual framework as well as the research question. The sampling plan should allow the study to generalise the situation to another setting or population. The term population refers to all those people who could be included in the study. It is a selection process about who will be included and who will be omitted (McNeill & Chapman, 2005). Sampling from populations addresses, research efficiency and accuracy. One of the methods that can be used to cover a range of potentially relevant social phenomena and perspectives from relevant data resources is 'purposive sampling'. Purposive sampling are samples in which the researchers use various criterion with the underlying focus on intentionally selecting a specific case that will provide the valuable information for the question in the study (Kemper et al., 2003). Purposive sampling has a specific purpose that is aligned to the aims of the research and the identification of subjects with relevant characteristics (Newby, 2014).

In this study, researchers used purposive sampling where the selection of the participant is based on answering particular research questions, as to the specific inclusion and exclusion criteria being followed. These criteria give a clear outline and the features of the people that are included. First, the secondary schools that were involved in this study were from the Banda Aceh area (picture 2.2).The schools were selected using the following criteria: (1) The schools that had been heavily impacted upon by the 2004 tsunami

and previously involved in DRR activities with consideration given to their familiarity with the theme of the research and the importance of it; 2) Schools that were known as SSB based on the list from LIPI's pilot project (table 6.1) and Local Education Authority (see appendix 3). The researcher sent invitations to 30 schools. Of these, only 15 responded to the letter (see. table 2.1).

Picture 2.2. The location of schools in Banda Aceh



Second, students were from SSB and non-SSB schools. Third, the science teachers. Fourth, the school representatives represented the head principals or the curriculum division. Fifth, the officials were from the government, mainly representatives from the Provincial Education Authority, Aceh Disaster Management Agency (BPBA), the Education division from the Ministry of Religious Affairs and BAPEDDA in Banda Aceh. Finally, the Disaster Preparedness Division from the National Disaster Management Agency (BNPB), the General Secretary of the Consortium for Disaster Education, the head of the curriculum division from the National Curriculum Centre, the Indonesian Science Institute (LIPI), NGO Lingkar and Kerlip that were involved at the start and the implementation of SSB in Indonesia.

The sample size refers to the number of cases, people, units or sites that participate in a survey to obtain precise and reliable findings. Samples

are assumed to be representative of the wider population (Hammond & Wellington, 2013; Newby, 2014). The units can be people (e.g., students such as Grade X in Secondary High School), places (e.g., schools) and things (e.g., school records) (Fink, 2010). A sample in purposive sampling possesses certain characteristics, often seen as representative of some larger population being sought (Brown, 2010).

The sample in this study included 26 chemistry teachers, 15 head teachers, 4 local authorities for the FGD and 164 students who attended the classroom activity. While the interview participants were 8 national education stakeholders and 6 science teachers in Banda Aceh. The participants, once they had met the inclusion criteria, were contacted by the researcher via phone or in face-to face encounters. They were asked if they would like to take part in the research. The aim was explained to them. If they agreed to take part, they were subsequently included in the sample. The entire population is 285 students of science classes of year 2, from the 15 schools that attended the previous study (FGD). The study has 95% confidence level with ± 5 percent confident interval.

2.5. Research Instruments

Research instruments are the tools used by researcher to collect data for the purpose of the study (Salkind, 2010). It includes any tool used by the researcher to conduct a study e.g., a questionnaire, an interview schedule, interview guidelines, etc. (Hammond & Wellington, 2013). This research uses multiple instruments. Firstly, the FGD guidelines to assist the researcher with the activity. Secondly, the questionnaire to assess the implementation of disaster education in Aceh. Thirdly, the test to compare the level of knowledge and effectiveness of the SSB and non-SSB intervention. Fourthly, a template of the semi-structured interviews which provide a guideline in exploring information about the transformation of DRR education in Indonesia. Finally, science syllabus material provided by the National Curriculum Centre (see Chapter Seven).

2.6. Research Methods

2.6.1. FGD with Chemistry Teachers and Schools' Representatives

A focus group Discussion (FGD) is an arranged setting which brings together a group of people to discuss the same theme or topic. FGD utilises open-ended questions, because of the expected quality of the data obtained from specially selected participants in the focus group. Participants in the group in this study were able to express opinions and views on their experiences (Kumar, 2005). Conducting focus groups discussion allows researchers to collect a large amount of data from a group of people in a relatively short amount of time. Focus groups can be used to explore how people perceive or view a certain topic. The discussion can generate immediate and plentiful data for research (Wilson, 2012). During a focus group, the researcher can gain clarity, depth and detailed information because participants can provide different insights on the topic under study (DeMarrais & Lapan, 2004).

A focus group has several characteristics that make the method different to other qualitative methods in regard to the purpose, composition and nature of data collection. The essential purpose of focus group study is to identify different perspectives concerning a certain topic and to gain an understanding of the issues from the perspective of the participants. Focus group discussion can be used alone or in combination with other methods of data collection (DeMarrais & Lapan, 2004).

Focus groups typically consist of 6 to 8 participants, though they can be larger or smaller depending on the purpose of the study. Participants selected usually come from similar backgrounds or have shared perspectives and experiences related to the research issues. The group is led by a moderator who facilitates the discussion from designed questions to gain a breadth and depth of responses from participants (Hennink, 2014). However, some participants may lead other participants to follow their opinions (Moule and Hek, 2011). In this study, the researcher provided several questions on the topic of the study to help with the process. The issues discussed in FGD

include: (1) the implementation of DRR education in the Banda Aceh area; (2) strategies for integration, and (3) challenges for implementations.

The researcher used focus group discussion as part of the preliminary study on DRR education in Aceh, Indonesia. It aimed to acquire as much preliminary data as possible before going to the next stage of the research. In total 26 chemistry teachers, 15 head teachers and four individuals from local authorities were invited to the session in October 2014.

Two distinct focus groups were formed, both of which were asked a set of questions that were specially designed for each focus group. *The first* focus group, composed of school heads and local authorities' representatives were questioned on the application of the 2013 Curriculum and how it related to the implementation of disaster education in secondary schools in Banda Aceh. The focus group discussions were conducted in the office building by means of different sessions. This session included 19 participants, 15 from schools' principals/curriculum divisions, besides representatives of the Provincial Education Agency, the Aceh Disaster Management Agency, the Regional Development Planning Agency and the Ministry of Religious Affairs.

The second session was attended by 10 chemistry teachers; Grade X (first year in High School) and 16 chemistry teachers Grade XI (second year in High School). It should be stated that Grade XII was excluded from the research because this grade was preparing for the university entrance exam. This focus group has contributed to answer questions in relation to how DRR can be integrated into the teaching of chemistry in the schools' curriculum and what barriers would exist in relation to its implementation. The subject of chemistry was selected since it is one of the key science subjects (along with physics and biology) adopted in senior high school in Indonesia. Some topics in chemistry, such as environmental chemistry, hydrocarbons, acidic and basic properties, chemical properties, etc., provide underpinning knowledge about hazards and can be seen as a tool for addressing disaster related subjects. The FGD with school representative and teachers was held for approximately five hours each in The Tsunami and Disaster Management Research Centre (TDMRC) at the Syiah Kuala University building.

Table 2.1 List of schools included in the FGD.

No	Name of school	Type of school
1	SMAN 2	Public
2	SMAN 3	Public
3	SMAN 4	Public
4	SMAN 6	Public
5	SMAN 8	Public
6	SMAN 12	Public
7	SMAN 13	Public
8	SMAN 14	Public
9	SMA Muhammadiyah I	Public
10	MAN Model	Islamic
11	MAS Darul Ulum	Islamic
12	MAN 1	Islamic
13	MAN 2	Islamic
14	MAN 3	Islamic
15	SMTI Banda ACEH	Vocational

2.6.2. Survey

A survey is an activity for collecting information from or about people to describe, compare or explain their knowledge, attitudes and behaviour. The activity conducted includes defining the survey objectives, selecting respondents and preparing a reliable and valid survey instrument (Fink, 2010). A survey provides a quantitative or numeric description of trends, attitudes, or the opinions of a population where the researcher can generalise or draw inferences about the population (Creswell, 2014).

The purpose of the survey is to produce statistics, that is, quantitative or numerical descriptions about some aspects of the study population. The principal way of collecting information is by asking questions and analysed all their answers. The information is usually collected from a sample or target population rather than from every member of the population (Fowler, 2013).

The survey approach deals with data collection in a real world setting. It is systematic data collection which is usually collected by means of questionnaires, tests, or observation and interviews. Surveys might involve the collection of information at one or several points in time from statistically relevant samples of students, teachers or schools. The information is collected from a sample group selected from a tightly defined school population. The data generally analyse the relationships among variables. Moreover, considerable amounts of educational research, especially classroom and school levels are conducted in this way (Newby, 2014).

The first survey which involved the head teachers, was conducted as part of the preliminary study and intended to provide a general overview of the current issue on disaster education and whether the DRR concept can be a part of lessons in Secondary High Schools in Banda Aceh. The survey form was modified from the Indonesian Science Institute (LIPI) assessment form (Appendix 1). The researcher invited 30 schools' representatives to participate in this study, but only 12 schools returned the survey form. The second survey was designed in a test format as part of classroom intervention activities. Students were asked ten multiple choice questions adopted from (National Oceanic And Atmospheric Administration/NOAA) to allow the student to select an answer that they believe is appropriate. This survey involved students from both the school-based disaster preparedness programme (SSB) and non-SSB schools in Banda Aceh with the aim of gathering data on their level of disaster knowledge.

In conducting the survey, the researcher worked closely with the local education authority, local disaster management agency, school management including head teachers and the curriculum department, as well as teachers in the field. The first survey was used as a component of the FGD, in which the researcher assessed similar information from the head teachers and teachers, while the second survey was conducted as part of classroom intervention.

2.6.3. Classroom Intervention

With the cooperation of the schools, the researcher conducted a classroom intervention. An intervention is a strategy to address a specific issue to address a particular need for the purpose of this study. The intervention included two activities which are thermal expansion and ocean acidification. It conducted in the classroom setting for about 3 hours. It aims to teach students about hazards and disaster through climate change topic.

One hundred and sixty four students from six secondary high schools participated in this study. The main objective of this activity is to determine if students are able to understand the terms hazard, risk and vulnerability in relation to climate change adaptation. Topics related to sea level and changes in the ocean environment were selected because the theme can be taught as part of science lessons where students learn about thermal expansion in physics, acid base in chemistry and ocean ecosystems in biology. It is easy to introduce climate change related topics such as sea level rises and ocean acidification because climate change is considered as an example related to teaching DRR in secondary high school in Indonesia. This activity also aims to recognise whether the inclusion of DRR education through the schools' science curriculum will improve students' understanding of hazards, their impact and disasters.

In the classroom, students were given a test (pre–test) to ascertain their initial knowledge on the topic. This was followed by conducting hands on experiments. The researcher was assisted by two teachers during the intervention to make students feel comfortable during the experiment. To encourage every student involved in the activity, pupils were divided into groups which consisted of five to six secondary school students. Each group was asked to undertake two tasks: first, they were asked to conduct an experiment on the rise in sea level, and second, the process of ocean acidification. The steps are described below.

Activity 1: Thermal expansion

Learning objective: Students will be able explain that the effect of temperature will cause a rise in sea level. The activity aims to show students the consequences of rising water levels and understanding the impact.

Materials:

- Flask
- Bunsen burner
- Thermometer
- Stop watch
- Water

Procedures:

1. Place stand with gauze mat over the Bunsen burner.
2. Fill the flask to the top with water. Place the hollow glass tube and thermometer in the stopper and gently press the stopper into the flask. Use the ruler so the water level in the glass tube can be measured.
3. Place the flask on the gauze mat and heat the water slowly over the Bunsen burner.
4. Read out the water level at 2-degree Celsius intervals and have one of the students write down the temperature and water level on the chalkboard. Record the temperature and water level at least five times.
5. Ask the students to observe the data.
6. Students were asked to write down their observation and have a discussion in their group on what potential hazards are connected with the increase in the Earth's temperatures.

Activity 2: Ocean acidification

Learning objective: Students are able to explain the impact of climate change on ocean and marine life.

Materials :

- Flask
- Bunsen burner
- Empty mineral bottle

- Baking Soda (researcher use baking soda as source of CO2 to increase the pH)
- pH strips
- Ocean water samples (the researcher collected the water from the sea for safety reasons)

Procedures:

1. Fill flask with ocean water. Then ask the students to measure the initial pH of the ocean water sample.
2. Dissolve a fix amount of vinegar and baking soda to create carbon dioxide gas (CO_2) in the drinking bottle. The bottle and flask are connected by a pipe to make the gas flow into the water.
3. The experiment is conducted with different concentration of vinegar (5, 10, 15 ml) to see whether the increase in CO_2 will affect the pH.[3]
4. Students were asked to underline what part is more acidic? Report back and follow with a class discussion to attempt to reach agreement on the impact of climate change on Aceh in particular and Indonesia in general.

Note:

Chemical reaction during the process:

Baking soda + Vinegar :

$Na_2HCO_3 + CH_3COOH \longrightarrow NaCH_3CO_2 + CO_2(g) + H_2O$

CO2 gas release through the pipe connected to the water.

$CO_2 + H_2O \longrightarrow H_2CO_3$.

H_2CO_3 will be dissociated into H^+ and HCO_3^-.

$H_2CO_3 \longrightarrow H^+ + HCO_3^-$.

The increase in H^+ causes the water to become more acidic.

[3] In Chemistry, pH is a term, which is used to measure the acidity or basicity of the solution. The pH range is from 0 to 14. Seven is neutral. The lower numbers are considered acidic and the higher numbers are basic.

Activity 3 :

Each group was asked to make a short presentation about their observations of both activities and their thoughts about the lesson. During the activities, the researcher opened a discussion about why thermal expansion and ocean acidification occur, the cause and effect and what they can do to limit adverse climatic trends. To relate this issue through discussion, the students were then asked to describe how the process can be prevented or mitigated.

Students were provided with picture cards including floods, landslides, droughts, forest fires, volcanic eruptions and earthquakes to help students during the activities. Using their previous knowledge in chemistry, biology and physics, students in the group were asked to explain the disaster, as well as how impacts and risks might be reduced. Each session was very well-organised as everyone involved in the research, opened an active discussion and presented their ideas during the activities. At the end of the lesson, students were given a test (post-test) which comprised the same questions as the pre-test to see whether their understanding had improved after the intervention.

Positive feedback was received from teachers who participated during the process. The research has given teachers new experience of teaching DRR in the classroom, as part of the lesson. It has also provided them with different ideas that are more contextual for students' lives. However, various learning models can also be applied in teaching and learning disaster related knowledge. This research provided one example as practical guidance for teachers in teaching disaster related content in the classroom, as discussed in Chapter Seven.

From this insight, to supplement the information about the implementation of DRR education, the researcher then undertook the interviews.

2.6.4. Interviews

An interview is a face-to-face conversation structured to gain information from people's opinions but based on the researchers' interests and goals**.** Interviews can give rich information pertaining to how people see a certain issue (Magnusson & Marecek, 2015). Interviews typically consist of a conversation aimed at obtaining the desired information (Matarazzo & Wiens, 1972). The "main body" of the interview refers to the process in which the interviewer is focused both on collecting information and ensuring that the conversation goes smoothly. The process includes engaging and responding to the requests and questions (Magnusson & Marecek, 2015).

It should be noted that there are different types of interviews; specifically, structured interviews, semi-structured interviews and unstructured interviews. First, the structured interview involves asking the same set of questions to every participant. Second, the semi-structured interview includes having a set of guiding questions that will keep the process on track but offer more flexibility during the interview. Third, the unstructured interview is where researchers have an idea to explore and do so in a flexible and unrestricted way (Wilson, 2016).

This study conducted in-depth, semi-structured interviews to gather more comprehensive information on the issue under the research. The in-depth interview is commonly used to gain a greater understanding of the topic, in contrast to surveys or focus groups discussion (Johnson, 2001). Additionally, in-depth interviews offer the opportunity to collect personal perspectives and experiences from participants, can explore more complex topics and process information much more effectively (Hennink, 2014).

This research captures the policy development of DRR education stakeholders in the central government in Jakarta and also investigated the application of DRR education in the in-depth interviews with science teachers in Aceh Province (see table 2.2). Thus, the core problem will be identified by means of the policy and implementation levels. The in-depth interviews involved nine DRR education stakeholders from a national level and six teachers from the previous study. This research was applied the interview

guidelines (Appendix 2). All the interviews were recorded with the permission of the interviewees. The interviews were conducted in two locations, namely Jakarta, the capital city of Indonesia and Banda Aceh, the capital city of Aceh Province, Indonesia. It required visiting the National Curriculum Centre, the Ministry of Education, Disaster Management Agency, third parties which support the development of DRR education in Indonesia, and also teachers from the previous study in Banda Aceh.

Table 2.2. Composition of the participants.

No	Organisation	Status	Role
1	LIPI	Government	Initiator of School based Disaster Preparedness programme in Indonesia
2	Ministry of Education/ The National Curriculum Centre	Government	The institution responsible for developing the curriculum in Indonesia
3	National Disaster Agency (BNPB)	Government	The institution that is responsible for dealing with disaster response
4	National Secretariat for Safe School	Government and NGOs	Compromised of governments and non-government institutions that aim to support the implementation of the Safe Schools' programme, established in 2017.
5	Lingkar	NGO	The NGO that implements Safe School.
6	Kerlip (Keluarga Peduli Pendidikan)	NGO	The NGO that implements Safe School/child friendly schools
7	Plan international	NGO	The NGO that implements Safe School
8	Vice –Head teacher	School	MAN model. National facilitator for disaster education.
9	Chemistry teacher	School	MAN 2. School from previous stages of the study (FGD and class intervention)
10	Physics teacher	School	

11	Chemistry teacher	School	MAN Rukoh. School from previous stages of the study (FGD and class intervention)
12	Physics teacher	School	
13	Chemistry teacher	School	MAN model. School from previous stages of the study (FGD) and new government pilot project for Safe schools' programme (since 2016)
14	Biology teacher	School	

Most of the data necessary for this research is related to national and local authorities' information and documents. The ethical risks of this research are the limited access to the data that is required. To deal with the situation, it requires immediate contacts and to provide clear information about the purpose of the study. This is to reflect the possibility of conducting the interviews and obtaining additional data with the permission of the selected institutions and people involved in the research.

The information provided by all the participants (education stakeholders and teacher's representatives) is essential in understanding the underlying issues related to the emergence of the DRR concept in Indonesia's education system and the issues that arise during its application in schools. This is related to increasing awareness and developing a more positive attitude to cope with current obstacles concerning DRR education in Indonesia to prevent the dangers associated with natural disasters. This might be of interest as the Indonesian government has never published any similar studies before. The interview method has reviewed several issues of policy and the implementation of DRR education in Indonesia to interlink with other methods; specifically, FGD, survey and content analysis.

2.6.5. Content analysis

Content analysis seeks to understand the diverse range of written texts such as letter, newspapers, policy documents, etc that provide a great deal of data about society (Walliman, 2011; Castree, 2013). It requires the researcher to focus on aspects of meaning related to the research questions (Schreier, 2013). Content analysis can be both quantitative, using descriptive statistics

to investigate patterns in the text, and qualitative using hermeneutic reading (Castree, 2013). Quantitative content analysis is an approach to text analysis which is focused on counting words or phrases by means of a set of procedures to make valid inferences from text. Qualitative analysis is where the text is reduced to themes that are assessed in terms of their meaning and how they are related to each other (Weber, 1990; Newby, 2014).

This research uses content analysis from the education policy document and curriculum materials, particularly the 2013 Curriculum, as it is the obligatory standard for teaching in Indonesia. This is conducted through a systematic review of the basic competencies in the national science syllabus provided by the National Curriculum Centre to see to what extent the knowledge of DRR has been included in the current curriculum (the science syllabus) and how the science curriculum has been used as a vehicle to teach DRR in secondary high schools in Indonesia. Additionally, Law 24/2007 on Disaster Management, the Circular Letter Ministry of Education number 70a/2010 and Head of Disaster Management Agency regulation (PerKa) 4/2012 was also analysed to investigate how DRR knowledge and its conceptual changes transform from local, national and global levels and the link between them.

Documents on DRR education are published by LIPI and the Ministry of Education in limited access, despite this being essentially for public purposes. The data obtained were analysed deductively and comparatively, grouped according to the variations in the answers and condensed it into several chapters. The researcher undertook several steps to analyse the data: 1) preparing the data for analysis, 2) read through the data, 3) analyse it in more detail and relate it to the FGD, survey and interviews, and 4) give a description of the themes presented in the narrative formats.

The result of FGD, survey and content analysis had been reviewed through interviews with stakeholders, and it found that the issues discussed are strongly connected and supported to each other. For example the lack of teacher capacity for DRR education from FGD was in line with what the stakeholders expression In addition to this, the need for classroom

intervention was recognised beneficial by FGD and stakeholders, particularly schools' teachers.

2.7. Data Processing, Analysis and Presentation

Miles and Huberman suggested that there should be three concurrent flows of action: 1) data reduction; 2) data display; 3) conclusion drawing/verification. The process of data reduction and analysis should be sequential and continuous procedures. Raw field notes and tapes of interviews or events need to be processed in order to make them useful. As the data accumulate, the first step is to organise the shapeless mass of data by classification and forming subgroups within the category which can then be summarised into tables (Miles and Huberman, 1994; Walliman, 2011). The data analysis helps to answer the research questions. The better the analysis of the data, the stronger the conclusions drawn (Lewis-Beck, 1995). A critical component of data analysis is the ability to determine any patterns that may be useful in the strategic sourcing process and to optimise the data sets to support the conclusions drawn in the study (Payne & William, 2012).

This study utilised both primary and secondary data. The primary data includes the school survey and students' test from SSB and non-SSB, the national science syllabus for secondary school level and results from the FGD and interviews. Secondary data will be obtained from online databases, websites and published articles or reports. This will not require any form of data collection tool. Once data is collected, it will be processed in preparation for analysis. Quantitative data which include the school survey and pre and post-test result obtained during the intervention was analysed and presented using pie charts. While qualitative data which included syllabus, results from the FGD and interview is coded through themes and texts and subsequently presented as descriptive text or several summaries delivered in tables. All materials were translated from Indonesian language (Bahasa) into English and the description is presented in the relevant chapters.

2.8. Validity and Reliability

Reliability and validity are the corner-stones of any research. This is the process to ensure that the study represents the situation that we intended to examine. Furthermore, the approach employed in the research can be used by other researchers and the results would be the same (Newby, 2014). The validity of a data collection instrument is the extent to which it measures what it is supposed to measure and the results might lead to meaningful interpretation of data (Creswell, 2014). The researcher needs to determine that ways to assess instrument validity fit with the needs and objectives of the study. Reliability refers to the degree to which an instrument consistently measures that which can generate consistent results. It means when an instrument is applied to target subjects more than once, the researcher can expect to obtain the same results (Salkind, 2010).

Reliability has to do with whether the results originating from the study can be relied upon. In other words, if somebody else uses the same research tools on the same population to answer the same research questions, they should acquire more or less similar results. Reliability refers to whether an instrument will give consistent results over stable time periods (Creswell, 2014). Demonstrating reliability and validity can be done by a process termed triangulation. Triangulation seek to validate a claim, a process or outcome through at least two independent sources (Newby, 2010). First data obtained is confirmed by the second or preferably the third source. The sources can be people, documentation, reports, etc (Newby, 2014). We have to be sure that what we gather in a certain situation is what we intend to examine, and if other researchers were to investigate using our approach, the result would be the same. The techniques to ensure that data are: dependency, certainty and collegial review (Newby, 2010).

In this research, the research instruments have been validated by teachers and the National Curriculum Centre. Firstly, the syllabus document was standardised by the National Curriculum Centre. Secondly, the test was validated by teachers and the interview guidelines validated by an expert. The researcher used cross verification to verify the data obtained from the FGD

with the data obtained in the study, including the questionnaire, interviews and classroom intervention to verify the data. The researcher also used many credible sources to compare the data obtained from related publications including journals, newspapers, books, etc., so that researcher can obtain more established data.

2.9. Ethical Considerations

Ethic is the set of ethical principles that should be considered when doing a research (Hammersley & Traianou, 2012). This involves concern about what is and what is not permissible when conducting research with people (Abbott and McKinney, 2013). The ethical principles include: first, respect for a person, where every participant should be treated and protected as a key part of the study, and second, beneficence – the obligation to maximise possible benefit and minimise harm (Alderson et al., 2005).

Educational researchers have become increasingly aware over recent decades of the ethical interaction with research participants. Higher education and research institutions have adopted ethical codes governing the conduct of research with human participants and ethics committees tasked with overseeing conformity with these codes. The process comprises discussion about the responsibilities and rights of researchers and participants involved in a study to guarantee that ethical standards are met. The identity of research participants was protected in this study by way of complete data anonymity and confidentiality (Drew, et.al, 2008).

This study was approved by the UCL (University College London) Research Ethic Committee in three different times for different stages of the research, as described below.

1. Ethical approval 6141/001 was received from the UCL Research Ethics Committee in October 2014 to conduct a preliminary study which included the FGD and survey in Banda Aceh, Indonesia with teachers and head teachers.
2. Ethical approval for application number 6141/002 was gained as part of the classroom intervention conducted from November 2015 to January

2016 in Banda Aceh, Aceh Province, which involved 164 students as participants. The researcher provided a DBS (Disclosure and Baring Services) as part of the ethical requirement for working with children under 18. This application underwent a complex review by the full UCL Ethics Committee.

3. The ethic application 6141/003 was approved in April 2017 as part of the last stage of the study to conduct interviews that involved education stakeholders at the national level and teachers in Banda Aceh.

In conducting the research, all participants were given an opportunity to read and discuss the information sheet and the consent form. The participants do not have to write their names anywhere on the questionnaires. All the data including the result of FGD, questionnaire, pre and post-test, interview records and the photos were taken during the field study. The researcher has obtained the written permission from the participant to publish the data including the photos in the thesis.

To ensure the adherence to legal requirements such as data protection laws and ethical guidelines, the researcher keep the data in a secured cabinet. The data will not be used for any other reasons than for the purpose of the study. When they agreed to participate, they were asked to read and sign the consent form presented in the Indonesian language, Bahasa. All stages of the research have been managed in a way that is both respectful of the individual and their opinions. Anyone who wishes to withdraw will be able do so at any time.

2.10. Structure of Thesis

Following on from the introduction in *Chapter One* and the Methodology in *Chapter Two*, *Chapter Three* elaborates the DRR concept and its relation to curriculum development in Indonesia from 1945 to 2013. This aims to gain a better understanding of the transformation of DRR education in the national curriculum, the current progress of DRR education in Indonesia, including the challenges concerning the implementation, and how to improve

the situation. It highlighted that the enactment of the 2013 curriculum in Indonesia's education system has opened a space for DRR education from both local and global knowledge to be developed and embedded within the High School science curriculum. This will be a beneficial step to achieving a more sustainable approach to DRR knowledge transformation in disaster prone communities.

Chapter Four focuses on the transformation of DRR as global education and its link to the Indonesian context when confronted by 21st century challenges. This chapter primarily examines the various ways in which global education emerged and transformed into the Indonesian education system, in which DRR education is incorporated. It will cover the response of the United Nations over the lack of disaster knowledge and preparedness in developing countries. It argues that the patterns and meanings of DRR have been radically altered since the Aceh tsunami December 2004 and triggered in the HFA agreement in 2005. Coincidently it found momentum under the Reformation era (1998-onward), retheorised as global DRR, as well as national DRR in Indonesia.

Chapter Five then discusses the manifestation of global DRR education into policies and institutional networks in the Indonesia context, where this collaboration significantly contributed to the early development of DRR education in the country. This revealed the process of the re-contextualisation of DRR knowledge, formulated by LIPI and UNESCO (United Nations Educational, Scientific and Cultural Organisation), which was piloted in some areas, though it was then deferred when national disaster management was established in 2007, and superseded DRR education in the form of the 'Safe School'. This transformation overlooked the substantial meaning of DRR education, being a more formalistic and pragmatic project. Thus, this chapter highlights the discrepancy regarding policy and the institutional link of DRR education in Indonesia.

Furthermore, in *Chapter Six*, the manifestation of policy and institutional network in terms of the school-based disaster preparedness programme (SSB) in Indonesia is discussed. SSB has been understood and

implemented differently at times and its sustainability issue is highlighted. *Chapter Seven* discusses on Integrating DRR concept within the science curriculum in Senior High Schools in Banda Aceh. This chapter develops a strategy for integrating DRR within the science curriculum in high schools as a practical way to mainstream DRR in the science curriculum, in practice. Finally, *Chapter Eight,* the conclusion reviews the substance of each of the chapters, and provides insights and identifies the limitations, in addition to its significant contribution. The chapter also looks at probable further studies.

CHAPTER THREE

DRR EDUCATION AND THE SCHOOL CURRICULA IN INDONESIA

3.1. Introduction

This chapter will review the application of DRR (Disaster Risk Reduction) education in the evolution of the school curriculum in Indonesia. It historically traces the postcolonial context of the school education system, while focusing on the Reformation Era from 1998 to 2016. The analysis in this chapter will respond to the research question about how the school curriculum was developed to sufficiently promote DRR knowledge for students in secondary high school in Indonesia.

This chapter argues that during the Sukarno and Suharto regimes (1945-1998), DRR knowledge was not evident in Indonesia's curriculum development. Despite several disasters and the severe impact that occurred, it was merely a sporadic response to cope with post-disaster impacts. Since 1998, from the reformation era onward, several curricula were revised since Indonesia realised the limitations of the national education system in terms of global competition in the 21st century. This gradually provided spaces in global DRR knowledge to develop through sciences and environmental topics, particularly under the recent 2013 curriculum, although no systematic and independent formulation was found in relation to DRR knowledge. This chapter is divided into separate sections, covering the meaning of DRR education, curriculum development, the challenges and finally, various insights in the conclusion.

3.2. Education and School System

To understand the meaning of DRR in the education system in Indonesia, in particular in school system it would need to figure out the education and school system in Indonesia. The DRR education was not explicitly existed in Indonesia, but its association has been embedded in several subjects under science curriculum. To have a wider picture of education in Indonesia, below

a brief explanation provided. The Indonesian education system is the fourth largest in the world, with more than 50 million students and almost 2.6 million teachers in more than 250.000 schools spread over 17000 islands. Two ministries, the Ministry of Education and the Ministry of Religious Affairs (MORA) are responsible for managing the education system (World Bank, 2014). Indonesian schools have the authority to manage independently with some funding support from the government and also have authority to develop learning materials and operationalise the curriculum based on guidelines from the National Curriculum Centre of the Ministry of Education.

Education in Indonesia compromises two systems; specifically, formal and non-formal education. Formal education is provided through a system of schools, colleges, universities and the like. The formal education system generally begins at the age of seven and continuing up to 20 or 25 years of age. Non-formal education may therefore take place both within and outside educational institutions, and cater to persons of all ages (SEAMEO, no date; ISCED, 1997).

Formal education in Indonesia has two forms: public schools (*SD/Sekolah Dasar, SMP/Sekolah Menengah Pertama, SMA/Sekolah Menengah Atas*) and *Madrasah*/Islamic schools (*MI/Madrasah Ibtidaiyah, MTs/Madrasah Tsanawiyah, MA/Madrasah Aliyah*). The difference between public and Islamic schools is the total hours provided in teaching Islam. The curriculum structure has been developed to be delivered in both public and Islamic schools. Islamic schools offer six hours of Islamic lessons each week, while public schools spend only two hours on Islamic studies. There are also vocational schools (SMK) focusing on life skills. These are considered as formal schools and are differentiated from informal ones (Ministry of Education, 2003).

The education system is divided into three school levels:

(a). Pre-school (TK/*Taman Kanak-Kanak*), or kindergarten is designed for children aged 3 to 5. The school aims to provide an appropriate environment and prepare children to adapt to the school environment

before entering compulsory education by means of various entertaining learning activities.

(b). Primary/Middle School offers six years of primary school (SD/Seskolah Dasar) and 3 years of middle school (SMP/Sekolah Menegah Pertama). Primary education begins at the age of 6, while middle school is delivered to children aged 12 and older. The aim of this school level is to provide basic education for children aged 6-15. It is compulsory for children in this age range to attend schools as part of the "Nine Years Compulsory Education Programme" or "Wajib Belajar Sembilan Tahun".

(c). High schools (SMA/Sekolah Menegah Atas, MA/Islamic School) prepare students to adapt to higher education and employment coupled with equipping them with essential life skills. Secondary high school refers to the 3 years of formal education which aimed at students aged 16 to 18 years old. (Ministry of Education, 2003).

The SMA/MA curriculum is structured within two main groups consisting of compulsory and interest based subjects. Compulsory subjects are divided into two categories: group A covers religion, civics, the Indonesian language, mathematics, history and English, while group B covers the arts, health, sports and entrepreneurship. The second one is interest based subjects that are categorised as group C, which includes science, social sciences, languages and culture. In order to develop parity of esteem between academic and vocational learning at senior secondary school, students need to take nine compulsory subjects, whilst taking up 24 hours per week of lessons (Ministry of Education, 2013c).

3.3. Defining Disaster in the School Curriculum in Indonesia

The traditional education system had been established in Indonesia since the glory of Kingdoms era and was based on several religions: Hinduism, Buddhism and Islam. During Dutch rule (1602-1942), Christian (Catholic and Protestant) schools were opened. This then became five religions that were recognised by Indonesia when it gained independence

(Somantrie, 2010). In this colonial era, education was selectively provided for an elite class or particular groups of peoples. It was to differentiate between schools for indigenous people i.e. AMS/*Algemeine Middle School,* which subsequently became Sekolah Menengah Atas (SMA) and for Dutch and European children, i.e. HBS */Hogere Burger School* (Somantrie, 2010).

The founding father of Indonesia (Ki Hajar Dewantara/KHD) declared his commitment to 'brighten the life of the nation' in the fourth paragraph of the Preamble and Article 31 of 1945 Indonesian Constitution. It was to restore and establish Indonesian nationalism against Dutch colonialism in any sense (Soedijarto et al., 2010). However, after independence in 1945, the objective of the Indonesian curriculum was primarily dominated by political reasons to develop the national integrity of a united Indonesia from the various ethnicities, languages, races and kingdoms. The curricula developed under the spirit of anti-Dutch colonialism which was against Western influences (Dewantara, 1936). During this period, DRR education was not explicitly known. However, the term disaster was used in different contexts. It was understood as the risk and impact of the independence war fought against colonialists (Poesponegoro & Notosutanto, 1975**;** Somantrie, 2010).

Since 1945, the main purpose of education in Indonesia is to develop the potential of a learner to be a religious person believing and obeying in the One God, and being of good character, creative, independent and responsible. This rhetoric refers to the first of five pillars of the philosophy of Indonesia (Pancasila), which is the believe in one God, civilised humanity, tolerance of all, the unity of Indonesia and democracy led by wisdom, and justice for all (Soedijarto, et. al., 2010). This means that the purpose of national education is to develop and improve intellectual, moral, spiritual, physical and social skills. This then manifested in Law number 20/2003, in particular Article 35 on national standards of education and Articles 37 and 38 of the national curriculum.

The concept of the Indonesian education objective was changed without substantially affecting the development of national education. In 1954, it used the term 'to create an Indonesian human being and responsible

citizens on community welfare'. In 1964, it was modified 'to prepare human beings and citizens as a manifestation of Pancasila. Additionally, in 1968, it was subsequently customised again to 'to create the real human of Pancasila as required under the 1945 constitution'. In 1994, the curriculum objective was added to developed the capacity of the student in mutual relations with their social and surrounding environment. Since 1998, the essential reform of Indonesian politics is to be more open and transparent regarding external global issues, and that attention to science and technology was explicitly written in the 2004 High School curriculum (KBK), as stated, 'to master the basics of science and technology, the work ethos and the ability to continue on to higher education (Somantrie, 2010).

In the 2006 curriculum change, the objective 'to develop the inherent talent and ability of the student based on their willingness and interest', was added (See Somantrie, 2010). In a more comprehensive articulation, Article 3 of the Law 20/2003 on National Education states that the objective of national education is: 'the development of the potential learner to be a human being who believes and fears one God, has good manners, is healthy, knowledgeable, smart, creative, independent and will be a responsible and democratic citizen'. However, this wording is considered too complex and may be contradictory without any clear interpretation. For example, when the belief in one God is understood to be a fatalistic doctrine, it would be difficult for creativity and innovation to emerge (Sanjaya, 2009). To this end, the curriculum in Indonesia has been changed several times since 1947, most recently in 2013 (Soedijarto et al., 2010). However, very little research has been conducted to determine how far the national education objective manifested in the curriculum.

Since the first Curriculum was developed in 1947 following the Independence of Indonesia in 1945, the issue of disaster had not been recognised in the curriculum until 1994 under Soeharto regime. It was firstly addressed in the Curriculum in 1994 as environmental topic in senior high school. A significance change has been made after the tsunami in 2004 when the disaster related content was introduced in the curriculum both intra and

extracurricular activities which mostly focus on the tsunami and earthquake. Considering the importance of this activity then it was legalised through Circular letter no 70/2010, about the mainstreaming DRR into school curriculum and this action still being continued until the latest curriculum called the 2013 Curriculum used as a standard for teaching-learning process in Indonesia started for elementary, middle and high school level. As a result, the National curriculum centre has embedded the disaster related knowledge into several subject such as Indonesian language, natural science, geography etc. (see table 3.1). The lecture and group discussion have been widely used in teaching-learning process (FGD with teachers). In the following, the development of the curriculum within different regimes will be discussed.

3.3.1. DRR and Curriculum under Sukarno Regime (1945-1965)

Soon after the declaration of independence on 17 August 1945, Ki-hajar Dewantara (KHD), was appointed to be the first minister of national education. During this time a new system was developed transforming the existed Dutch colonial system into national based education. At this earlier stage, the new education aims were established. Katodirdjo (1975) mentioned that national education is based on the principle of democracy, independence and social justice, in order to guide learners to be valuable citizens and be responsible to the nation (Katodirdjo,1975).

From 1945-1950, KHD fundamentally changed the colonial system of education, and delivered a ‘general instruction’ to all teachers to move from colonial characteristics to patriotic nationalism. Despite not being the minister for long he remained the head of education reform, which designed and formulated the first bill of education in 1949, that became Law number 4/1950 on the Basics of Education and Learning in School (Somantrie, 2010). This law was the first legal transformation from the colonial to postcolonial context regarding Indonesian education. In this law, the purpose of education is ‘to create a capable human being, who is a democratic and responsible citizen over the welfare of the State and homeland’. Consequently, the principle of education and teaching should be based on the Five Pillars of ‘Pancasila’, the

1945 Constitution and the national culture of Indonesia'. In the Pancasila, the formulation of nationalism and prosperity is demonstrated to respond to the crisis in education and with regards to poverty.

KHD also mentioned that education needs to be based on national culture, to support the State and its people for the honour of people throughout the world, a good attitude, besides physical and spiritual needs. It should be a combination of national religious values and external global needs, i.e., unlimited knowledge, learning foreign languages like Dutch and English, education/learning for public reasons, benefited knowledge and physical exercise. The core of KHD's education's philosophy is, religiosity, national customs (local values), global challenges and for better human beings. Thus, education was defined as 'guidance for children, as human beings and part of the community, feel safe and achieve great happiness'. From this definition every child has its own inherent character (kodrat) and nature; hence, the teacher only has the capacity to guide them to be the best person, and as part of the community to feel safe and achieve great happiness' (Somantrie, 2010).

However, the concept of KHD is not progressing, due to the pragmatism of political power and the influence of liberalism. This has evidently been displayed by the decline in the national character and difficulty in adapting to 21st century challenges concerning education, which has been a great concern since the reformation era in 1998. According to Somantrie, KHD used the constructivist model, as can be seen from his work in magazines and newspapers during colonial times, even after he was deported to the Netherlands for his critiques. It was a symbolic acknowledgment of his work for example, to use his philosophical words 'ing ngarso sung tulodo': being in front to be a model, 'ing madya mangun karso': being in the middle to develop spirit; and 'Tut Wuri Handayani (being behind to guide and advise)', as a motto in the logo of the Indonesian National Education Ministry (Somantrie, 2010).

Moreover, since 1959-1965 under Sukarno, the Ministry of Education (MoEd) has formulated the expansion of the concept**:** '*Pancawardhana*',

covering five concepts of development: the development of love for the nation and national moral issues, intelligence, gentleness and inner beauty, hand skills and physical exercise. From these principles, the Senior High School (Sekolah Menengah Atas / SMA) curriculum was established: in the spirit of anti-imperialism, scientific based, updated and practical, to support the revolution and the majority of peoples, combining theory and practice in a school context, and based on the level of thinking and physical development of the student (Somantrie, 2010).

In general, the development of the Indonesian curriculum was to create nationalism, while natural science was marginalised. In 1964, the curriculum comprised three specialisations for senior high schools: social, cultural and natural sciences (IPA). Natural science was placed as an additional subject, and focused on mathematics and its associated subjects. The emphasis on national character building was extremely obvious in this curriculum, as promoted by subjects in citizenship, the Indonesian language and local languages. English was taught to replace the Dutch language and various science subjects were introduced; specifically, chemistry, biology, geography and mathematics. However, these subjects were framed under anti-colonialism and isolated from global development, as there was also a lack of qualified teachers, which was a major obstacle in this era (Somantrie, 2010). After this period, there were fundamental movements on the independent creation of a national education system (Suratno, 2014). The first curriculum, known as Curriculum 1968 concentrated on the promotion of cognitive aspects and thinking skills among the students and emphasised the sense of nationality regarding the country's five basic values, termed *Pancasila*.

In 1975, the National Curriculum Centre established learning objectives for the students to achieve. These were detailed points of learning activity like general instructional objectives, specific instructional objectives, material, teaching media, and evaluation (Theisen, 1990; Aziz, 2012). However, this curriculum concentrated on the subjects rather than students and lacked guidance for teachers. As a result, in 1984, the curriculum was revised to become the Student Active Learning model (Cara Belajar Siswa Aktif /

CBSA). This curriculum placed students at the centre of learning and made students actively involved during the teaching and learning processes. Somantrie (2010), highlighted the inconsistency of theory and the practice of the curriculum in Indonesia (Somantrie, 2010). The ideal objective set out in several changes to the curriculum was only theoretical and did not work in practice. In practice, the teacher was only preaching and dictating to students.

3.3.2. DRR and Curriculum within Suharto Regime (1966-1998)

It should be noted that the Suharto regime had completely turned Indonesian national policy from nationalism during Sukarno's era, into US friendly policy in relation to politics, economy and education. In education sector, The Ministry of Education developed educational materials for schools with support from UNESCO and USAID and sent delegates to the University of California (UC), Santa Barbara, USA, led by Prof. Murray from the Graduate School of Education (Soedijarto et al., 2010).

The New Order emerged from 1966-1998, after the fall of the Sukarno regime (Old Order) which was an authoritarian, militaristic and centralistic system. All policies were designed centrally and there was no freedom of expression on the ground. Despite there being law on education, the goal of national education was redefined 'to create a truly Pancasila human as required by the preamble and the content of the 1945 Constitution' (TAP MPRS No. XXVII/66). The term Pancasila as a pillar of the nation was explicitly articulated along with introducing a Moral Pancasila Education (PMP) subject in school. It was essentially changing the previous interpretation of Pancasila introduced by Sukarno. This covered: a) increasing moral behaviours and strengthening faith, b) increasing smartness and skills, and maintaining a healthy and strong physique (Somantrie, 2010).

A significant change in the national curriculum was initiated by the Minister of Education, Mr. Mashuri Saleh (1968-1973). This included changing the national exam into a school exam, introducing modern mathematics and modern science subjects, revising the old school books and evaluating national education, and established the national curriculum centre in 1974.

This project was supported by US educated scholars, led by the California University graduate (Dr. Soedijarto, M.A) and team members[1](Soedijarto et al., 2010). The 1975 Curriculum[2] was the reformation of the previous curriculum to be more systemised and integrated, introducing Moral Pancasila Education (Pendidikan Moral Pancasila/PMP) as the main subject. It also introduced (Article 5(3), concerning the education objective, as stated in Article 3(1), it was to clarify the previous statement, to create people based on Pancasila, physical and spiritual health, in addition to having knowledge and skills, and creativity and responsibility. PMP subsequently became an obligatory subject at every level. This was well formulated from publishing books and training for teachers, as to the political purposes. The 1975 Curriculum was classified into three sub-divisions: natural sciences (Ilmu Pengetahuan Alam/IPA), social sciences (Ilmu Pengetahuan Sosial/IPS) and language. The obligatory subjects were Indonesian, English and mathematics (Somantrie, 2010). Furthermore, this curriculum designed English as an instrument to adopt global education. However as English resources were exceedingly limited, this instrument failed to absorb global knowledge. The use of English to replace Dutch was a strategic decision, as Suharto's regime was predominantly influenced by US global policy.[3]

To adjust the policy advocated by Soeharto, as mentioned previously, a new curriculum was introduced in 1984. Despite its purpose being similar to the 1975 curriculum, the 1984 curriculum was more flexible and offered students more choices to develop their interests and motivation. The 1984 curriculum provided a space for 'new aspects' of education to be inserted in

[1]They are Dr. Vincent Campbell (Stanford University), Dr. Frank Womer (University of Michigan), Dr. Daryl D. Nichols (American Institute for Research), Dr. Ralph Tyler (University of Chicago)(Soedijarto et al., 2010).

[2] This curriculum was under the Decision of the Ministry of Education (MoEd) and Culture number 008-E/U/1975 regarding the application of the SMA curriculum. It came into force in 1976.

[3] In the early part of his tenure, Suharto signed a large gold mining contract with a US company, Freeport in West Papua in 1966 and Exxon Mobil for gas mining in Arun, Aceh Province in 1967.

appropriate subjects (Somantrie, 2010).[4] Ten years later, a new regulation was introduced called National Education System Number 2/1989. This law confirmed that the curriculum was to achieve the objective of the national education in regard to student development, the environment, national development needs, science and technology, in respective levels of education (Article 37 of Law 2/1989).

However, the 1984 curriculum was considered still too overload for students, which resulted in poor performances, a lack of attention to the natural and social environments and difficulty in incorporating a new aspect related to global issues (UNESCO, 2015). Again a new decision by the Ministry of Education number 061/U/1993 revised the 1984 curriculum into the 1994 curriculum. It acknowledged the need to adopt the advancement of science and technology, as it was met with global development. The 1994 curriculum was re-designed to address various cultures and different physical environments within the country by implementing Local Content Curriculum (LCC). Additionally, there was no significant developments in this period until the Reformation Era began in1998.

3.4. DRR in the Reformation Era: 1998 Onward

In the Reformation Era, a significant change occurred in relation to the Indonesian system. Military rule which lasted for 32 years and which had been restrictive, centralistic and autocratic collapsed when university students led mass demonstrations across the country. There was a substance revision of the 1994 curriculum into the 1999 curriculum, which comprised the new spirit of reformation. This 1999 curriculum then moved significantly into the 2004 KTSP curriculum, as a Competency-Based Curriculum, generally developed by central government and interpreted technically in local units. The government also paid more attention to expanding the Nine Years Compulsory Education Programme (Wajib Belajar 9 tahun), which starts from primary school (aged 6-12) and continues through middle school (aged 13-15)

[4] See Lampiran Keputusan Menteri Pendidikan Dan Kebudayaan Tanggal 2 Mei 1984 No 0209/U/1984 Tentang Landasan, Program, Dan Pengembangan Kurikulum 1984 Sekolah Menengah Umum Tingkat Atas (SMA).

for children. In addition, in 2003, the government issued Regulation no. 20/2003 to provide a platform for the standardisation of the national education system. It covered the curriculum, school management, financial support and teacher professionalism. The government also launched a School Operational Aid Fund (Bantuan Operational Sekolah/BOS) to support the quality of education (Suratno, 2014). This is critical to the development of education in Indonesia, where schools can include certain topics such as disaster education in the curriculum to provide students with adequate knowledge and skills to meet environmental challenges. In other words, in this reform era, the global competencies have been addressed.

Significant reform in the education sector took place at the end of 1990s, triggered by the financial crisis, leading to a decline in school enrolment, massive job losses, high rates of inflation and a fall in government spending. The government sought to protect the education budget by maintaining expenditure in real terms by setting two main goals: giving autonomy to local authorities to manage schools and allocating a minimum of 20 percent of the national budget (APBN) to the education sector (Manning, 2000; Utomo, et. al., 2002). Thus, education was decentralised to the local, provincial and district governments. The government delegated authority to the local boards of education, and even to schools or teachers (Utomo, et.al, 2002; Aziz, 2012).

3.4.1. KTSP - Competency Based Curriculum

Within the decentralisation period, the government developed the 2004 curriculum as a competency-based curriculum (Kurikulum Berbasis Kompetensi/KBK). Nevertheless, after two years of implementation, there was a gap between National and local levels. As a consequence, KTSP was re-launched in 2006, and known as the 2006 KTSP curriculum.[5] The development of KTSP should follow the guidelines provided by the National Education Standards of Indonesia (BSNP/*Badan Standar Nasional*

[5]The National Education Minister's Regulation No 22/2006 on Education Content Standard introduced the Education Unit Curriculum (KTSP) in Indonesia in 2006.

Pendidikan). This curriculum gives schools more autonomy to develop or adopt their own materials by considering the potential of schools and their surroundings. It gave more space to the school or teacher to modify the national curriculum according to the local need. The evaluation standards were also developed and issued by the National Curriculum Centre, which included the competencies for the national exams (Aziz, 2012; Suratno, 2014).

Competency based curriculum, according to Oliva (1982), is part of outcome-based curriculum, which originated in Europe in the 19th century, while in the US this model developed in the 20th century (Burke, 1995). Subsequently, it was developed in the 1950s by Ralph Tyler and developed by Bloom, with the 'mastery learning and competency-based curriculum. Debling and Hallmark (1990), stated 'competence pertains to the ability to perform the activities within a function or an occupational area to the level of performance expected in in work context.' These qualifications should be expressed in terms of knowledge, skills and attitude. Hence, competency is a quality which must be mastered by learners to face their environment and future (Popham & Baker, 1967). Or, 'a structured series of intended learning outcomes' (Johnson, 1967).

Under these normative values, the aim of Indonesian education was formulated under Article 3 of the Law number 20/2003. To implement this aim, the curriculum centre as a body in charge of the revision of the curriculum under the Ministry of Education shall regularly develop a national curriculum, evaluated and implemented.

The overall curriculum designed for local standards would always conform to the eight national education standards, namely: (1) content standards, (2) standard process, (3) competency standards, (4) standards of educators and education personnel, (5) standard facilities and infrastructure, (6) management standards, financial standards, (7) assessment standards of education, and (8) graduate competency standards. Two of the eight, namely Content Standards (SI) and Graduate Competency Standards (SKL), are the main reference in developing a more applicable curriculum (Ministry of

Education, 2006). Hence, since 2004, KTSP curriculum is implemented based on the diversity of school unit capacity and the context of the area at the regional level. Moreover, it should be noted that the diversification curriculum has opened a space for students in remote areas, indigenous communities, and students who have experienced disasters, as Special Service Education (Pendidikan Layanan Khusus)[6]. However, it has no concern about any knowledge, skills and attitude about disasters, rather it is regular education in a post-disaster area.

Subjects in the formal education system in Indonesia can essentially be divided into five themes: religion and culture, language and arts, social studies, science and technology, plus health and physical education. According to Pandey the disaster related content is very limited to social studies, science and physical education, and more prevalent at the lower level (primary and middle school). Moreover, no material is available and no material related to the theme of hazards or disasters are provided in the science related subjects (Pandey, 2007). However, the 2006 Curriculum, as attached under the National Ministry of Education Regulation Number 22/2006 on Content Standard has four specialisations: natural science, social science, language and religious study. Under the 2006 curriculum, global knowledge was introduced under the scope of citizenship and personality grouping subjects, to increase awareness of students on their rights and obligation as a citizen of Indonesia, respect of human rights, being patriotic, environmental preservation and anti-corruption (Somantrie, 2010).

Many provinces have developed school based curricula under national based standards. The law on regional government designed education into regional governments under the decentralisation system, while Law 20/2003 in the national education system has followed the standard based education system, as set out in the 8 standards previously. The national education standard was recognised as the minimum criteria for the education system in Indonesia (Article 1 (17) of Law 20/2003).

[6] Special Service Education (Pendidikan Layanan Khusus) is a sub-division in the Ministry of Education, which is responsible for providing education during emergency situations and after disasters.

However, when a new Education Minister was elected and considered the 2006 Curriculum to be too formalistic; subject based, lacked soft skills, entrepreneurship and was not fully competent based. Additionally, the 2006 curriculum did not link-up with local, national and global issues and was teacher-centred, the evaluation was merely based on the test, which does not include the process of learning and there is no remediation (Anas & Supriyatna, 2014). These problems were identified later when quality assurance of the school curriculum was not achieved. Teachers were overwhelmed in developing syllabus hindering them from improving instructional practices. This situation encouraged the government to produce the latest revision known as the 2013 Curriculum, which emphasised the mastery of core competencies by putting forward a "project-based and scientific approach" (Suratno, 2014). The 2013 Curriculum has developed more detailed national standards and used the concept of student-centric, long life learners, contextual, and character building (Anas & Supriyatna, 2014).

It is in line with the transformative spirit stated in the National Education Strategic Planning 2010-2014 planned a curriculum change in the learning process and the restructure of the curriculum. Regarding the learning process, it is supposed to change the paradigm from 'teaching to test' into teaching and considering social responsibility, character and good behaviour (Chapter IV, Priority 2 Education, Point 3 of the Medium National Strategic Planning (RPJM) 2010-2014). Furthermore, RPJM also highlighted curriculum development should be responding to life challenges in the 21st century (Sukemi & Andriono, 2014).

3.4.2. The 2013 Curriculum: Toward 21st Century Challenges

In the 21st century, many new generations that are surrounded by and use advanced technology. This sort of community predominantly lives in large, highly-populated, expanding cities. When a curriculum is developed for the 21st century, it must contain a global dimension (Hicks and Holden, 2007). Garlake (2007), state that:

> ‘a curriculum … should encourage the development of critically thinking pupils who are not only aware of global issues and events from different points of view but also realise that there can be effective participation in working on challenges, solutions and opportunities’.

So, the views of education around the world today have changed to effectively match and benefit challenges in the 21st century.

It can be argued that globalisation and its 21st century challenges are a major consideration of the 2013 curriculum, as it was not considered in previous curricula. Globalisation in terms of the advance of knowledge and technology needs a specific competency to understand that advanced technology is an important external factor for the country’s development. This change in the paradigm has become a strong foundation for the Indonesian government to revise the 2006 Curriculum, as it is the heart of education (Klein, 1992). Further Olivia (1992), highlighted that the ‘Curriculum is a product of its time…Curriculum respond to and is changed by social forces, philosophical positions, psychological principles, accumulating knowledge, and educational leadership at its moment in history’ (Olivia, 1992).[7]

Since Law 20/2003 on the national education system, curricula have been developed by the unit of education and school’s committee under the supervision of the coordination of the District Education Department for Primary Schools and Provincial Education Authority for Secondary Schools (Article 38 (2) Law 20/2003). This is also confirmed in Article 17 of Government Regulation Number 19/2005. This was to revise the centralistic national curriculum before. The idea was initiated from the national workshop on ‘Culture, Education and Character Building’ on 14 January 2010, in which the new Minister of Education, Muhammad Nuh expressed his concern at the decline of national values and character (Anas and Supriyatna, 2014).

[7] The 2013 curriculum was referring to Law 17/2007 on RPJPN (Rencana Jangka Panjang Nasional) 2005-2025. This then manifested in Perppres 5/2010 on RPJMN (Rencana Pembangunan Jangka Menengah Nasional) 2010-2014, as a five year programme.

Moreover, the government has also recognised that Indonesia's performance in international educational assessments has not improved. Hence, the 2013 Curriculum has been developed to embrace the internal, external and global challenges that affect the nation. The internal challenge includes attainment of the eight national education standards. While external includes the issues of lack of confidence, lack of creativity, demoralisation, drugs, pornography, along with globalisation, has become a significant issue in the Indonesian education system, as highlighted in the National Strategic Planning (RPJM 2010-2014). The external and global challenges require that education in Indonesia provides the best advantages for the younger generation to deal with environmental pressures and advances in technology. However, these issues are considered complex when it is related to political, economic growth, etc. (RPJM 2010-2014: Point 424-425). The lack of quality in global competitiveness can be seen in the low level of TIMSS (Trends in International Mathematics and Science Study) and PISA (Programme for International Student Assessment) standards since 1999.[8] For example, based on the result of the PISA 2009 study, Indonesian students only attained level 3 of 6 levels, while in other countries, for instance Taiwan, 50% of students achieved level 6 (Sukemi and Andriono, 2014). Based on a government assessment, the curriculum is failing to support students to reach global standards. In the broader context, Indonesia's education system aims to generate knowledge, skills and scientific progress that will keep the nation on the route of development in the twenty-first century (Somantrie, 2010; UNESCO-IBE, 2011). It should also be noted to achieve this the 2013 Curriculum required a shift from teacher-centred instruction to more

[8] TIMSS is a test for learner age 10 and 14 years old managed by the International Association for the Evaluation of Educational Achievement (IEA). PISA is a survey to assess learners who are aged 15 and are nearing the end of compulsory secondary education. It assesses performance in science, mathematics, reading and problem solving.

interactive teaching and team-based learning, to foster higher-order cognitive skills and the development of character and behavioural skills.

This new curriculum is built on several key principles, one of which is a move from a content-based to a competency-based approach, with students no longer simply memorising content but demonstrating their understanding of knowledge. Consequently, students are at the centre of learning (Sukemi and Andriono, 2014). Wagner (2008), stated that it is the gap between what even our best suburban, urban, and rural public schools are teaching and testing versus what all students will need to succeed as learners, workers and citizens in today's global knowledge economy. Therefore, it necessitates seven survival skills for the twenty-first century: (1) critical thinking and problem solving; (2) collaboration across networks and leading by influence; (3) agility and adaptability; (4) initiative and entrepreneurialism; (5) effective oral and written communication; (6) accessing and analysing information; and (7) curiosity and imagination (Wagner, 2008).

In more general terms, the characteristics of the 2013 Curriculum, according to Ministry of Education Regulation Number 59/2014 are:
(1) developing a balance between spiritual, social, knowledge and skills and its application in different circumstances in schools and the community; (2) positing school as part of the community in order to develop a mutual learning experience from school to community and in adverse circumstances; (3) offering more flexible time to develop attitudes, knowledge and skills; (4) developing competency standards under the core class competency (kompetensi inti kelas) and further details in the basic competency of a subject (kompetensi dasar mata pelajaran); (5) developing core class competency (kompetensi inti kelas) and organise elements for basic competencies; and (6) developing basic competencies based on the accumulative principle, mutual reinforcement and mutual enrichment among subjects and education levels.

The 2013 Curriculum is a re-conceptualisation of the competency based 2006 Curriculum, structure development, core competency (KI) development as a binding factor; besides the basic competency (KD) of each

subject in relation to core competencies. The process of curriculum development covers: curriculum construction, implementation and evaluation (Ministry of Education, 2014). It is important to mention that the development of the 2013 curriculum was not directly related to DRR education. It was mostly triggered by the weakening of the national character and the low performance of Indonesian students in comparison to other countries.

The 2013 Curriculum has a strong emphasis on scientific approaches, responding to advanced knowledge and technology, in addition to preparing for global competiveness (Sukemi and Andriono, 2014). Several paradigms were revised, such as thematic approaches rather than subject approaches and character-building purposes rather than merely mastering the content/substance of a subject. Hence, the issue of national cultural values has been a huge concern since this event. Subsequently, the Ministry of Education followed with the development of guide books related to character education, trained teachers, developed model schools at a regional level. The vice president Boediono subsequently responded on August 2012, writing in the national newspaper, 'Harian Kompas', about his concern that the current education system in Indonesia is conceptually unclear and misguided (Anas and Supriyatna, 2014). This was then followed by Muhammad Nuh who revised the 2006 Curriculum**.** Muhammad Nuh believed that the curriculum needed to be changed because the 2006 Curriculum did not address the aspects of discipline, fairness, pragmatic thinking, sectarian (not integrated between one lesson with another lesson), and lack of social skills (Anas and Supriyatna, 2014).

It can be said that the 21st century has encouraged the Indonesian community to be individualistic, pragmatic, unfair and small-minded. In this context, the 2013 Curriculum offers a new paradigm, as described by Anas and Supriyatna (2014), consisting of six dimensions, i.e. design, story, symphony, empathy and meaning. In short, the emergence of the 2013 curriculum was to face global competition in the 21st century and restore the shortcomings associated with the existing 2006 curriculum.

The strategy of the 2013 Curriculum was to simplify the number of subjects, in primary school from 10 to 6 subjects; 12 to 10 in junior high school, and no division but preferences in senior high school. Three divisions remain in SMA: maths and natural science, social science, language and culture. Despite students choosing their preferences, they still have the flexibility to learn other subjects. Therefore, students can demonstrate their potential in this system. Hence, the 2013 Curriculum encourages the innovation and creativity of teachers and students (Sukemi and Andriono, 2014). Regarding SMA, it comprises obligatory and optional subjects rather than strict divisions of field, thematic, based on student interest and a creative approach. The former Minister of Education Nuh commented that:

> 'The core of the 2013 Curriculum was creativity. Creativity is a modality for innovation, looking for alternative solutions for an issue and the complexity of future problems. Creativity is the ability to do and find new things to answer various issues' (Sukemi and Andriono, 2014, 124).

Indonesia was in an obscure position when it developed its goal for curriculum revision, such as Indonesian values: religious and social, to create learners who are productive, creative and innovative, and contribute national and global society. The new 2013 Curriculum opened a space for SMA via a group of optional subjects (mathematics and natural sciences; social sciences, and culture and language), that meant it differed from the 2006 Curriculum, which considered this as mandatory. Consequently, the learner can now go beyond mandatory subjects based own their own interests (Ministry of Education, 2014). This is to say that the learning process is not limited to the boundary of teaching a subject, but all subjects are combined to develop a common goal related to personality and character building.

The change in political power, when the new president Jokowi was elected in 2014, has consequently changed the position of the Ministry of Education, from Muhammad Nuh to Anis Baswedan. This replacement occurred soon after Muhamad Nuh announced the authorisation of the 2013 curriculum for schools in Indonesia, which replaced the 2006 Curriculum.

However, the new minister, Anis Baswedan amended this instruction to halt the implementation of the 2013 Curriculum. In practice many schools gradually adopted this new curriculum. Nevertheless, this rapid policy change contributed to confusion in the schools. Considering the result of student performances and the global challenges, the focus of the Indonesian education system has shifted to curriculum reform initiatives, ranging from a single approach to interdisciplinary approaches, knowledge orientated to knowledge, skills and attitudes and furthermore, lessons which focus on national and global issues. There is reason to believe that the Indonesian school system could benefit considerably from the reform. These changes have opened the opportunity to integrate different types of topics, for instance character education, corruption, maritime studies, disaster education, etc. These topics have been taught across the curriculum as a part of language education, mathematics, natural and social sciences with a more comprehensive approach which involves knowledge, skills and attitudes as part of the learning outcomes (Anas and Supriyatna, 2014).

3.5. DRR and Curriculum: Integration

The huge impact of the disaster in 2004 was exacerbated by poor early warning systems and the lack of community preparedness. To respond to this devastating event, the government initiated various measures to deal with disasters. One initiative is the mainstreaming of DRR into the national education system. In doing so, the integration approach under the 2010 Circular letter on mainstreaming DRR into formal education has been the focus. This integration approach allows for the integration of DRR knowledge into existing subjects which do not require the development of a new syllabus. It is expected that disaster risk awareness and relevant skills will be more developed at the school level and will be more effective in reducing risk. Pandey (2007), confirmed that ‘integrating DRR into the curriculum is the most effective tool for this’. However, the centralistic approach failed to accommodate the different characters and circumstances across the

archipelago of Indonesia. Most of the resources are centralised on Java island (Pandey, 2007).

The DRR curriculum should be integrated between learning experiences, as many students live in post and potential disasters areas. In this context, DRR education development in Indonesia can positively contribute to the development of global education on DRR, as discussed in Chapter Four. However, DRR education remained isolated from this discourse early on.

Based on the evaluation of the 2013 Curriculum, it is an obscure how the teaching process is conducted and what values should be highlighted. Thus far, it has just mentioned the content of a certain subject, so it has been a dilemma regarding implementation. Consequently, the 2013 Curriculum is not a novel innovation but simply a restructuring of the 2006 Curriculum. There has been a lack of training and the dissemination of the 2013 Curriculum for education stakeholders at the regional (local) level. Moreover, many teachers still do not understand the concept of 2013 Curriculum. It is a chronicled problem in Indonesian education that the changes to the curriculum are merely changes in approaches to the learning process (FGD).

The change in the curriculum does not change the paradigm for teachers in the teaching and learning process in schools; therefore, teachers should clearly understand the basic notion of education in Indonesia. However, it has been a concern of school teachers in Indonesia for a long time, as the quality of teachers is poor because the faculties of education in universities are not the favourite choice of brilliant students, and being a teacher is not a popular choice for most people (See Anas, and Supriyatna, 2014 and FGD).

The Inter-Agency Network for Education in Emergencies (INEE) underlines that curricula should address the particular context and needs of learners with consideration of culture, social background and the language of the learner in formal and non-formal education. A few of the key actions include ensuring that curricula are appropriate to learners needs; ensuring

that curricula teach disaster risk reduction, environmental education and conflict prevention; guaranteeing that curricula cover the core competencies of basic education and addressing psychosocial well-being and the protection needs of learners, and moreover, learning materials and instruction are provided in the language of learners and teachers (INEE, 2010).

The lack of creative and independent thinking of Indonesian students, and poor performance levels in science subjects, has been a big challenge to drive the DRR issue in science subjects. Conversely, using DRR can also be a beneficial tool in relation to teaching sciences, as students are familiar with disasters. DRR education and science are two sides of the same coin which can support one another. It was not until 2010 that the paucity of science knowledge among school students and the public at large became a national concern and plans were initiated to improve the position of DRR in the national curriculum. The publication of Guidelines for DRR (2012) by the BNPB detailed DRR education under the umbrella of Safe Schools, as discussed in Chapter Six. However, since the 2010 circular, there has been no attempt to review DRR education and curricula in schools.

The opportunity to include disaster education in the curriculum actually increased within the Indonesian curriculum. The local content curriculum (LCC) with two hours teaching per week will give schools and Provincial Education Authorities the chance to decide which subjects should be taught in schools. The integration of disaster education must compete with other subjects, such as local culture and art, Islamic norms, environmental education, etc. In this sense, the option really depends on the capacity and resources available in schools. The interview with the Head of the Curriculum division, Ministry of Education, Jakarta also revealed that the teachers capacity and creativity in developing the curriculum based on the need is one of key point in the integration process (picture 3.1)

Picture 3.1. With the head of the National Curriculum Centre and the Head of the Curriculum division, Ministry of Education, Jakarta.

The lack of DRR education in schools was particularly a problem at a time when Indonesia was becoming more internally focused with respect to national cultural based education in the 2013 Curriculum. One outcome was the inclusion of a previously neglected DRR curriculum as additional subjects in the 2010 circular. Two years later, BNPB announced Disaster Guidelines for Safe Schools. However, control over the curriculum remained in the hands of central government and local (Provincial) Education authority, some of which lacked expertise in DRR education. It should be noted that there was no clear standard format to integrate DRR knowledge into the school system. As it was an insertion knowledge, in practice many schools have been unable to utilise these items without any support (Interview with Yanti). This condition has hindered the movement of DRR education in several provinces.

Nevertheless, teaching DRR will be extremely challenging in some areas in Indonesia, especially in areas where the customs are traditionally conservative and teacher's knowledge of hazards remain exceedingly limited. The research conducted by Tuswadi and Hayashi (2014), in 24 primary schools in the area of the Merapi Volcano on Java Island, on student perceptions (knowledge, attitude and behaviour) indicated ineffective and poor curricula on DRR may have a negative impact on people there. This situation is possibly caused by ineffective teaching related to disaster prevention practice that relies as much on textbooks and pictures as broader

teaching media. It causes students to believe in the more dominant mystical attitudes concerning disasters, as represent the poor quality of DRR education in Indonesia.

There are very view examples that teachers have the capacity and role to maintain the DRR programme in schools. The current DRR education was mostly implemented as an extracurricular activities and it is primarily related to disaster preparedness (drill)(Interview with Yanti).

According to the General Assessment Report, about 160 countries who participated in the self-assessment report in Hyogo for Action (HFA) 3 revealed varied progress in using knowledge, innovation and education to build a culture of safety and resilience at all levels. The average score for HFA number 3 increased from 2.9 to 3.2 from 2011-2013. The report highlighted that 72% of participating countries indicated that DRR was included in some way in the national educational curriculum in all education levels, including primary (65%), secondary (56%), university (61%) and professional education programmes (55%)(Ronan, 2014). This finding reveals that the progress of the implementation of DRR in school curricula remains relatively slow globally. Similarly, according to case studies from different countries, many DRR education programmes were not a part of the formal school curricula, although they are characterised as elective programmes (Selby and Kagawa, 2012).

Based on the review of DRR development in Aceh, in 2012, the UNDP has provided some guidance to consider. The first point is that ‘curriculum development needs to be government led and be a participatory process, which engages governmental and non-governmental DRR practitioners’. This advice demonstrated the gap between the government initiative and the practices of NGO in the field with respect to DRR. Without this combination it was believed that DRR education will not effective. The second aspect pointed out by the UNDP is that ‘DRR cannot be taught through books alone’. It indicates the importance of practical knowledge to be exercised and simulated in more interesting ways (UNDP, 2012).

The concerns have been highlighted by research that teaching and learning in Indonesia remains teacher and book centric, rather than student centric. Consequently, current DRR has been generally influenced by this situation. The third piece of advice stressed that 'a cultural approach to teaching DRR is critical'. That is to say that as a primarily Muslim nation, Islamic approaches should be considered when explaining DRR, but scientific issues must then be explained too. This is more critical when introducing DRR in traditional Islamic schools, such as Dayah in Aceh province. The fourth piece of advice is to 'focus on building strategic partnerships to promote awareness on an issue such as DRR'. It is the need to utilise the role of existing religious organisations and religious leaders, as they are considered moral authorities in the community, when DRR is introduced to schools and student. The fifth lesson learned is concern about the commitment of stakeholders to sustain the programme in the long term perspective (UNDP, 2012).

Table 3.1. shows that the DRR education has shown some progress both in National and local level such as from elementary to university. It can be seen from some of basic competencies which explained word disaster issues in Indonesian language in elementary school, natural science in junior high school and geography in secondary high school. The government has realised the importance of organizing young generation to deal with different range of pervasive problems, such as disaster as stated in the background of curriculum 2013. Nevertheless, the integration has faced some challenges including the scarcity of learning resources for teachers and students, especially in remoted area, lack of teacher knowledge related to hazard and teaching capacity, and lack of evaluation.

Table 3.1. Summary of some example of DRR education progress at national and local level in several stages, from primary school to secondary high school, and to university (Modified from Nurdin, et al., 2017)

Education level	National		Local	
	Progress of integration	**Challenges for integration**	**Progress of integration**	**Challenges for integration**
Bahasa Indonesia (Indonesian Language) SD, grade V	Basic competency on disaster related knowledge has been included in the National curriculum where students are expected to have concern, responsibility toward natural disaster by providing report.	As each area has different types of disaster, the used of the vocabularies cannot be generalized and therefore the development of lesson plan might be varies. This condition will give different results on understanding disaster contexts.	There are some methods in delivering the information related to natural disaster through local wisdom, for instance by using a story telling, local song like '*smong'* from Simelue Island in Aceh.	The lack of capacity of teachers and students in developing the disaster related topics/lessons. The lack of teacher's knowledge on local wisdom.
Natural Science SMP, grade VIII	Basic competency on disaster related knowledge has been included in the national curriculum focusing on understanding the process of earthquakes and volcanoes phenomena	Some possible barrier in the implementation are due to lack of ability of teachers in understanding the topic and their limited access to some materials in conducting experiments to explain the process of the earthquake or volcanoes phenomena.	The involvement of disaster smart car (*mobil pintar kebencanaan*) in educating school communities has contributed to have more information about natural disaster, such as demonstrating the volcano eruption process.	The availability of learning resources for teachers and students, especially in remoted area. The availability of learning materials needed in conducting experiment /demonstration on the process of disasters. The ability of teachers in conducting experiment.
Natural Science SMP, grade VII	Basic competency on disaster related knowledge	In the implementation, teachers might use different circumstances in	In the local level, teachers and students are more	The main issue in the implementation is lack of

	has been included in the national curriculum where students need to be able to describe causes and impact of global warming.	explaining the context of global warming and its impact depending on the background of the area. This could contribute to varied results in understanding the issue of global warming for students.	aware of the local impact of global warming that happened surrounding them.	teacher's capacity in connecting more updated themes of disaster issue in their classroom including the bigger scales that happened around them (national and international).
Geography SMA, grade X	Basic competencies on disaster related subject has been included in the national curriculum which addressed the ability to evaluate and have a concern toward the environment problem both in Indonesia and Worldwide.	The teacher's achieved competencies has yet to be enriched with relevant information concerning the environmental problem they need to address in their teaching learning process. It will give different perceptions for teachers in interpreting disaster in regional and global contexts.	Indeed, there are schools with no provision of direct activity. In the contrary, some areas in Indonesia has involved students in planting mangroves to support coastal zone and to educate them about the importance of coastal area in their environment.	The availability of learning resources and the ability of teachers in explaining and associating the learning process with the environmental problem and disasters that happened around them.
Chemistry Grade X/XI/XII	Basic competency on disaster related knowledge has been included in the national curriculum which address the focus on having an action of keeping environment and thriftiness in utilizezing the natural resources.	The issue about disasters are not clearly mentioned in the chemistry subject. It can be delivered within various topic in chemistry. The condition might lead different point of view in explaining about keeping environments and how they are related to disasters	Teachers argued that chemistry can be one of the potential subject to explain about disaster and climate change issues. Some potential topic within chemistry such as fossil fuel, environmental chemistry, can be utilized as very good tools in explaining related disaster issues (FGD)	The limitation of knowledge on hazards and disasters and practical guideline in developing disaster related issue in the lesson plan (FGD).

University	The disaster management has been included as one of the priority agendas for the Ministry of Higher Education	The disaster management has yet to be widely introduced in the universities throughout Indonesia	Disaster management is a compulsory subject for under-graduate in the University (ex. Syiah Kuala University, Aceh). Disaster knowledge have been included in the university curriculum focusing on basic concept of understand ding on hazard and climate change adaptation.	Lack of human resource, teaching staff who are capable to teach and incorporate the DRR knowledge into different subjects such as education, engineering, agriculture, law, etc.

It can be said that the problem may lie in how well the material is being taught. Teachers are already overloaded with new subjects and concepts - DRR is just one of many' (UNDP, 2012). Hence, the learning material used to integrate DRR in the (science) curriculum should be developed from the current lesson (not new material) to maximise the learning process of science and disaster in school (FGD and interview with Samsul Bahri, Ruhdini). To foster the process, it demands a paradigm shift from education stakeholders to be more creative and innovative to promote the integration of DRR in the curriculum. So, schools can play an important role in raising awareness among students, teachers and parents (Shaw et al., 2004; Sukemi and Andriono, 2014).

3.6. DRR Education in Various States

Diverse research has pointed out that incorporating global issues into formal education can be an effective way of addressing disaster risks (see Petal and Idzakah, 2008). In Australia, for example, classroom intervention has changed students' views at the primary school level about the importance of managing the environment. This intervention has increased students' concerns relating to global warming and their awareness of the impacts (Taber and Taylor, 2009). In the Philippines, DRR integration conducted through science clubs in every school, have increased student's knowledge and awareness. The science clubs, which were initially intended to support pupils in general science, chemistry, biology and physics have strengthen local disaster prevention and mitigation, as a response to devastating catastrophes such as the Southern Leyte mudslide in 2006 and Typhoon Ketsana in 2009 that struck the country. A survey conducted by Fernandez (2014) for 658 science club members from different provinces who attended summer camps organised by the Philippine Society of Youth Science Clubs in April 2010 confirmed that the awareness and knowledge of students in the science clubs on hazards and disasters is considerably high (Fernandez and Shaw, 2014).

Johnson (2013), suggests that DRR in science classrooms should be well prepared to manage controversies on the issues which address common understanding and the objectives of the topic, including a database to support the evidence. Such good examples have been practiced in Austria and Denmark, where students who attend lectures about climate change showed an improvement in understanding that human beings are responsible for recent global warming (Inez et al., 2013). Similarly, in South Australia, several approaches have been developed to introduce climate change into classroom teaching, such as constructivist approaches 'to encourage learning and critical thinking about climate change'. The problem-based method guided students through the conceptualisation of the implications of environmental change. Students at Woodcroft College, Australia were given the opportunity to examine potential climate change impacts on a local coastal ecosystem. At

the end, the students found that that learning about climate change made them more aware about future environmental issues (Bardsley and Bardsley, 2007).

It draws attention to the idea that students can do more to minimise the increase in the Earth's surface temperature. As Lidstone stated, knowledge of hazards is important for students because of the following reasons: (1) to create a 'safe society' - safer not only from the forces of nature but also from economic consequences; (2) the more factual knowledge we have, the better off we are; (3) to avoid uncertainty or dependence on intuition (Lidstone, 1996). Effective DRR education can only take place if schools pay more attention to disaster themes and topics. This action can be supported by the integration into several subjects and formulation of different approaches as shown in table 3.2.

Table 3.2. Example of hazard-related content in curricula in secondary high schools around the world (Lidstone, 1996; Selby & Kagawa, 2012).

Country	Subject	Approach	Description
Hong Kong	Geography	Traditional Physical science approach	Focus on knowledge of hazards and understanding the physical process of hazardous events.
South Africa	Geography	Incidental approach	Use recent disasters as example to introduce knowledge of hazards, mitigation and prevention action.
Philippines	Natural science and social studies	Centralised and competency based approach	Introduce hazards which are relevant to national context.

Japan	Integrated study	Inquiry-based active learning	Interdisciplinary and comprehensive topics of DRR knowledge that are relevant to students locally.
Cuba	Chemistry	Symbiosis approach (use existing cross curricular)	Focus on the issue of global warming, smog that causes pollution and damage to the ozone layer, acid rain and other fundamental issues related to disaster mitigation.

3.7. Developing Pedagogic Devices for DRR Education in School Curricula

When the process of formalising integrating DRR into curriculum is established, a further issue would be a pedagogic device for DRR, as Bernstein highlighted: 'Are there any general principles underlying the transformation of knowledge into pedagogic communication, whether intellectual, practical, expressive or official knowledge or local knowledge?' (Bernstein 2000). This 'pedagogic device is described by Bernstein as the ensemble of rules or procedures via which knowledge is converted into classroom talk, curricula and online communication' (Singh, 2002).[9] Bernstein stated that 'restricted codes have their basis in condensed symbols, whereas elaborated codes have their basis in articulated symbols'. The specific object of the sociology of education is 'the device which constructs, regulates, and distributes official elaborated codes and their modalities'. This, Bernstein comes to call, 'the pedagogic device' and its realisation is in the 'structure of pedagogic discourse'. But it is precisely this specific object (the object that gives the sociology of education its domain theoretical specificity) that has been absent from the sociology of education. Bernstein stressed that: 'The

[9] Bernstein (2000), argued that it is crucial to distinguish between both text transformations that occur. The first is the conversion of knowledge appropriated from the field of production within the official and pedagogic re-contextualising field. The second is the translation of this pedagogised knowledge by teachers and students in the re-contextualising field of the school/classroom.

pedagogic device is thus a symbolic ruler of consciousness in its selective creation, positioning and oppositioning of pedagogic subjects. It is the condition for the production, reproduction, and transformation of culture' (Bernstein, 2009IV).

The pedagogic device is considered 'the most fundamental concept of Bernstein (Moore, 2013). It has been as relevant as the 2006 competence-based curriculum (KTSP), where teachers are expected to be creative in integrating disaster preparedness material in subjects that they are teaching even though there are no formal materials to support their tasks. However, this expectation was not achieved, where the lack of capacity of teachers and the overburdened curriculum indicates that DRR education has made no significant progress (Jannah, 2014). The accumulation of DRR education narratives has not been fully inserted in the 2013 Indonesian curriculum yet, as formal knowledge codes in condensed meanings. Therefore, it requires more knowledge and skill to explanatory process of teaching methods, as called 'formal educational pedagogic codes'. It is a teacher as becomes a key actor to deliberate of DRR education in classroom.

In the process of constructing modes of classroom knowledge, teachers may re-contextualise discourses from the family/community/peer groups of students for purposes of social control, in order to make the regulative and moral discourses of the school/classroom more effective (see Singh, 2001a,b). Moore on Bernstein explained that:

> … formal educational knowledge codes are integrating codes that systematically condense meanings, essentially through the theories and methods of disciplines, and that formal educational pedagogic codes are ones that methodically expand those condensed meanings through the explanatory processes of teaching methods (Moore, 2013, 77).

The term 'official pedagogic device' is defined as 'a device for translating power relations into discourses of symbolic control and for translating discourse of symbolic control into power relations'. The output of the pedagogic device is to shared competences and specialised

competencies (Bernstein, 1990). There is an inter-relation between power relations and pedagogic discourse in which DRR education is located. The DRR education was reach to a full official discourse of Safe School, a framework to embed DRR knowledge into school system. The main objective was to mainstream disaster preparedness into existing curricula and modules, and in extracurricular activities. DRR could, for instance, be placed under the science programme (chemistry, biology, physics, etc.), and as such contribute to education for sustainable development.

This is supported by the finding from FGD with school representative which found that schools realized the importance of mainstreaming the DRR concept into school subjects; however, the process of addressing the topic should not interrupt the teaching-learning process and it should be more practical for student's lives. Therefore, using media would probably be one of very good options that can be employed to disseminate the DRR concept in formal lessons as well as creating a workbook to monitor the process for both student and teacher. Another practical option for this research was contributed by the SMA Lab-School, which is a short-term project, lasting approximately 4-6 weeks in a specific topic, which will be regularly organised in Lab-School each year. The study also pointed out that no school has integrated the DRR concept into its formal lessons. It is important to point out that most of teachers whose role as a key element of disseminating DRR knowledge in the school have inadequate understanding on the disaster education. This condition has delayed the DRR learning process in the school system as shown in the table 3.3. disclose

Table 3.3. Overview of Focus Group discussion (FGD) with School Representatives

Main Issues	Description	Participant Response	Participant Suggestion
The current situation in secondary high schools in Aceh.	The implementation of the new curriculum which is called 2013 Curriculum (K13) is the main concern in Aceh at the moment, as it lacks understanding and technical implementation in comparison to the previous curriculum, KTSP 2006.	Participants have a varied perception and understanding of the new curriculum 2013. This is because of the lack of training on the issue, as well as substantial problems that the curriculum lacks technical guidance related to its application. Some problems might be encountered while introducing a certain topic, because the schools need more time to adapt to the new curriculum.	Prior to integrating the topic on the DRR into the curriculum, the teacher should be well trained on 2013 Curriculum (K13), particularly in chemistry. Having clear research methods will probably help schools to introduce the new topic.
Disaster preparedness in schools in Banda Aceh.	No schools have a regular drill on the DRR. However, two schools: SMA 6 and SMA 13 have been involved in several projects on disaster	Participants mentioned that it is challenging to maintain the sustainability of the programme due to the lack of policy	There is a need to formulate clear regulation in local authorities, i.e., Aceh government and local education authority, so the

	preparedness in Aceh. Schools also have evacuation signs as part of their commitments. In 2005, all schools in Banda Aceh were invited to attend the seminar on disaster preparedness. Participants were selected by schools. Representatives of BPBA and the local Education Authority, who attended the discussion, think that disaster preparedness is crucial for Aceh. However, they are concerned about the lack of the human resources and funding.	from the local authority. Some schools are also concerned about the lack of assistance and guidance from the Aceh Disaster Management Agency (BPBA) and local Education Authority. Only schools that have been established as pilot projects after the 2004 are more familiar with the disaster issue. It is a concern that any research implemented within the school will need formal permission from the local Education Authority	school will have a clear base to undertake the programme.
Mainstreaming DRR into school curricula.	No school has integrated the DRR concept into formal lessons. However, some schools prefer to introduce this topic in extracurricular	Participants believe that implementing DRR will benefit Aceh since many catastrophes have occurred in many parts of this region. However, they are	Prior to integrating DRR into the curriculum, teachers should be well trained on Curriculum 2013 (K13).

	activities. Not all teachers are familiar with the DRR concepts. Integration of the DRR concept might disrupt the learning process if it is not well prepared. Development of the topic should be counted as part certification for teachers.	concerned about how the DRR concept will be embedded into formal lessons. It should start by analysing basic competence (KD), which is relevant to the DRR topics. Alternatives can be undertaken by using media (e-learning) which can be easily used by both teacher and student. Additionally, it can be conducted through extracurricular activities and a short term project.	Lack of understanding of both (DRR and K13) might delay learning processes and achieve the target for the final exam. The local education authority is supportive of the research and would like to link-up with industries such as mining and water in Aceh. Another practical option for this research is a short-term 4-6 weeks project on a specific topic.

3.8. DRR Education and its constraints

Since the application of the Law 2007, 2010 Circular letter, the 2012 guideline, no evaluation has been conducted to review the progress and challenges on the ground. There has been no formal assessment and evaluation on how DRR education has been implemented at the school level. Even the collaboration of national and international agencies has contributed to the current formulation of DRR educational resources in Indonesia. This can be seen from the availability of different learning materials from the

Ministry of Education, LIPI, Save Children, UNDP. For instance, integrating DRR into subjects in Primary School, DRR Integration Modules for teachers to integrate DRR content into school subjects, such as the Indonesian language, science, social science and extracurricular activities. The modules include floods, fire, earthquakes, tsunami and landslides, for elementary, junior and high school. It could be said there has been significant progress in terms of knowledge accumulation (see Chapter Seven about modules and resources), but we cannot measure how far this contributed to students' ability to prepare or respond to disasters.

Three components should be measured in the evaluation, as asserted by Bloom, Hasting & Madaus (1971); specifically, knowledge, skills, and attitudes. Knowledge covers understanding of the facts related to DRR, its risks, and impacts, as well as how to better respond to those disasters in their context. Skills will be seen from the capacity of education stakeholders to critically evaluate the existing weaknesses of people to respond to disasters and can show their ability to better respond to disasters, such as in drill situations. And attitudes would have to wider impact of their behaviour in their daily life concerning disaster risks. Consequently, this evaluation can offer a better insight for policy makers in understanding the development and challenges and improving such obstacles for better implementation in future.

The implementation of the new curriculum (the 2013 Curriculum) has given teachers new tasks. Moreover, it requires enormous effort for teachers to understand the changes in this curriculum. If access to DRR materials is still one of the main issues in teaching DRR, then the process of integration might be suspended, especially when teachers need learning material to achieve specific basic competencies. As the government of Indonesia illustrates its lack of support for DRR-related teaching materials, the teaching process is really dependent on teachers' motivation to persevere and seek relevant tools and materials proactively.

It has been recognised that the ability of Indonesian teachers remains low in general. Thus, it should be inserted in university education which produces teachers for schools and alternative training for teachers to

improve their ability to integrate DRR in the curriculum. This recommendation is considered essential to sustain DRR education. Thus 'the key points are the commitment and the operational capacity to implement DRR education in school'. When the teacher has the appropriate ability, it can be integrated into the curriculum, in various ways, for instance extracurricular activity or in other programmes, such as CFS (Child Friendly School/Sekolah Ramah Anak) (Interview with Zamzam).

In terms of national policy, data bases on disasters risks, hazards and potential areas is required in Indonesia, so it can be accessed by education /schools' stakeholders as they can promote integrating DRR education in schools. This data is currently unavailable from the government. The recent repositioning of the National Secretary of the DRR consortium is expected to create a coordination hub among national policy makers, that will continuously improve DRR education (Interview with Zamzam).

At this point, DRR education has simply been disseminated to limited piloting projects since 2004. The uneven distribution of DRR education knowledge in schools should be a concern of education stakeholders, as it should be a more well-coordinated programme between national/local education authorities and national/regional disaster management agencies.

3.9. Conclusion

The objective of education in Indonesia has evolved in a rhetorical manner, in terms of being religious based, nationalist building and global competition. However, its interpretation may vary depending on the pragmatic political purposes of the ruling regime. These objectives then manifested in ten variations of the national curriculum from the 1947 curriculum to the most recent one, the 2013 curriculum. The nationalism dynamic in the Old Order (Sukarno), social economy factor in the New Order (Suharto), globalisation and the degradation of national culture in the Reform Order has been emphasised.

The popular support for anti-colonialism during Sukarno rejected the influence of the Dutch curriculum and all association with Western influences.

Sukarno only wanted to focus on internal nationalism and avoid outside influence, which made education development in Indonesia primarily based on national scope and resources. It was much more on defining and formulating the philosophy of national education from the early stages of Sukarno's presidency (1945-1966) into a more institutionalising and systematic formulation of the curriculum during the Suharto period (1966-1998), in terms of nationalism building.

During the Sukarno and Suharto regimes (1945-1998), DRR education had not emerged despite many disasters and its severe impact, it was merely a sporadic response to cope with post-disaster impact, as discussed in Chapter Five. The lack of disaster science development, religious fatalism and limited traditional knowledge, as can be seen from the alienation of science subjects in the school curriculum has stopped DRR education from emerging; while LIPI initiated developing disaster science in a bureaucratic frame and has no direct access to the school system. The change in the curriculum at the national level has contributed to confusion in practice, since schools must follow the national curriculum, but uneven development across Indonesia has created different responses in practice.

Many of the disasters that occurred and were recorded in the Emergency Event Database prior to 1945, were primarily earthquakes and volcanic eruptions. The losses and damages were unfortunately not documented since economic damage did not receive much attention at that time. Within that period, natural science development led by LIPI was not linked with the education system in Indonesia. Consequently, the existence of natural science subjects in school curricula lacked development. Conversely, LIPI has developed several development projects concerning natural disaster science in relation to disasters that occur repeatedly. This knowledge was the seed that grew into the disaster preparedness part of DRR education. However, the knowledge was marginalised in the school curriculum until 2004.

The absence of DRR education (in general) in Faculty of Education, as the institutions in charge of producing teachers in Indonesia, has contributed

to gaps in teachers' knowledge and skills with regard to teaching DRR education. The National Curriculum Centre under the MoEd should play a greater role in this issue, even though concerns remain due to the low ability of education stakeholders at national and local levels.

It is noted that there is no systematic approach to introduce DRR education in the school curriculum. Moreover, it would require teachers to be creative and pro-active to develop such basic national core competency content in each subject, including science. While the existing movement relating to DRR education is developed beyond curricula, as discussed in Chapter Six. These approaches remain problematic in its application as it has overburdened school stakeholders, such as the management, teachers, and students. Additionally, the programme was dependent on funding, so there is no sustained effort to make disaster safety an integral part of school education. While SSB needs more effort and resources to implement, DRR integration can conducted by teachers in certain subject has the capacity to do so. On the one hand, the integration of DRR into the curriculum has become a part of SSB, but conversely, it can be considered as an independent approach which has the potential to be applied extensively. Hence this chapter suggests a paradigm shift from the fatalistic approach of religious teachings to be more scientific approach through the integration of DRR in the science curriculum, to increase the awareness of disaster preparedness.

Despite there being no formal assessment and evaluation regarding DRR education in Indonesia, i.e. DRR modules, curriculum, books, etc., it can be concluded that it has been significantly progressive in terms of knowledge accumulation and learning resources. However, we cannot measure how far this has contributed to students' ability to prepare or respond to disasters.

CHAPTER FOUR
DRR AND GLOBAL EDUCATION IN INDONESIA

4.1. Introduction

This chapter will answer the second research question; specifically, what is the origin of Disaster Risk Reduction (DRR) knowledge in the global context and how it transformed and evolved in the national education system in Indonesia over different time periods, from independence in 1945 up until 2016. It is argued that DRR education in Indonesia is a marriage of global and local experiences. It is an accumulation of valuable knowledge relating to global concerns over various natural disasters in developing states, which lacks preparedness (knowledge and skills) regarding places severely affected by humanitarian crisis. The United Nations (UN) and its affiliations have responded to crises since 1945, particularly in 1989, when the United Nations formulated these experiences to be formal knowledge, which was subsequently adopted by means of UNESCO initiatives. Coincidently in 2004, the devastating disaster that occurred in Indonesia (Aceh province), drove Indonesia's Institute of Sciences (LIPI) to coordinate with the UNESCO, producing several initiatives to introduce preparedness knowledge and skills to Indonesian schools, as the beginning of what later became known 'DRR education'. This chapter will be divided into five sections: following first section, the introduction, Section Two defines global education in the Indonesian context. Section Three explores the evolution of global education and DRR issues under the UN system and Section Four analyses how global DRR education became entangled in the Indonesian education system. Finally, Section Five will demonstrate some insights surrounding this process.

4.2. DRR Education in Global Education Context

It should be stated that DRR was not apparent in the early development of global education, as it was regarded as being too similar to issues related to the environment and sustainability. Nevertheless, as technology continues to develop, various disasters occurring worldwide can

be watched live and have an impact on people, both economy and social aspects. Consequently, the need to reduce such negative impacts is considered essential and work is taking place to protect the Earth, human beings and valuable resources. It is this global recognition that has raised awareness of DRR and enabled it to develop as part of global education. The evolution of DRR education in the global context will be discussed in subsequent sections.

4.2.1. Sporadic Humanitarian Response in 1945s

Even though natural disasters have occurred for centuries, there are very few literatures describing DRR education prior to establishing the UN as the world's representative in 1945. In the beginning, the DRR initiative was related to humanitarian relief for refugees post-WW-II. Subsequently, it expanded to cover humanitarian relief in cases of natural disasters upon the occurrence of specific events (only a few natural disaster cases, not all of them). It then formed humanitarian relief in cases of natural disasters upon the occurrence of specific events calling for emergency actions. In the early days when large disasters occurred, the Social and Economic Council and the General Assembly invited the World Health Organisation (WHO), World Food Programme (WFP) and the UN Children's Fund to assist people affected by disasters, such as in Ecuador in 1949, in the Polesine flood in Italy in November 1951, and so forth. There was great concern regarding emergency situations post disasters, and in some regions covering rehabilitation and reconstruction, such as the United Nations General Assembly (UNGA) response to the powerful earthquake in the Yugoslavian city of Skopje in 1963, a hurricane in the Caribbean, and two years severe drought in Afghanistan (See the UNGA Resolution 2757 (XXVI), 1971).[1]

Hence, between 1945-1965, DRR was more of a sporadic short-term response to areas in countries that had been affected. In the following years, the UN initiated a more systemic approach at the request of the Social and

[1] On the nature of the UN General Assembly Resolutions, see Kadir (2010) The United Nations General Assembly Resolution (UNGAR) as a Source of International Law: Toward a Reformulation of Sources of International Law, Indonesian J. Int'l L. 8, 275.

Economic Council Resolution 1049 (XXXVII) 1964 to the General Assembly to study the types of assistance. This was then consolidated, reviewed and recommended under the UNGA Resolution 2034(XX) 1965 on the UN's role in humanitarian relief programmes, including the position of the UN Secretary General as the coordinator, extended assistance to rehabilitation and reconstruction rather than immediate assistance only, in addition to funding allocation. The report places equal emphasis on the importance of promoting understanding among governments with regards to the necessity for 'pre-disaster planning' and the establishment of a single national responsible authority for disaster management.

It was the first resolution to consider the term 'pre-disaster planning' or later extensively known as 'disaster preparedness', 'natural disaster reduction' in which the UN could offer advice and assistance upon requests from governments regarding all types of planning measures. Despite the lack of response in many developing countries, it increasingly attracted global attention, even in the report published in 1970, the Secretary General emphasised the importance of national responsibility over pre-disaster planning. However, it was found '…that many national emergency plans were inadequate and that many countries in disaster prone areas had no plans at all' (Macalister-Smith, 1985).

The UNGA Resolution 2435(1968) on Assistance in Case of Disaster, a response to previous resolutions 2034 (1965), stated that the extended assistance for developing countries, and the need for 'scientific research and modern technology in reducing the impact of natural disasters on man and society' has been demanding. Points 1 and 2 of this Resolution highlighted to governments the need to establish administrative measures and scientific research on disasters risk, and to encourage preventive and protective measures, such as the construction of safe houses. However, it did not work as many developing countries lacked the expertise and were newly independent countries and wanted to focus on recovering political and economic stability. Equally the UN failed to give a clear diagnosis of the problem and provide clear and applicable recommendation for developing

countries prone to disasters. Thus, the repetitive rhetoric of the need for governments to consider preventive and scientific research on disaster risk and hazards within various UNGA Resolutions in the period 1968- 2004 were rather unsuccessful. This can be seen from the Secretary General's review of the 2034 Resolution, in 1971, which recognised the unsatisfactory progress of the Resolution, and provided an expansion of the UN role from emergency relief to the new system of UN management, such as the designation of the UN Relief Coordinator and its office under the Secretary-General, and emphasis on the afflicted countries role to increase capacity to prepare and respond to disasters.[2] This has urged developing nations to consider their internal capacity to prepare for disaster.

The failure of DRR education in the 1970s specifically refers to post-colonial states which experienced under-development in science, technology and internal conflicts. 'Pre-disaster plan' and 'planning and prevention' is a result of political pressure from post-colonial countries over developed states in the UN system. Since this era, several resolutions used the term developing countries as countries that were under development and require disaster relief assistance (See several UNGA Resolutions on the New International Economic Order/ NIEO).

Having reviewed its role in responding to natural disasters, the UN then developed a more collective effort to support the international community in responding to several disasters in developing countries. The UN has played a more effective role in post disaster response, supported by its affiliated agencies, such as the United Nations Development Programme (UNDP). It called for the Secretary General to appoint a Disaster Relief coordinator to mobilise and coordinate relief activities in the field. For example, point (f) of this resolution 2816 (1971), highlighted 'to promote the study, prevention, control, and prediction of natural disasters, including the collection and dissemination of information concerning technological developments'. This

[2] See the UNGA Resolution 2608 (XXIV) on 'Assistance in Case on Natural Disaster'); 2717(XXV) 1970: 5(b) 'pre-disaster planning at the national and international level …').

point was changed to promote DRR education, as part of the duty of the UN Disaster Relief Coordinator (See UNGA Resolution 2816).

4.2.2. The Globalisation of DRR Education (1990s)

The following UNGA Resolution 42/169 of 11 December 1987 then decided to designate the 1990s as a decade in which the international community, under the auspices of the UN, would pay special attention to fostering international co-operation in the field of natural disaster reduction. The term 'Natural Disaster Reduction' started to be used in the global arena. The UNGA Resolution 43/202 of 20 December 1988, taking note of Economic and Social Council resolution 1989/99 of 26 July 1989, in which the Council recommended that the General Assembly act to develop an appropriate framework for international co-operation to attain the objective and goals of the establishment of 'the International Decade for Natural Disaster Reduction' beginning on 1 January 1990, to fight against fatalism (UNGA Resolution A/RES/44/236, 1989). This resolution acknowledges the responsibility of the UN to promote DRR programmes, run disaster prevention courses and preparedness entrusted to the Office of the UN Disaster Relief Co-ordinator, as set out in resolution 2816 (XXVI) of 14 December 1971. This resolution was clearly announced:

> (1),… the International Decade for Natural Disaster Reduction, beginning on 1 January 1990;(2) Decides to designate the second Wednesday of October International Day for Natural Disaster Reduction, to be observed annually during the Decade by the international community in a manner befitting the objective and goals of the Decade; (3), Adopts the International Framework of Action for the International Decade for Natural Disaster Reduction contained in the annex to the present resolution (UNGA Resolution A/RES/44/236, 1989).

The declaration on the International Decade for Natural Disaster Reduction (IDNDR) in 1989, was to raise global concern on coping with

disasters around the world, particularly in developing countries. It raised concerns on environmental protection for prevention and mitigation of natural disasters, 'recognising the importance of environmental protection for the prevention and mitigation of natural disasters' (UNGA Resolution A/RES/44/236, 1989). It was also pointed out '…that the international community as a whole has now improved its capacity to confront this problem, and that fatalism about natural disasters is no longer justified', to justify natural disaster. Therefore, the effort and the capacity to mitigate disaster risks remains at a low level. The objective of the IDNDR is:

> (a) To improve the capacity of each country to mitigate the effects of natural disasters expeditiously and effectively, paying special attention to assisting developing countries in the assessment of disaster damage potential and in the establishment of early warning systems and disaster-resistant structures when and where needed; (Annex UN GA Resolution A/RES/44/236, 1989, point 2(a)).

Since this declaration in 1989, the UN has taken a more active role in supporting developing countries in disaster preparedness and mitigation. Such as in point (e) of this declaration which stated:

> To develop measures for the assessment, prediction, prevention and mitigation of natural disasters through programmes of technical assistance and technology transfer, demonstration projects, and education and training, tailored to specific disasters and locations, and to evaluate the effectiveness of those programmes.

The term 'natural disaster reduction' began to be used in this resolution, as implicitly, which produced mitigation and preventive measures to encourage governments to develop national policies on disaster reduction systems. The idea was not very clear in regard to what form this 'natural disaster reduction' would apply. The organs, organisations and bodies of the UN system are urged to accord priority, as appropriate and in a concerted manner, to natural disaster preparedness, prevention, relief and short-term recovery, including economic damage risk assessment, in their operational activities. The Secretary-General was requested, in this regard, to ensure that

adequate means are made available to the Office of the United Nations Disaster Relief Co-ordinator so that it may diligently discharge its specific role and responsibilities in the field of disaster mitigation (Annex UNGA Resolution A/RES/44/236, 1989, point 5).

To support DRR education, the UN then established 'a scientific and technical committee on the IDNDR, consisting of twenty to twenty-five scientific and technical experts selected in consultation with their Governments on the basis of their personal capacities and qualifications, including experts from the organs, organizations and bodies of the United Nations system' (Annex UNGA Resolution A/RES/44/236, 1989, point 12). This technical committee was considered the first think tank regarding developing DRR in education, at a global level. This can be seen as a seed of the development of DRR education as a global knowledge. The term global education then known to cover the whole global concern including DRR.

In 1989, the UN explicitly manifested and managed the DRR programme in developing countries as the establishment of the secretariat at the United Nations Office in Geneva, in close association with the Office of the United Nations Disaster Relief Co-ordinator, with its members drawn from the international community of disaster reduction experts and other relevant experts. The secretariat was responsible for the day-to-day co-ordination of Decade activities and provided substantive and secretarial support to the special high-level council and the scientific and technical committee, as well as for other related activities. (Annex UNGA Resolution A/RES/44/236, 1989, point 14 (a, b). Regarding specific measurement related to disaster prevention, in December 2002, the United Nations General Assembly (UNGA) Resolutions 57/254 declared the 'Education Decade' for sustainable development 2005-2014, under UNESCO. In this Resolution, education for disaster mitigation becomes more explicit. It is then DRR education becomes a global project in developing countries that mostly affected by natural disasters.

In the following years, the forward-looking platform for international concerted disaster reduction, as developed by the World Conference on

Natural Disaster Reduction and as expressed at the Yokohama Strategy for a Safer World: Guidelines for Natural Disaster Prevention, Preparedness and Mitigation and its Plan of Action established (A/CONF.172/9, Resolution 1, Annex I).

The secretariat at the United Nations Office in Geneva mandated on disaster reduction and the strategy document entitled “A safer world in the twenty-first century: risk and disaster reduction”, (Adopted by the programme forum on the IDNDR, held in Geneva from 5 to 9 July 1999). Furthermore, it reiterates that natural disasters damage the social and economic infrastructure of all countries, emphasis is placed on natural disaster reduction in the Programme of Action for the Least Developed Countries for the Decade 2001–2010, adopted by the Third United Nations Conference on the Least Developed Countries, held in Brussels from 14 to 20 May 2001. (A/CONF.191/11). Additionally, it stressed the need for the international community to demonstrate the firm political determination required to utilise scientific and technical knowledge to reduce vulnerability to natural disasters and environmental hazards, considering the particular needs of developing countries (UNGA Resolution A/RES/56/195, 21 January 2002).

4.2.3. Environmental and Sustainable Development

Soon after the various UNGA Resolutions in response to a disaster in El Salvador and the accumulation of the lack of preparedness for disaster risks in other developing countries, encouraged the UN to develop an International Strategy for Disaster Reduction under the UN GA Resolution A/RES/56/195, 2002.[3] In point 24, the resolution requests the Secretary-General to submit to the General Assembly a report on the implementation of the present resolution, including criteria and modalities for the selection of the non-permanent members of the Task Force, and on the progress made in the implementation of the International Strategy for Disaster Reduction, under the

[3] See the UN General Assembly Resolution A/RES/55/240, 10 April 2001 in responding to El Salvador’s earthquakes

item entitled ‘Environment and Sustainable Development’(UNGA Resolution A/RES/56/195, 21 January 2002).

This resolution can be considered as the first initiation to invite all Governments and relevant organizations of the United Nations system to strengthen national participation, in particular of disaster-prone countries in order to achieve sustainable development goals and objectives, with the full utilization of scientific and technical knowledge and strengthening of global and regional approaches. It provided 24 detailed policies for DRR education development, including reaffirming the inter-agency task force for DRR, national focal point, encourages adequate financial and administrative resources for the effective functioning of the Task Force and the inter-agency secretariat in implementing the strategy, to establish national platforms, and so forth (UNGA Resolution A/RES/56/195, 21 January 2002).

The articulation of DRR education has been demonstrated in the global commitment to DRR in the UN system, as articulated in the Yokohama Strategy, (UN, 1994), various UN General Assembly Resolutions, the Hyogo Framework for Action (HFA) 2005-2015, and most recently, the Sendai Framework for DRR 2015-2030. Additionally, substantial effort has also been made to integrate DRR in the education sector. Furthermore, in the 2013 Global Assessment Report, 72 % of reporting countries specified that DRR had been integrated within their national education curriculum (Ronan, 2014). These efforts displayed the significant progress of DRR education post 2004, though it was considered to lack the essential basics i.e. disaster science, pedagogic development and human resources. Hence, as this research found in Indonesia, such progress has been stagnant in terms of sustainability and knowledge improvement. Even the integration of DRR into the curriculum is not clear as it would need sufficient policy makers and teachers and it would also change the existing established curriculum system. It can be argued that the current development of DRR education is an isolated project rather than integrated one (FGD with school representatives).

Additionally some activities also conducted to disseminate disaster information through all available channels, including handbooks and

information systems, the information necessary for the effective management of international cooperation in the fields of disaster prevention, early warning, response, mitigation, rehabilitation and reconstruction; and 'to maintain the annual observance of the International Day for Natural Disaster Reduction on the second Wednesday of October, as a vehicle to promote a global culture of natural disaster reduction, including prevention, mitigation and preparedness'(UNGA 56/195, 2002).

The emergence of global knowledge pertaining to DRR education was relatively new, embedded in the environmental and sustainable development issues, until the emergence of HFA 2005, Building the Resilience of Nations and Communities to Disasters, in which DRR become an independent field in the global sphere. But there was a huge change when the tsunami hit Aceh province in 2004. The disaster not only attracted the Indonesian government, but also the UN to consider schools as places that are vulnerable to disaster risks. Since this period, there has been enormous progress at both national and local levels focusing on DRR education to strengthen the ability of schools and communities to manage disaster risk. This is evident in the global campaign that was conducted under the theme of 'Disaster Risk Reduction begins at Schools' that took place at the UNESCO headquarters in Paris in the IDDR on 11 October 2006. The campaign explored two issues of DRR education: the integrating of DRR related subjects in the school curriculum and school safety in terms of safe standards for school construction. This campaign managed to raise awareness in numerous countries including Indonesia. Hence, the disaster triggered the accumulation of global national knowledge regarding DRR education, as Djalante highlighted:

> 'From 2004, the policy was transformed through the formation of legal and institutional frameworks for a more systematic and holistic DRR. (Djalante and Garschagen, 2017).

In the following years, DRR education has become embedded in major global frameworks. For instance, the Sendai Framework for Disaster Risk Reduction (SFDRR), Sustainable Development Goals (SDGs), the Paris Agreement on Change, the Addis Ababa Action Agenda on Financing for

Development (AAAA) and the New Urban Agenda in 2016. The various global frameworks for disaster management indicated the complexity of the development of disaster resilience thinking and how it impacts upon the post-colonial fragility of governance and institutional networks, as discussed in Chapter Five (see Chandler, 2014).

4.3. Defining Global Education in the Indonesian Context

Global or International Education, which originated from Western nations could just mean learning about other countries or regions. Hence, educators frequently had larger objectives in mind. For instance, New Jersey's International Education initiative outlined its goals as, "To help students understand, connect to and act on critical global issues by integrating international perspectives into curricula in all core curriculum content standards areas," (New Jersey Department of Education, 2005). This, it suggested would be achieved through the teaching of foreign languages and social studies education that is focused on global issues. Similarly, Andrew Smith, President of the American Forum for Global Education, asserted that, "As educators, we have a responsibility to prepare our students to meet the challenges of our interconnected world" (Smith, 2002).

The term 'global education' may 'refer to a specific educational field and, more broadly, as an umbrella term to embrace all of the issue-based educations'. It was developed from a Western perspective, as something to know the others, and, it cannot be separated from the historical colonial status over many peoples and regions in the world. Western countries as former colonialist countries have changed their perception to introduce a new paradigm to their new generation about the problems within postcolonial worlds; which are basically domestic issues in developing countries, as it is embedded in daily life, i.e. injustice, conflict, the environment and poverty. While developing states require global support in terms of conceptual development and global cooperation (advanced science and technology), it is to prepare learners to survive and compete in the global market, to face the global infiltration of the science of technology (Hicks, 2007b). Thus, for

Indonesia, global education is not just about 'responding to the world', but mostly responding to domestic challenges, particularly to well-formulated DRR education and its application.

Standish described some covered content of global education such as intercultural, peace, development, human rights, foreign policies and the environment. These emerged as a response to World War II and the decolonisation process, to unite the similar interests of human beings to create a new world order in peace, equally developed, mutual respects and sustainability (Standish, 2012). Conversely, global education can be understood to be a global partnership in the education sector, such as exchange opportunities, partnership with schools abroad, students international visits and hosting international visitors, and so forth(Marshall, 2007). Moreover, the global term has been understood as common concerns as interdependence issues among countries. For example, the haze problem in 2014-2016 caused by deforestation in Indonesia has severely impact to the health problem the air in Singapore and Malaysia. Thus, climate change and environmental degradation has impacted on the entire world.

The emerging term 'global education' is essential to cover the emerging global notion and issue of DRR initiatives, which have not been well-distributed and understood across the world, but it has an impact even on daily life (Standish, 2012).

It can be said that learning about global issues is a process of increasing self-awareness: for instance, what students think about natural disasters and what do they think should be done to reduce the risk of them occurring. The study of global issues does not just seek to elicit the thoughts of students regarding global issues but how they can actively involve themselves in finding the answers (*ibid.*). In fact, a new reason for education can be seen as developing the relevant knowledge to prepare students to deal with global issues in society (White, 2007). It is also no longer just for the people who may become victims, but for all people.

Global education was initiated in different scopes and contents, depending on the social and culture of the state. In the US, as Alex Standish

explained aims to 'integrate children from different cultural backgrounds into a more inclusive definition of America' (Standish, 2012). It showed nation building post-colonisation as America originated from different ethnicities and cultures. Similarly, education development in Indonesia can also be understood in terms of building a new nationalism from various ethnicities, kingdoms, tribes, languages and religions. Therefore, nationalism as anti-colonialism became the first global issue to be embedded in Indonesia's education system, developed under the transition of Indonesia's independence that is known as 'Sumpah Pemuda/the Youth Pledge)', on 28 October 1928, to proclaimed three common principles, i.e. one motherland, one nation and one language. This 'new understanding' became the transformation of the meaning of nation from its traditional understanding, as various different kingdoms under Dutch colonialism to be the new state of Indonesia (Kadir, 2015).

It is implicitly the recovery of colonialism and its natures to exploit other resources, to sustain power over blood and the dignity of others. Therefore, Standish maintained that 'pupils explore a range of international issues including environmental problems, malnutrition, health problems, natural disasters, and other challenges of development.' (Standish, 2012, 20). It should be noted that the essence of global education in pre-dated Indonesia was dominated by traditional learning of oral approaches regarding other parts of the world, influenced by the religious development of Hinduism, Buddhism then Christian values that came from colonialist Western states (the Dutch), and Islam from the Middle East. Hence, global education in pre-independent Indonesia was rather absent, as it was dominated by ethnic nationalism, various kingdoms and religious approaches. These religious norms then developed under anti-colonialism values (jihad) as resistance against Western domination. These religious values then manifested in the first Indonesian national pillar of Pancasila, which remains valid in the journey of the education system in Indonesia, as discussed in Chapter Three

Nevertheless, there is no explicit articulation of 'global education' in Indonesia, although there has been an implicit transformation of some content

of global education, which initially manifested in environmental issues and new awareness of globalisation in the 21st century in the development of the 2013 Curriculum. It has been explicitly acknowledged that the existing education system and curriculum in Indonesia has less successful to achieve the expectation related to the educational goals; either in developing the national cultural character or developing the skills and knowledge to compete globally. Thus, this concern has become an underlying issue in the National Strategic Planning 2010-2015, which then triggered the revision of the 2006 Curriculum to be the 2013 Curriculum (see Chapter Three).

Hence, it can be argued that the development of global education in Indonesia has been distinctive from those in Western states, i.e. the US and the UK. Global education in Indonesia is more complex because it also has a colonial influence. It was expected to be a solution for current limitations in the education system or be an essential part of national education development. Integrating global and national experiences of DRR has contributed to the development of DRR initiatives, in the form of policy and institutional network, as discussed further in the Chapter Five. Following this understanding, DRR education has been developing in Indonesia, as a subject to formulate itself under the pressure of global and national experiences.

DRR is an element of global issue due to the fact that it needs a solid effort from the national to the international level to build an understanding and awareness on disaster risk, and therefore, education is an essential part to place it in. The DRR education requires resilience thinking to mitigate disasters, the capacity to manage disaster risks through more viable resilience strategies (see Chandler, 2014).

The turning point of the Indian Ocean disaster created a fundamental change in the way disaster risks and disaster impacts have been viewed in Indonesia and globally. The formulation of the Hyogo Framework for Action (HFA) in 2005 which consists of five priorities which covers DRR governance, risk assessment and early warning, knowledge and education, reducing the underlying risk factors, and disaster preparedness and response has created a stronger concept on reducing disaster risks. However, this thesis has a

particular focus on DRR education in schools, which comes under Priority 3 (using knowledge, innovation to build a culture of safety and resilience at all levels). The HFA provides a monitoring and scale review to measure the level of progress made by each country. In general, Indonesia has moved gradually from a score of 3.0 (not substantial progress) to 3.7 (nearly substantial progress)[4] during the period 2013–2015 (BNPB, 2015b).

Education has therefore become the core of the HFA, as its role may directly or indirectly cover the five actions proposed. Education in schools has its role in preparing future generations, in sustainable development. Nonetheless, mainstreaming DRR in the existing school system demands a large paradigm shift in Indonesia, as it is a part of shifting the paradigm from the traditional system into the modern school system, including the curriculum.

The concept of interdependence (Garlake, 2007) as an essential component of DRR education has strong links to the nature of DRR in global education. A disaster has no direct relationship with state boundaries, it may occur in one and more states simultaneously, or the same disaster may happen in many, and the impact will also go beyond state boundaries, even covering the entire world, such as climate change issues. This reality has obviously globalised DRR education to develop the knowledge and awareness of students. By definition, global DRR education refers to the knowledge, values and skills that are orientated towards issues that are global in nature. In science, students are taught about natural patterns of disasters, the environment, and so forth. However, in the post-modern world, the meaning of DRR itself has also changed, and not just in scale.

Thus, global education and world studies run counter to the idea that education is a means of inducting children into knowledge and culture through a subject-based curriculum. Instead global education means studying real-world problems, engaging with them, and learning to see issues from the perspective of others (Standish, 2012, 20).

[4]The level of measurement progress of HFA Priorities for Action : 1 is minor, 2 is relatively small, 3 is not substantial, 4 is substantial and 5 is comprehensive achievements.

4.4. The Transformation of Global Education in Indonesia

4.4.1. Political Ethical Movement

The marginalisation of indigenous peoples from education during Dutch colonisation was critiqued by the emerging anti-colonial scholars in the Netherlands, such as de Waal, van Dedem, van Kol, van Berg, Schoepman, Bool, van Nunen, dan van Deventer (Poesponegoro & Notosutanto, 1975). Responding to this, the Dutch government initiated 'ethic politic/politik etis)' as compensation for inhuman, long hard exploitation, e.g. forced work (tanam paksa 1810 – 1830) of colonised peoples to provide some space for education. The movement of anti-colonial activists to the Dutch colonial government must provide some compensation for colonised peoples (Bumi Putra) and the transfer of Western knowledge (education) to colonised peoples.

The political ethical policy can be a turning point for colonised people of the East Indies (currently Indonesia) to interact with global knowledge, so as to shift from marginalised and stagnant religious based education to broader knowledge, despite the extremely limited elites of Pribumi and the limited territory in Java Island (See Suminto, 1985). According to Poesponegoro, et al., (1975), they were Algemene Middelbare School, established by the Dutch in the 1930s and were located in limited areas under effective Dutch occupation, such as Medan(North Sumatra), Bandung (West Java), Semarang (Middle Java), Surabaya (East Java), Makassar (Eastern Indonesia), Yogyakarta (Yogyakarta Sultanate) and Surakarta (Surakarta Sultanate).

Some universities also established and became the leading universities since Indonesia gained independence. This includes the Technische Hooge School (THS) in Bandung (1920) (now the Institute Technology Bandung (ITB); Rechts Hooge School (RHS) in Jakarta (1924) (now the Faculty of Law Universitas Indonesia (UI) Jakarta; Geneeskudige Hooge School (GHS) in Jakarta established in 1927 (now the medical school at the University of Indonesia, Jakarta); and Landbouw Hooge School (LHS) Bogor 1940 (now the Institute of Agriculture Bogor/IPB) (Somantrie, 2010, 62). Despite

approximately three years of Japanese colonisation (1942-1945), it could not change the established education systems during Dutch rule, as the Japanese occupation also became a transition of the independence of Indonesia (17 August 1945), as a consequence of the impact of the US bombings of Hiroshima and Nagasaki (Somantrie, 2010, 64). Indeed, this became the first phase of the transformation of Western education in broader terms into Indonesia's people.

During colonialism, education was limited to Pribumi elites on Java island. The situation meant the political power was dominant on Java because more people were educated. However, the situation changed after the Reformation Movement in 1998. The increasing demand for decentralisation has contributed to the increasing local nationalism referring to their historical existence. This has become a dilemma for Indonesia in re-designing global education under a decentralised system. In the meantime, the 21st century has also given Indonesia the opportunity to compete with other states, but thus far the country has made little progress, as it remains under development and obscure in terms of its nature and characters. Hence, Indonesia has opened some spaces for external knowledge which directly or indirectly has an impact on peoples and the State. In the initial stage there is a transformation regarding understanding global education, from the spirit of anti-colonialism into the common interest of all states facing common global challenges, such as DRR issue.

4.4.2. International Education in Curriculum

The term 'International' was initially found in the 1975 curriculum, as a special reason for SMA (Sekolah Menegah Atas) education to functionally gain the actual international knowledge and facts. Before that, under the Ministerial basic education and culture Instruction number 2/17 August 1961 on national education system Pancawardhana, the term 'international' used equal to 'national-international religiosity', as influenced by the religiously driven. However, this expression was not explained and defined in its application. This curriculum was considered the first official recognition of

international knowledge, even without a clear definition. As before, there was no explicit recognition of international knowledge, and there was even suspicion of foreign languages, as they could degenerate national cultural identity.

From 1975 onward, there was a transformation of international knowledge into international schools as part of the 2004 curriculum. The term was reiterated in the 2004 curriculum to express the standard of international, to describe the different levels of national and local standards of education in Indonesia. In other words, in the 2004 KTSP (Kurikulum Tingkat Satuan Pendidikan) curriculum, Indonesia recognised the under-development of the education system in general, so it needed to attain the 'international standard'. Moreover, the term 'Sekolah dan Madrasah Bertaraf Internasional' in the 2004 curriculum introduced to develop a place for learners to be more competitive in the global market. It entails a national school with a foreign system and curriculum. The characteristic is primarily the use English as an instrument for teaching and learning. Nevertheless, defining international schools remains a dilemma for Indonesia; whether it is a national school with foreign curriculum, a foreign branch of school (private), or national schools with English as the principal language (Somantrie, 2010).

English was taught as a tool to absorb the global development of science and technology, art and international relations. Therefore, it appears that global education in Indonesia was not intended to be inserted but it is expected that the student can find it by him/herself via their English capability. Hence, English, the global language was a gateway for them to acquire global knowledge in early stages of Sukarno and Suharto era (Soemantrie, 2010). While the global education in relation with DRR issues was systematically developed, as the UN concern with sporadic assistance post disasters was gradually shifted to preparedness issues. Coincidently, since the Reform era (1998) the Indonesian system has substantially changed by absorbing global education through environmental and children rights (Human Rights) frame. This situation became a gateway for DRR education to be developed in Indonesian's education policies.

KHD suggested the importance of foreign language as a tool to learn knowledge, and international relations, though he reminded people not to be like the Dutch, to maintain the national character (Somantrie, 2010). KHD's concept was that foreign languages were essential but needed to be selected and screened in the interest of national culture. It can be understood, as this early stage of the creation of Indonesia was premature, so any foreign aspect, including their languages was a concern(see Chapter Three)

4.4.3. The Concern on Human Rights (Children Rights)

The reform era post Suharto (1998 onward) was outstanding as it opened a new paradigm for Indonesia to adopt human rights, in particular the rights of children in a disaster emergency under the term 'Special Service Education' unit in the Ministry of Education. Regarding this special service, the government has to ensure school children have access to education post-disaster. Although no DRR knowledge and skill was explicitly formulated, the consciousness of disaster risks had the potential to accept DRR education later on.

During the Suharto regime, Indonesia was considered a restricted country regarding global issues. All aspects were centrally controlled and monitored by the military. Such circumstances hindered the government from being open with the public, and to global changes. Relating to education, the concern was to develop a new nationalistic Indonesia, united in politics, society and culture. During the Reformation Order, president Habibie (1998-2000), a scientist who had graduated in Germany, made use of his knowledge and experience, to promote democracy and transformed several global norms into the Indonesian system.

The Global Human Rights issue was the first concern of Mr. Habibie, introduced the Global Human Rights agenda into the Indonesian system, by establishing Human Rights Law 1999 and Human Rights Court Law 2000 (Kadir, 2009). It was the first time Indonesia had adopted the global issue of human rights, in contrast to the previous autocratic and militaristic government of Suharto. From these general human rights issues, the rights of children in

disadvantaged situations and areas gained momentum and established as Law 23/2002 on Child Protection. It covered rights for children in disadvantaged areas/indigenous communities, the economically disadvantaged, and those affected by natural disaster and social disaster. Then in 2003, remarkably, the word 'disaster' was inserted in Law 20/2003 relating to the National Education System. In general, it can be said that at that stage, national education was becoming more concerned about the issue of national disasters.

The development of the children's rights section under human rights law is considered a part of the global transformation, so that children can get can basic access to their needs and be protected during and after a disaster. In other words, the emergence of DRR education for school children was initiated by the transformation of global human rights conventions into the national system and emphasised that the rights of child should be respected. It can be seen in the Law related to child protection 23/2002 and Law 20/2003 on the national education system, as special education, including children in disaster areas. The limited rights of children in disaster areas was then extended in Law 24/2007 that revealed the primary concern of every person to receive an education, training and advice, and skills in the manifestation of disaster management both in none disaster or in disasters situations. Consequently, human rights have become the underlying foundation of DRR management and education in Indonesia. In other words, the Indonesian Government has explicitly recognised that DRR education is the right of every citizen and that the government has an obligation to fulfil these rights. These human rights approaches to formulate DRR management under Law 24/2007 and also previously in special service education in National Education Law 2003, can be seen as the opening up of the government and people of Indonesia, after the occurrence of the 1998 Reformation Movement.

Basically, the global human rights idea was originally transformed into Indonesian policy because of global pressure on the Indonesian government to discontinue violation during the occupation of East Timor. Hence, Indonesia formulated the Law of Human Rights 1999 and

the Law of Human Rights Court in 2000, the notion of human rights then rapidly moved to various aspects of people's lives, including education, and children and other vulnerable peoples. However, the recognition remains in legal language and there is no sufficient evidence on the ground (Kadir, 2009).

The preamble of children rights referred to the UNCRC (The United Nations Convention on the Rights of the Child) stipulating that childhood is entitled to special care and assistance. Article 3(3): state parties shall ensure that the institutions, services and facilities responsible for the care or protection of children shall conform to the standards established by competent authorities, particularly in the areas of safety, health, in the number and suitability of their staffs, as well as competent supervisors. Article 6 (1): state parties recognise that every child has the inherent right to life; (2) state parties shall ensure to the maximum extent possible the survival and development of the child. The expression of concern for children amongst the vulnerable groups being at risk of disaster impact were stated in the earliest document, post the Aceh disaster (CDE, 2011). This document refers to various facts children face during disasters.

Fulfilling the rights and concerns of children during disaster situations became the underpinning issue of the establishment of safe schools, as safe places for children facing disasters. Since 1998, Indonesia has ratified the UN convention on the Rights of the Child. It strongly relates to assuring that children can be saved from disaster risk and the subsequent impact. In Law 23/2002 on child protection, the rights of children become more important (Sukemi and Andriono, 2014). Despite the term 'the right of every persons' described in Law 24/2007 in most of the implementation, the term the right of children is dominantly applied, as in DRR modules, where the aim of the module was 'to protect the rights of children' in terms of survival and quality sustainable basic education in DRR (Ministry of Education, 2015).

The ratification of several international conventions in relation to human rights and the rights of children and environmental protection in Indonesia is a result of pressure from the International Monetary Fund(IMF). It is important to

mention that this global knowledge was essentially intended for political and economic reasons, rather than for education purposes. Nonetheless, it has contributed to a transformation of DRR from merely political-economical purposes into the education aspect of disaster, subsequently known as DRR education.

The term rights, noted to be an influence by global human rights movements, has politically and economically transformed Indonesia since the Reformation Era in1998. It is to say that the rights based approached of DRR education was adopted in the formulation of Law 24/2007. The expression of DRR education was manifested through the rights based approach in Indonesian legislation, transformed from global knowledge on DRR in HFA 2005. In other words, despite the fact local disasters require DRR education, the limited expression in local and national knowledge has encouraged Indonesia to adopt a global language.

In many policies, regulations and DRR related material in Indonesia, the consideration was the protection of the rights of children to achieve a quality and sustainable education. On this basis, DRR education, including SSB was developed (Ministry of Education, 2015). UNESCO, as an UN associated agency concerned with education has played a pivotal role in developing DRR education that has been incorporated into Indonesian system. The Japan International Cooperation Agency (JICA) has also continuously supported Indonesia to transfer the lessons learned from Japan into Indonesia (Ikeda and Mulyadi, 2012). However, the Aceh tsunami in 2004 raised more awareness, which made it more explicit under the commitment of 168 states with regards to HFA 2005-2015. This then remarkably changed the paradigm of DRR in Indonesia by developing a national legal framework of the Law 24/2007 on Disaster Management. Subsequently, the National Education Ministry issued a Circular Letter to mainstream DRR education in schools, followed by Perka BNPB Number 4/2012 on the Guideline for the Implementation of Safe Schools, in addition to the mainstreaming of children's rights adopted initially by LIPI under the Children Science Support (CSS) programme in some areas in 2006 (Rafliana) as discussed in Chapter Five.

4.4.4. Environmental (Climate Change) and Sustainable Development

DRR issues can be traced from the element of Education for Sustainable Development and Environmental Education in the late 1960s. Since then, the emphases on environmental education has shifted from conservation of the countryside in the 1960s-1970s (plants, trees, hedgerows, wildlife), to national and global problems in the 1970s-1980s related to pollution, resource depletion and global warming, to issues of sustainability in the 21st century. This development was greatly influenced by the UN associated institution, i.e. UNESCO in formulating the idea to be more feasible and understandable (Palmer, 1998). It indicated that DRR was a growing concern for current and future education, as Toffler (1974: xxii) noted that 'All education springs from images of the future and all education creates images of the future. Thus, all education whether so intended or not, is a preparation for the future'.

The influence of global forces on DRR increasingly appeared. In 2015, in the module developed by Ministry of Education and UNICEF (2015, 8) set out explicitly that 'Mitigation disaster risk as a long-term project, part of sustainable development, through knowledge, innovation, and knowledge of safety and resilience culture in all education units, as referred to in HFA, which Indonesia is fully committed to.' To demonstrate its international commitment to DRR education, the commitment was reconfirmed in the Sendai Framework for Disaster Risk Reduction 2015-2030. (Ministry of Education and UNICEF, 2015).

The meaning of DRR education was not recognised previously in the curriculum. So, there has been a positive transformation, where the terms of DRR education were not recognised before in the national language (Bahasa Indonesia) but are now becoming part of the national language because of the national fact (Indonesia is a disaster prone country) and requirements**.** If the meaning of DRR has evolved in relation to political participation and the need to play an active role in society, then DRR education has developed as a tool for preparing young generations to play this active role upon their transition to adulthood.

Following this fact, the Indonesian government set up national action for DRR as Priority five (RAN PB) 2010-2012, which translated from priority Five of the HFA 2005-2015. It was said 'to strengthen disaster preparedness and respond effectively to all levels of the community'. In particular in Priority 3 of the HFA 2005-2015, DRR education was shown as 'using knowledge, innovation and education to establish a safe and resilient culture at all levels'(Ikeda and Mulyadi, 2012, 11). Thus, there would be a need to develop a safe and resilient culture in school communities, including preparedness and the mitigation aspect.

Current DRR in global discourse was believed to be part of environmental learning to develop environmental awareness of the population to be a sustainable society. DRR as an emerging issue in disaster vulnerable countries may become an independent global issue and discipline, as a common goal and interest of global citizens. However, this movement was created by the 'developed world' via the Organisation for Economic Co-Operation and Development (OECD) in the 1990s (OECD, 1995: 3). Such an unexpected number of victims and destruction has attracted 168 states, including Indonesia to create a global commitment for disaster risk mitigation, under what is known as 'the Hyogo Framework for Action/HFA' in 2005.

4.4.5. The Global Safe Schools Movement

School plays an important role in Indonesian society, and is seen as a place to transfer information, knowledge and skills to the surrounding community. Consequently, school is an effective, dynamic and sustainable strategy in transforming disaster education (CDE, 2011). In global development, there was a global campaign in 2010-2011 UNISDR, focusing on the development of urban areas in terms of theme 'One Million Safer Schools and Hospitals Campaign' to promote DRR in schools and hospitals. In May 2013 in Geneva, a significant communiqué from the Fourth Session of the Global Platform for Disaster Risk Reduction requested that "a global safe schools and safe health infrastructures campaign be initiated in disaster prone

areas with voluntary funding and commitments to be announced at the World Conference for Disaster Risk Reduction in 2015"(UNISDR (2015b).

In 2015, the Third UN World Conference on Disaster Risk Reduction in Sendai, Japan welcomed high-level government representatives and international organisations and announced more commitments to the Worldwide Initiative for Safe Schools (WISS) and school safety to be implemented globally. Under the motto "As of 2016, every new school will be safe from disasters," the meeting highlighted the importance of building partnerships and using a holistic approach to promote safe schools as a global project. A set of tools were developed by the UNISDR to support governments in developing a holistic approach to school safety (UNISDR, 2015a).

To support this spirit, the UNISDR has coordinated with WISS (Worldwide Initiative for Safe Schools) as an umbrella for the safe school global partnership programme that encompasses key safe school initiatives in supporting resilience in the education sector. The WISS work is focusing on developing DRR national strategies and the implementation of safe schools. The initiative builds on the comprehensive school safety framework which covers safe learning facilities, school disaster management and disaster risk Reduction and Resilience Education. The WISS was endorsed by GAD3RES members and resulted in the political commitment of 21 "Safe School Leader" countries to implement school safety on the ground (UNISDR, 2015b).[5] The Initiative also promotes good practices and the possibility for replication in and offers technical supports for other countries. This commitment shows that the education sector has become one of the main concerns of the UN for the coming years. However, this commitment has not yet been supported by

[5] Safe School Leader Countries committed to supporting the implementation of the Worldwide Initiative for Safe Schools: Algeria, Brazil, Costa Rica, Croatia, Ecuador, Finland, Honduras, Indonesia, Iran, Italy, Kyrgyzstan, Lao PDR, Lebanon, Mexico, Mongolia, Nepal, Nigeria, Philippines, Saint Vincent and Grenadines, Tunisia, Turkey. The First Meeting of Safe School Leaders with the participation of 16 countries, developed a draft 'Istanbul Roadmap' which was presented at the WCDRR and will be further revised in close coordination with Safe School Leader countries, building on the commitments made to WISS and the implementation of safe schools at the Commitments to Safe Schools session (UNISDR, 2015b).

innovative research on how to transfer and develop the pedagogic nature of DRR education(see Chapter Seven).

This major framework has transformed Indonesia, including the institutional integration of DRR and the activities to address and reduce susceptibility to climate risks at school and local community level (Djalante et al., 2012). This transformation has come through institutional interaction and science knowledge development between experts from Western countries and Indonesian science institutions, besides the Ministry of Education. Finally, the term safe school was subsequently added in the UNGA Resolution then adopted in the Indonesian language as 'Sekolah Siaga Bencana (SSB)' or 'Sekolah Aman', as discussed in Chapter Six.

4.4.6. Natural Science Knowledge Development

Essentially the essence of DRR education is the science of natural disaster in relation to natural science, i.e. chemistry, physics, geology and earth science, and the likes. Further development of this science would describe the nature of a disaster, its process and impacts. From this knowledge and understanding, humans (scientists) then develop knowledge on how to prepare and respond to disasters and the impacts. Moreover, DRR is considered as new knowledge and it has attracted more attention in recent decades. As science has far developed in Western countries, so DRR education also flourished and then transformed into developing countries. While despite many natural disasters occurring in developing countries, the lack of science development has negatively contributed to the development of DRR science and education. It can be seen from several UNGA Resolutions above that the UN highlighted the importance of knowledge transfer relating to disaster preparedness.

Equally, the module developed by LIPI refers to the geological features of Indonesia as located on three continents. The knowledge of the causes and impact of a disaster, how to respond, how to mitigate the risks and the history of disasters in Indonesia (Krakatau Volcanic eruption 1883, tsunami in Simelue 1907, Flores 1992, Aceh and Nias December 2004, Pangandaran

July 2006) are essential with respect to DRR education (Hidayati, et al., 2011; Rafliana 2017).

According to Rafliana (2017), the DRR concept was originally used in Western culture to solve social problems in society. It was a critique of the Christian Orthodox church that fuelled enlightenment and industrialisation, which then led to colonisation. Consequently, Indonesia essentially does not have any appropriate DRR knowledge; therefore, it will take time to embed foreign knowledge into the Indonesian system. While science in Indonesia remains very bureaucratic, it will be difficult to develop DRR in formal education. Rafliana (2017), highlighted the strong link of science development and DRR education in Indonesia which LIPI has been involved in. She states:

> Only after the 2004 Indian Ocean tsunami did scientists from social and natural science backgrounds come together to understand and agree that the loss of lives during disasters was not down to a lack of knowledge, rather the weak role of science and science communication. It was recognised that commonly adopted technical approaches in reducing risks were deemed ineffective and insufficient to bring social changes.

During the colonial era, the sciences were primarily used as tools to gain power and legitimacy. Rafliana (2017), pointed out that 'There were very few Indonesian scientists from the pre-independence era up to Soeharto (New Order) regime, who worked on disaster documentation, despite the numerous disaster events that occurred in the past'. During that time, disasters were not perceived as disruptive factors towards the government's development agenda which caused the absence of disaster knowledge during that time. The rationalisation of science during the period was not enough to improve the understanding of risk in society and prepare for future disasters. Moreover, the traditional knowledge embedded within communities was only vaguely recommending messages of preparedness concerning future threats (Rafliana, 2017, 414-415), as discussed in Chapter Five.

The establishment of disaster research in LIPI has predominantly focused on natural hazards, including geological dynamics, particularly

tectonic plates, since 1963. Supported by Professor Kerry Sieh from the California Institute of Technology, in the 1990s, LIPI's researchers began their research on the Sumatran Subduction Megathrust in 1994 and Mentawai in 2002. During this time, LIPI researchers introduced knowledge on tsunamis and earthquakes, including some public preparedness by way of posters, public discussions and village meetings. This was one of the first attempts by LIPI to convey science to society. In Indonesia nevertheless, the unprecedented Indian Ocean Tsunami gave disaster risk reduction momentum, not only in Indonesia but globally. It brought transformational changes in the way disasters are viewed and managed worldwide (Rafliana, 2017).

4.5. Locally-triggered of DRR Knowledge Development

DRR Education became important in Indonesia after the local catastrophic disaster in December 2004, in response to the under-representation of DRR knowledge in the Indonesian system. It is important to consider the influence of the Aceh tsunami on DRR, since for many Indonesians this event shifted their social and political attitudes.

In reading the literature after the event, there seems to be two significant responses: a rise in concern over the lack of a DRR system in Indonesia and a call for a more international participation to help those affected by the disaster. These two responses are not necessarily mutually exclusive, however, for some people this event enhanced their sense of humanity, while for others they wanted to break down barriers with other nations. Many writers and commentators have remarked on the prominence of national flags in streets, on cars, on houses, and on clothing in the weeks after the tragic disaster. For many Indonesians their reaction was one of national failure and desire to stand up for their country in opposition to this 'new' disaster. Moreover, Aceh had been closed from global and national media coverage as it was under martial law (1976-2005) (Kadir, 2015). This period after the disaster demonstrates how quickly Aceh moved from being isolated to being recognised by the rest of Indonesia and the world.

In the first year of this rehabilitation of emergency response, international actors led the work in the field, as Aceh's government had collapsed, and the central government of Indonesia also had no experience of responding to such a devastating disaster. Then the first institution was developed as a coordinating body for the rehabilitation and reconstruction of Aceh-Nias (BRR) for a four-year period until April 2009. In this project, the education sector was embedded in this massive project, either physically reconstructed or rehabilitated emotionally by means of anti-earthquake construction, evacuate buildings, gathering valuable information from those who survived to develop a better strategy for disaster preparedness (BRR, 2009). Hence, the spirit of DRR education was therefore embedded into the entire community in Aceh at that time.

Aceh's disaster has attracted many international actors to help the remaining population and its government's institutions to recover physically and psychologically. Indonesia had failed and was unable to start working on this situation without international aid and support. While it is possible to retain a sense of humanity and seek more international aid for education, there was also some differences in relation to both responses. Some argued for a stronger sense of national integration and that any response to the disaster should be out of national self-interest. In contrast, the world required to break down national barriers and an exclusivist notion of DRR, in which case an international response was called for, that would see nations cooperating in the name of shared interests in humanitarian works.

Based on the literatures, the government became more aware of the importance of disaster education because the catastrophe was a huge blow for it (CDE, 2011). The first document published regarding DRR education in Indonesia was the 'Framework of School-based Disaster Risk Reduction 2006-2009, World Campaign for Disaster Reduction Integrating Disaster Management at School'. Furthermore, Consortium for Disaster Education (2011), recognised that: 'for a country like Indonesia that is exceedingly vulnerable to various threats of disaster, subjects in disaster preparedness have not yet been considered important for schools' (CDE, 2011, 5). Even

more this disaster contributed to the collapse of Aceh's government and the failure of Indonesia to properly respond to this disaster in any sense. Consequently, Indonesia had to open Aceh's territory to International aid provided by several international agencies: INGO, UN institutions, and 53 countries were involved, 35 of them were from developed countries.[6] There were about 435 NGOs, 27 donors and one Indonesian government agency - the Rehabilitation and Reconstruction Bureau (BRR) that worked to support the province after the catastrophe. This international assistance has been memorised with the unveiling of a monument in Blang Padang Banda Aceh, Indonesia, inscribed with the words 'thanks to the world' (Nazaruddin and Sulaiman, 2013:79-80).

Since 2006, the Indonesian society for disaster management (MPBI) together with 22 local and international NGOs and the UN Technical Working Group on DRR, developed two essential activities in Indonesia: a national workshop on 'building school resilience toward disaster' on 11 October 2006 and a school road show presented to 16 schools in Jakarta on 12 October 2006 for the purpose of introducing basic disaster preparedness to primary school children (CDE, 2011). This evaluation found that despite plenty of enthusiasm among students, teachers and schools' management, there was insufficient capacity and resources in place for this. This was the initial emergence of the Safe Schools and DRR concept in Indonesia in 2006.

Rahiem et al. (2017), confirmed that 'the tsunami in Aceh is one example of a plethora of aid groups coming from all over the world to help what were primarily Muslim communities, with the majority coming from different social, cultural and religious and non-religious perspectives". The country received a lot of support from different countries and international organisations during that time. All the activities have helped to strengthen the country's capacity to respond to emergency situations caused by disasters and also to establish a system that helps to reduce vulnerability, whilst in turn reducing risks created by disasters in the first place.

[6] To memorise the contributions of 53 countries, Aceh build a Monument called the 'thanks to the World monument, which stated, 'thank you' in the respective language of these countries.

4.6. Conclusion

Global education originated in developed states to learn the concerns of other peoples in developing countries, and progressively became a global concern, i.e. peace, the environment, climate change and natural disasters. Such issues were gradually developed through the UN and its affiliations as global concerns in maintaining peace, security and sustainable development. The landscape can refer to the emergence of DRR education, as initiated by the UN's humanitarian response to many natural disasters that have occurred globally from 1945 onwards. The accumulation of this lengthy experience (1945-2004) has evidently proved that the knowledge, awareness and skill to respond to natural disasters had been lacking in developing countries. It was then the beginning of DRR notion formulated in the UN system by certain experts in 1989. This formulation was subsequently held by the UNICEF and became a basic document adopted by LIPI post December 2004.

Indonesia, which was a colonial country (former Dutch colony) initially considered the global DRR issue as a Western initiative, part of continuing colonialism and domination, so more restrictive nuance occurred from the early days of independence, until the Reformation Era 1998. But then as the country began to grow to limit the colonial influence but new awareness over common global issues, such as human rights, sustainable development and environmental issue attracted global commitment in 1980s. This situation occurred in relation to DRR education which was initially alienated from global discourse, then gradually found its place within sustainable development and the environmental framework.

Hence, DRR education in Indonesia is considered to be external interference that encouraged the Indonesian government to establish disaster management and institutions to respond to any potential disasters. Significantly it is not a completely new subject, as it has experienced many natural disasters, but due to the lack of dissemination of information and of natural science development, very few people know about DRR education. Furthermore, under the inflexibility of Dutch colonialist power, this knowledge remained static and yet attracted serious attention from the government until

2004. It emerged from the knowledge on disasters, which developed through scientific processes, in terms of how and why a disaster occurred. From this basis, technology developed to forecast when a disaster may occur, and what kind of preparation can be made to prevent or mitigate such disaster risks. Several terms are used to describe this since the UN provided experts to develop this knowledge in 1989, such as 'pre-disaster planning', 'disaster preparedness' and 'natural disaster reduction'. The science of disaster is strongly related to natural sciences and earth science. More development of this science would describe more about the nature of a disaster, its process and impact on human beings and the environment. By understanding scientists subsequently develop knowledge on how to prepare and to respond to disasters and the impacts. This then developed into new initiative pertaining to DRR education.

Although progress has been very slow, there has been three enabling environments that have helped the transformation of global and DRR education in Indonesia. *Firstly*, the Reformation Era since 1998 has opened Indonesia to global movements of human rights, the rights of children, environmental protection and sustainable development, in which DRR education is a part. Hence, the global pressure with respect to fulfilling children rights in terms of emergencies has triggered the Indonesian government to recognise children's right in Law 20/2003 on National Education system, Law 23/2002 on Child Protection and Law 24/2007 on Disaster Management. *Secondly*, the development of disaster science under the LIPI in partnership with experts from the United States (Caltex) has laid a strong foundation to assist with the understanding of disasters, its impact and preparedness in Indonesia. *Thirdly*, the earthquake and tsunami in Aceh demonstrated Indonesia's inability to cope with disaster risks and attracted the global community, including the UN and its associated agencies, in addition to INGOs to participate in emergency, rehabilitation and reconstruction programmes.

Within this massive global mobilisation, DRR education found its place to flourish, in which global, national and local collaboration positively

occurred. Regarding the global aspect, it has contributed to the global commitment of 168 countries to the third priority of the Hyogo Framework for Action (HFA 2005-2014) and the UN Decade for Education for Sustainable Development (2005–2014). In relation to the Indonesian national system, it upgraded DRR education from being a limited part of the education service in emergency post disaster situations into the establishment of the national and regional agency for disaster management under the Law 2007 and moreover, a national strategy for education in SSB, an integrated curriculum and partnership in the Ministry of Education's Circular Letter in 2010. Thus, since the HFA 2005, DRR has gradually become independent global knowledge, as well as national knowledge in Indonesia. However, the current development of DRR education is trapped within a short term project triggered by the global influence in the international system.

At present, this transformation has not yet proved effective and successful as it became a quite formalistic administrative approach; while on the ground there has been a movement of increasing awareness of Disaster Risk, which also triggered the development of community programmes on DRR education. However, there are also some limitations relating to this development, as it has yet to effectively match the national and global mainstreaming of DRR education. The subsequent chapter explores the contextualisation of DRR education in Indonesia, in terms of policy and institutional networks which identify the interrelated elements of DRR education that need to be evaluated and establish a better formulation in the future.

CHAPTER FIVE
RECONTEXTUALISATION OF DRR EDUCATION IN INDONESIA
Policy and Institutional Network

5.1. Introduction

Following the previous chapter on the transformation of Disaster Risk Education (DRR) education, in this chapter, I review the development of DRR education in terms of policy and the institutional network in Indonesia. The chapter historically traces the post-colonial context of disaster management and its institutional system from 1945 to 2016. This analysis is to respond to research question three in the Introduction. This chapter highlighted limited DRR knowledge contributed to the absence of appropriate policies and institutional networks in Indonesia prior to the 2004 catastrophe in the province of Aceh. However, post 2004, the network between UNESCO (The United Nations Educational, Scientific and Cultural Organisation) as an international organisation and LIPI (Indonesian Science Institute) as a national institution helped the development of the DRR initiative. Hence, the DRR initiative rapidly turned into national policies and institutions and has become a benchmark for the further development of the DRR education system. This chapter investigates the nature of DRR education, the re-contextualisation of policy and institutional networks, the challenges and concludes with the summary.

5.2. The Notion of DRR in Indonesia

5.2.1. Reactive, ad hoc and top-down institutional response

Since the early phase of independence, disaster management was combined with other emergency situations, particularly colonial war victims and displaced people under the agency known as Welfare for War Victims and their families (Badan Penolong Keluarga Korban Perang/BPKKP), which was established in August 20, 1945 (BNPB, no date). Subsequently, three legislations (Undang-Undang) were issued concerning the management of emergency situations which included war/conflict and natural disasters (see

Lassa, 2010, 2013).[1] The idea of an emergency response to a natural disaster was introduced as part of other leading crisis to maintain the sovereignty and integrity of the new state of Indonesia. During that period, few disasters were recorded, such as the explosion of Mount Agung in Bali, the drought in Java and Lombok, and the flood caused by Bengawan Solo River, which affected more than one million people. Such disastrous events made the government of Indonesia seriously consider natural disasters more comprehensively (EM-DAT, 2016; Lassa 2010a, Djalante, 2017). Thus in 1966, the first agency related to natural disasters was formed under Presidential Decree Number 256/1966. This was the National Consultative Board for Natural Disaster Management (Badan Pertimbangan Penanggulangan Bencana Alam /BP2BAP) under the Ministry of Social Affairs (Lassa, 2010; BNPB, no date). By this mandate, however, the focus of the organisation was not only limited to managing emergency situations and coordinating the distribution of humanitarian aid to people affected by human-made disaster but also people affected by natural disasters (EM-DAT, 2016; Lassa 2010a, Djalante, 2017).

Due to the increase in the number of natural disasters, in 1967, a new improvement of agency was established by means of Presidential Decree Number 14/U/KEP/I/1967 under the name, the National Coordination Team for Disaster Management (TKP2BA). Two years later (1969), this agency was modified because the National Coordination Board for Natural Disaster Management (BAKORNAS PB) under the administration of the Ministry of Welfare, expanded the mandate to cover activities of mitigation, emergency situations and the rehabilitation process. In the same year, the provincial coordination level for managing disasters was also formed under the instruction of the Ministry of Internal Affairs Number 27/1979, known as SATKORLAK PBA (BNPB, no date; Lassa 2010). However, this agency and its coordination was not permanent, as it was ad hoc, and responded sporadically.

[1] These were Law Number 6/1946 on Emergency Situations (or bahaya), the amendment of Emergency Situation of Law number 1/1948 and the Law Number 30/1948 on the transfer of full sovereignty to the president during emergency situations.

After the Suharto administration ended in 1998, social, ethnic, religious and separatism conflicts were triggered in several areas in Indonesia. The BAKORNAS PB was then modified to be the National Coordination Board for Disaster and Displaced People Management (BAKORNAS PBP). However, the disaster that struck Aceh province in December 2004 caused the Indonesian government to focus more on disaster management in the country. As a result, the government released a Presidential Decree in 2005 (Number 83/2005) with a specific mandate to support Aceh province after the catastrophe. Since that time, there has been an increasing move to study the nature of disasters and preparedness in Indonesia. Even more, due to the collapse of the provincial government of Aceh, a new national ad hoc institution for disasters (Badan Rehabilitasi dan Rekonstruksi Aceh-Nias/BRR) was also established for four years (2005-2009) to cope with the rehabilitation and reconstruction programmes, coordinating all humanitarian agencies working in Aceh (BRR 2009; Lassa 2010).

5.2.2. The lack of preparedness knowledge regarding disasters

Prior to the large earthquake and tsunami in the Indian Ocean on December 26th, 2004, communities in Aceh were not aware and not even familiar with the word 'tsunami' (Shigeyoshi et al., 2011). To illustrate this, when the mega quake occurred, many people who were on Aceh's coast saw the sea level declining and countless fish appear on the beaches. Some people even attempted to catch the fish rather than escape from the sea (UNESCO, 2008). There was no DRR knowledge in place at that time. LIPI[2] and UNESCO then had developed and formulated the information related to DRR, but it needed to be transferred into several national policies and institutions.

The success of this knowledge formulation became the first indicator to measure disaster risks, sources of potential risk, volume of risk surrounding the

[2] LIPI was established in 1967 by the Government of Indonesia, a successor to the 'Indonesian Science Assembly' established in 1956. It aimed to become a national scientific institution, facing global competitiveness in science development (Rafliana, 2017, 420).

school, historical view of disasters in school areas, the vulnerability and potential capacity of a school and its community and knowledge on what should be achieved to mitigate disaster risks (Rafliana and Triyono, 2008). In particular, LIPI developed five principal parameters for disaster education, i.e. 'Knowledge and Attitude, Policy Statement, Emergency Planning, Warning System and Resources Mobilisation' (Interview with Rafliana). Rafliana specified this process as 'science communication' from LIPI to the community'. That is to say LIPI considered DRR education as science knowledge pertaining to disasters which it needed to introduce to the community.

The first training for volunteers, known as the 'COMPRESS' (Community Preparedness) initiative was in January 2005 (Rafliana, 2015). In 2007, LIPI COMPRESS developed a booklet on preparedness procedures for earthquakes and tsunami, in response to assessments undertaken in District Aceh Besar, City Padang and City Bengkulu in 2006 (Bustami et al., 2007). Several researchers from LIPI, both social and natural scientists, and fifteen volunteers accomplished the one week workshop in 2006. This was subsequently established as the Children Science Support (CSS) programme in the Province of Jogjakarta and coastal communities in Pangandaran (Rafliana, 2015). In 2008, the LIPI COMPRESS extended CSS to involve the entire school community, called it School Based-Disaster Preparedness (Sekolah Siaga Bencana/SSB) and referred to the LIPI-UNESCO framework, as will be discussed in Chapter Six (Triyono and Surtiari, 2012).

Within the first four years (2005-2008), the COMPRESS LIPI programme was supported by the Ministry of Research and Technology, UNESCO and also other associated Non-Governmental Organisations (NGOs). Additionally, LIPI's role was supported by the Decree Letter of the Coordinating Ministry of Social Welfare No. 23/KEP/MENKO/KESRA/IX/2006 on establishing the National Team for Indonesian Tsunami Warning System, which encouraged LIPI to become more involved in public education and risk preparedness. The programme produced DRR understanding and products through preparedness assessment, guidebooks, comic books, animation, songs and posters (Rafliana, 2017). Rafliana also noted that in the early stage

of COMPRESS, the process of disseminating DRR knowledge was less complex. The approaches chosen were teacher training, in the form of lecturing, and questions and answers. However, the programmes become more complex when COMPRESS was supported by considerable funding in 2007–2008, as the scope and intensity of 'the organisation's dynamic was even more valued'. However, 'the reciprocity of the agent and structure relationship issues within and surrounding COMPRESS LIPI was too challenging for the organisation to sustain', hence, in 2014 COMPRESS was unofficially dismissed. Nonetheless, the legacy of COMPRESS has been fundamental to the development of DRR education in Indonesia (interview with Rafliana)

The LIPI-UNESCO formulation of DRR knowledge which is based on the science of disaster has created a strong link between DRR education and science knowledge in Indonesia. In other words, it can be said that there was no DRR education without science development. Moreover, science development can gradually eliminate the existing fatalistic doctrine held in Indonesian communities, as what happened during the explosion of the Merapi volcano in 2011, where some local people insisted on remaining until they passed away.

5.2.3. The doctrine of religious fatalism

The doctrine of religious fatalism is considered a boundary to the development of scientific based DRR knowledge. Even this fatalistic doctrine has a positive impact in post-disaster recovery, although it had a negative impact regarding disaster preparedness education. This fact can be seen in Japanese people who had progressively developed disaster preparedness knowledge, the skills and technology, but had made little progress in psychological recovery, post disaster (Interview with Rafliana).

The fatalistic doctrine refers 'to belief that because natural disaster is God's will, people can do nothing' (Ghafory-Ashtiany, 2009). Therefore, people had no need to try to prepare and respond to disasters, as it is related to fate. Furthermore, some people believed that disasters were God's punishment for sins perpetrated by humans. For example, 'after the devastating disaster in

2004 in Aceh, some Islamic clerics stated that God was angry with Aceh's people given that they did not follow religious obligation (Cody, 2005; Duncan, et al., 2012; Oktavinanda, 2012). Such a doctrine has meant that the dissemination and sharing of knowledge in Indonesia has been poor. Rafliana from LIPI confirmed that this fatalistic doctrine still strongly influenced in some area in Indonesia, including the school that was previously involved in the safer school project run by LIPI in 2009 (Interview with Rafliana).

However, the influence of this doctrine could be gradually reduced by more modern approaches to Islamic teachings that suggest that natural disasters are also caused by humans, and that God has given help to humans to prepare for and prevent disasters. Science will contribute to supporting this notion as it shows the underlying causes of disaster, such as environmental degradation and climate change. Adiyoso and Kanegae argues 'that there is an increase in the Muslim belief that promoting "positive views" of Islamic teachings will encourage people to undertake disaster preparedness' (Adiyoso and Kanegae, 2014). This positive view could contribute to increasing individual perception of understanding natural disasters.

5.2.4. Traditional knowledge

It should be mentioned that traditional knowledge may have different expressions and connotation in the literatures. The CBD (Convention of Biological Diversity) asserts that traditional knowledge is the knowledge, innovation and practices of indigenous and local communities embodying traditional lifestyles relevant for the conversation and sustainable use of biological diversity. The scope includes traditional medicine, folklore and so on. The World Intellectual Property Organisation (WIPO) defines traditional knowledge as "the category containing people's expressions such as music, dance, song, handicraft, design, narration and art work". The CBD and WIPO have used this definition to elaborate cultural characteristics comprising cultural sanctuary objects. The objects included in traditional culture expressions are those that: 1. Can be taught and transferred through generations; 2. Can

develop dynamically; and 3. Can be managed consistently in relation to community identity (Kintner and Lahr, 1983).

Some describe traditional knowledge as a traditional culture, which means 'something produced by the thought and intellectuality of humans when they develop and maintain their life within their environment'. This term is used to preserve traditional knowledge for economic purposes and the identity of indigenous communities, such as folklore, art, dance, carvings, weavings and the like (Santyaningtyas and Noor, 2016). Additionally, according to the Indonesian Bill of Traditional Knowledge and Traditional Cultural Expression, the definition of traditional knowledge is 'community knowledge acquired as a result of actual experience in interacting with the environment'.[3] Traditional Knowledge can be characterised as knowledge which is generated, preserved and transmitted in a traditional context; distinctively associated with the traditional or indigenous culture or community which preserves and transmits it between generations. It is linked to the local community through a sense of custodianship, guardianship or cultural responsibility (WIPO/GRTKF/IC/7/9). However, it should be noted that not all traditional knowledge and culture is relevant to the development of DRR knowledge, as described above in the doctrine of fatalism which has produced a culture of and traditional knowledge of fatalism and animism. Thus, from the very beginning, it has been a predictable key obstacle regarding the DRR project in Indonesia. Plus, 'there is a superstition which says that natural hazards are 'supernatural' (UNISDR, 2007, 19).

In the context of disaster education, each natural disaster that occurred many years ago, may only have been recognised by a limited number of surrounding communities, so that it became local knowledge. Additionally, knowledge may vary depending on different backgrounds, ideologies and the nature of disasters. For example, over generations, the indigenous people in Simeulue Island has maintained and disseminated traditional knowledge, called "Smong", which helped them to save lives during the tsunamis in 1907 and

[3] Article 1. 1. The Indonesian Bill of Traditional Knowledge and Traditional Cultural Expression

2004 (AdooMc et al., 2006). Smong is a traditional folktale in Simeuleu and is described below:

> (Listen to this story/Once upon a time/A village was drown/ That was spoken/ It started with an earthquake/Followed by the receding water/ Suddenly, the whole country sunk/ If the earthquake was strong/And the water receded/ Hurry to find a place/Go to highland to save your life/ That's what you called *Smong*/ The history of our ancestors/Please remember this/The message and the advice/ *Smong* (tsunami) is your water bath/Earthquake is your swing/ Lightning is your drum/ Lightning is your drum/Lightning is your lamps) (Yoppie Andri, 2008 in Musfarayani, 2009).

Parents in Simeulue, Aceh, usually told the story to their children and grandchildren to inform them of the mega waves or *Smong* (local language). The story does not have to be the same as the one mentioned. The story became an oral tradition passing local wisdom from generation, especially to some of the younger generation who may have not have experienced Smong. They ought to use local wisdom to pass on the story so that people could learn what to do if the disaster happened again. However, nobody knows when the story of *Smong* actually began(Musfarayani, 2009).

Unlike Smong, which is an invaluable tradition associated with DRR preparedness, in other parts of Indonesia, traditional culture has had a negative impact on the community. For example, in Sleman, Yogyakarta, a person named Mbah Marijan lived on the slope near the active volcano, Mt. Merapi on Java island and was known as the guardian of the volcano. He was a trustworthy person who would inform the community of the scale of Mount Merapi's activity. Unfortunately, he and numerous other people from the surrounding community insisted to stay in and died during one of Merapi's eruptions (Lavigne et al., 2008). Hence, this traditional knowledge needs to be built on with greater scientific and rational DRR education, as science should be integrated with DRR knowledge in schools. It should be noted that Lingkar has researched this for Yogyakarta, regarding the myth that is well known in

the community, which says that as Mount Merapi is friendly, there is a need for a guardian (Jannah, 2014).

Additionally, 'Sesajen' (Compensation for 'Disaster Power') in different parts of Indonesia is greatly influenced by animism; the belief that natural disasters and the risks are natural curses that require compensation to avoid the 'anger' of natural power. In many coastal communities, they commonly throw a buffalo's head into the sea at a certain time every year. In the mountains or land areas they commonly put some food (rice and flowers) in public places, as can be found throughout remote areas on Java and Bali Island (Kadir, 2017). A further example is the indigenous community in Mentawai where the traditional belief of Arat Sabulungan (the spirit of Mentawai) suggests that earthquakes will create more natural prosperity for the communities. This is because normally after the earthquakes in Mentawai, more fruits and mushrooms grow, and the fishers catch substantial amounts of fish (Kompas, 2010; Rafliana, 2017). However, there are very few researches with respect to traditional knowledge and natural disasters in Indonesia.

It is important to mention that an opposing view exists. In most places in Indonesia, traditional knowledge tends to be fatalistic. It is only in a few places like in Simeulue that traditional knowledge (Smong) tends to support DRR education**.** Within this situation the development of DRR education has to be part of the positive traditional knowledge and against negative traditional knowledge in certain communities. Understanding the context of local where certain traditional knowledge has been established would help the teacher to underline the specific circumstances concerning traditional knowledge. Likewise, the science-based DRR approach became a breakthrough in rectifying the mind-set of certain fatalistic and cultures over natural disasters, as will be discussed in Chapter Seven. This research proposes an integrated approach to the DRR concept, whereby it is incorporated into the existing science curriculum in schools to be part of this initiative.

5.3. Contextualisation of DRR Knowledge in National Policies

As discussed in Chapter Four on human rights transformation in Indonesia, the integration of disaster education is generally regulated under special service education in an emergency under Article 32 (Paragraph 2) of Law 20 of 2003 on the National Education System, specifying that special service education is required for students in remote or underdeveloped indigenous communities and/or students affected by natural and social disasters and from low income populations. The term students 'those affected by natural disaster and social disaster' indicated education as a distinctive response to a post-disaster situation, to preserve education for students in post-disaster areas. It might be referring to ensuring children's rights to education and protection by organising education in times of emergency and crisis. Following this, a sub division of special education (DPLK) was established under the Ministry of Education. This special education service at the Ministry of Education has limited its funding to the emergency and recovery process, which focuses more on the rehabilitation or reconstruction of schools, to support temporary learning activities during emergency situations by using the regular curriculum (the same curriculum used in non-disaster times). Hence, Law 20/2003 on the National Education System does not indicate DRR education as a part of formal education in Indonesia, rather it introduced the term special education in terms of emergency education post-disaster.

After the 2004 Indian Ocean earthquake, Indonesia has been making progress in institutionalising DRR in national policies. As Djalante mentioned,

> 'The National Disaster Management Agency was established along with its provincial and local counterparts, a new law on disaster management was adopted and various activities to strengthen community resilience were implemented by the government, international organisations and NGOs' (Djalante et al., 2012).

DRR education in Indonesia, in terms of national policy was initiated by the response of the vice president Yusuf Kalla in 2004 (Hidayati et al., 2011). On this occasion, LIPI was given a role to be the focal point in DRR education, even it was not really apparent what that mean (Interview Triyono). Hereafter,

LIPI adopted parameters from UNESCO and began to assess community' preparedness. Its work revealed that community including schools were in fact poorly prepared. From this the idea, DRR education developed, as many NGOs were enthusiastic about this particular issue. It was then activated to be the Consortium of Disaster Education (CDE), which led to the enactment of the 2010 Circular from Ministry of Education on Mainstreaming DRR into the School Curriculum (Ikeda and Mulyadi, 2012, 11). This is considered the first national movement of the emergence of DRR education, in terms of knowledge, policy and institutional networks in Indonesia.

5.3.1. Law 24/2007 on National Disaster Management

Following global and national pressure in relation to the absence of national policy on disaster, a new law on disaster management, Number 24/2007 was issued. To support this, in 2008 there was the formation of the National Board for Disaster Management (BNPB/Badan Nasional Penanggulangan Bencana) at the national level, followed by provincial and district disaster management institutions at provincial and local government levels (See Presidential Decree no 8/2008 concerning disaster management). These institutions were designed to coordinate, plan and implement any aspects on disaster management and disaster risk reduction in Indonesia (Djalante et al., 2012). Law 24/2007 designed regional governments for disaster management, such as Article 8 (b) protection for communities against disaster impact, and 8(d) allocation of a sufficient disaster management budget in the government budget. However, in practice this obligation was more a responsive action toward disasters.

It should be noted that Law 24/2007 set out the meaning of DRR as the right of every person to gain the proper knowledge and skills in both areas where there is the potential for disaster and where there is not the potential for disaster to occur. This Law has normatively moved from the previous limitation of DRR education as children's rights to every person's right, and from those affected by disaster to every citizen. Consequently, DRR education became the right of every individual citizen, in which the government has a duty to fulfil this

obligation. The law aims to provide a basic guideline for the implementation of disaster management in Indonesia, including enhancing community awareness, and concern, capability and alertness in facing disaster (Article 14). However, the BNPB as the major institution in charge of DRR management does not yet fully consider education as part of its responsibility. It is focused on its own institutional and human resource development and is more influenced by state financial autonomy and national budget allocation. National Action for DRR 2010-2012 was formulated as a national policy for the implementation of DRR as a priority. As a result, the government allocated 1% of the national budget for the DRR programme, while 20% was assigned to the education as stipulated in the 1945 Constitution, placed under the Ministry of Education.

Law Number 24/2007 has placed strong foundation on DRR systems in Indonesia. It has considered responding to the physical and social aspects of disaster, the establishment of BNPB (Badan Nasional Penanggulangan Bencana) and BPBD (Badan Penanggulangan Bencana Daerah) in 33 provinces[4], the role of national and local governments, community, private sector and international agencies. The law also set out three phases related to disaster management: i.e., pre-disaster prevention, emergency response and post-disaster recovery. Specifically, this law has significant implications for DRR in Indonesia as it has established norms and set up institutions at the national and regional levels.

This law also defines the meaning of disasters into three types, i.e. natural, non-natural and social disasters. It describes DRR under the term disaster risk management (DRM), as 'a series of efforts encompassing policies on development with disaster risk, disaster prevention, emergency response and rehabilitation' (Article 1(5) Law Number 24/2007 on Disaster management).

The Law was the result of a movement to improve disaster management in Indonesia with assistance from the UNDP, the United Nations Office for the Coordination of Humanitarian Affairs (UN-OCHA) and other institutions. The

[4] In 2007 there were 33 provinces in Indonesia. In 2012, a new province was established bringing the total to 34.

Law also represents a paradigm shift from emergency response to disaster into a wider scope for DRR, recognising every person's basic right to protection from and education about disaster risks. Hence, disaster management now represents every aspect of risk management (BNPB, 2015a).

It was subsequently introduced in various government, presidential, ministerial/BNPB regulations and local provincial/district or municipality regulations.[5] Subsequently, Government Regulation 21/2008, Article 14, states that 'education and training in disaster management aims to improve people's awareness, concern, skill and preparedness against disasters; which can be implemented by national or local government and non-government organisations through formal and non-formal education, training, simulation and exercises'. These agencies have received more legal power, and financial and technical resources to establish DRR strategies throughout Indonesia. They can develop DRR plans, early warning systems and community preparedness under the decentralisation system, as the responsibility for DRR and disaster management 'is shared across different levels of government, from heavy reliance on national governments to greater responsibility of local governments' (Lassa, 2013; BNPB, 2015a).

However, there are a few concerns with Law 24/2007. The establishment of the BNPB as the coordinator of disaster management would face bureaucratic challenges from different institutions involved in the structures. Moreover, there is an overlap with other disaster laws such as Law Number 27/2007 on the management of small islands and the provincial disaster law (such as Qanun in Aceh), which means the coordination process does not work very well. In terms of education, Law Number 24/2007 states that education and training should be a part of regular disaster management and disaster

[5] Government Regulations covers the Disaster Management Implementation (Government Regulation No. 21/2007), the Funding and Management of Disaster Assistance (Government Regulation No. 22/2007), Participation of International Institutions and Foreign Non-Government Institutions in Disaster Management (Govt. Reg. No. 23/2007). For institutional development it has a Presidential Regulation No. 8 Year 2008 on the Establishment of the BNPB and various Ministerial/BNPB Regulations lay out Disaster Management in the Local Level (MoHA Reg Nr. 131 / 2004), Guidelines for the Organisational Structure of BPBD (MoHA Reg No. 46/2008), and the Head of BNPB Regulations, such as Number 3/2008 on Provincial / District / Municipality and Local Regulations (PerDa) (Maarif, 2011).

mitigation efforts. However, the law does not clearly state how disaster education should be defined and implemented. It can be argued that the fractional link between regulations in disaster management, education and technical works might hinder the effective implementation of DRR education on the ground.

5.3.2. The 2010 Ministry of Education Circular Letter (CL)

Following Law 24/2007 on Disaster Management, and Government Regulation 21/2008 on the implementation of Disaster Management, President SBY's speech at the third tsunami commemoration in 2007, requested the Ministry of Education and the Ministry of Internal Affairs to urge Regional Government to embed DRR education into intra and extra curricula. Realising the importance of DRR in schools, the National Platform for DRR together with other stakeholders in the education sector, supported the Ministry of Education with the issuance of a Circular Letter, Number 70a/MPN/SE/2010, targeting the head of regions, Local Education Authority, Local Disaster Management Agencies and other local authorities to mainstream DRR in education.

The first strategy of this circular was to develop safer schools through school-based disaster preparedness (SSB), through integrating DRR into the curriculum and partnerships. It became the national agenda stressed in the '2006-2009 National Action Plan for Disaster Preparedness', where stakeholders and school institutions undertook various activities to support the programme on different levels (CDE, 2011; BAPENNAS, 2010). This Circular moved the general policy regarding DRR in the community into the school system. Hence, it focused particularly on disaster risk mitigation in school, both structural and non-structural to develop the culture of safety; empower the school's community, integrate disaster mitigation into the curriculum in formal education both intra and extracurricular curricula and develop partnerships with other institutions. This Circular was developed in partnership with the UNDP through its SCDRR (Safer Communities through Disaster Risk Reduction) programme (CDE, 2011).

The Circular defined DRR as disaster risk mitigation and became the foundation for the implementation DRR education in schools. The formulation of the Circular was heavily influenced by the global framework rather than local traditional knowledge. For example, it repetitively refers to HFA 2005-2015 and linked it into seven key concepts of education for sustainable development, i.e. interdisciplinary, holistic, value orientated, critical and problem solving, multi-methods, participatory, applicative and local culture (Ministry of Education, 2010). Hence, the rhetoric of the Circular was much more a repeat of what was already under the global DRR framework and the LIPI-UNESCO-COMPRESS initiative before.

5.3.3. PERKA BNPB NUMBER 4/2012

During the ongoing practice of SSB-LIPI, the Head of the National Disaster Management Agency issued a modification of SSB under PerKa BNPB 4/2012.[6] The problem found that the Circular merely focuses on DRR education in terms of the non-physical aspect. Moreover, most existing schools had no safety plan, so it was a challenge for the SSB to implement. In particular, in urban areas as limited spaces, many school buildings were built and extended to cover the increasing number of students due to the impact of urbanisation. Therefore, the building infrastructure was not based on safety standards. The term SSB (Sekolah Siaga Bencana) then also changed become 'Safe School' (Sekolah/Madrasah Aman).

To be more specific, this guideline set out two pillars related to Safe School: Structural; specifically, safe locations, safe buildings structure, safe design and classroom layout, supporting safe resources. The non-structural aspect is predominantly related to DRR education: increasing knowledge, skills and attitude, safe schools' policy, disaster preparedness plan and the

[6] The application of Safe Schools was referred to the legal basis of the 1945 Constitution, Articles 28 and 31 and 34 (2); Law 36/1999 on Human Rights; Law 23/2002 on Child Protection; Law 24/2007 on Disaster Management, Law 20/2003 on National Education, also the Keppres 36/1990 on the ratification on the Convention on Child Rights.

mobilisation of resources. This is basically to focus on earthquakes and tsunami as schools were at high risk from both at that time (Perka BNPB 4/2012).

Recently, the Ministry of Education issued a Regulation on the National Secretariat for Safe schools (110/P/2017) for coordination between relevant stakeholders. However, it has not obvious how far this has progressed. Hence, despite the definition of safe schools defined in the PerKa BNPB 4/2012, it cannot directly become the main regulation, as school safety is a result of a combination of processes from different stakeholders, including LIPI, the Ministry of Education, NGOs and the community.

5.3.4. Decentralisation and Regional Contextualisation

Decentralisation began in the Reformation Era (1998), following the centralising experiences witnessed during the Suharto regime. Since this decentralisation period, local government has more power to conduct any programme except foreign affairs, defence, (internal) security, justice, fiscal and religious affairs in their region. Furthermore, district government has more power than the provincial level. The increase in the number of district governments has contributed to different levels of development. Several of the newly developing districts will need more time to bridge gaps in human resources and infrastructure, as decentralisation has upgraded many sub-districts into districts with more power devolved from central government (Lassa, 2010; Grady et al., 2015).

Concerning DRR education, many districts still require more assistance in terms of supporting their transition. However, as the political power is now more at a provincial/district level, which mean that the programme from central government would require approval from local governments, including the arrangement and the implementation of DRR education. It should be mentioned that central government has lost its power including DRR issues. However due to fiscal concerns, central government still has power over the increasing role of districts, as less than 5% of these governments can only satisfy funding their annual budgets and generally rely on central government for funding support. The direct relationship between central and district has frequently alienated

provincial government. Village government also has no clear place in this arrangement. Thus, conflict with district regulations has to some extent prevented the implementation of DRR initiatives.

According to the BNPB risk assessment of 33 provinces in 2007, there is limited capacity for risk assessment and no proper dissemination at provincial level. Such an issue has contributed to the complexity of coordination between central, provincial and district levels when implementing DRR activities. Similarly, Grady et al. (2015), argued that decentralisation has not automatically led to improved community engagement in disaster management due to low levels of awareness of DRR knowledge. Moreover, the incoherent policies at different governmental levels create a dilemma in the process of disaster risk reduction implementation in the community.

5.4. Re-contextualisation of DRR Education in Institutional Networks

The DRR institutional structure in Indonesia can be considered through four organisational divisions (modified from Grady, et.al 2015):

(1) Devoted DRR institutions which refer to the BNPB and BPBDs as the main actors regarding DRR preparation, operation and appraisal of DRR policy. In implementing the programme, BNPB need to coordinate with different ministries and sectorial agencies. However, it is a difficult for BNPB to coordinate disaster management as it would need many sectors and inter-ministerial proceedings both horizontally and vertically with local governments. Under Government Regulation 38/2007 on the division between central and local government, it has explicitly set out the roles of central and local government in disaster management. Hence this poses potential conflict and overlap role in management and funding (Grady, et al., 2015). Thus, the collaboration of national and international agencies has contributed to the current formulation of DRR education in Indonesia. The BPBDs are the main agencies at the provincial level and some district levels concerning disaster management. The BPBDs are funded by the provincial or district level annual budgets, and in some cases also rely on allocations from the central government. They coordinate with other

government agencies at local, provincial and national levels on DRR activities in their areas;

(2) Government ministries and agencies and have their DRR activities and also implement programmes in DRR. Certain ministries that are involved, such as the Ministry of Home Affairs, have developed disaster risk maps at provincial and district levels; and the Ministry of Education which provided a National Strategy on Mainstreaming DRR into the School Education System.

(3) Non-ministerial institutions which also have essential roles in DRR in Indonesia, including Secretariat for Safe School, the Agency for Meteorology, Climate and Geophysics (BMKG); and

(4) Ad-hoc institutions, such as The Agency for the Rehabilitation and Reconstruction (BRR/Badan Rehabilitasi dan Rekonstruksi Aceh-Nias) and the Consortium for Disaster Education (CDE).

The BRR is an ad hoc institution established during the early response to the mega catastrophes in Aceh in December 2004, by Government Regulation in Lieu of Law (Perpu) No. 2/2005 to coordinate and jointly implement a community-driven recovery programme for Aceh and Nias (BRR, 2009). BRR had responsibility to support the recovery process in Aceh. The objectives were to temporarily support the government of Aceh to rehabilitate, reconstruct and coordinate the massive international aid as the Aceh government was unable to cope with the disaster. Under the BRR, the education sector was established as a specific unit, focusing on rehabilitation/reconstruction and capacity building for teachers and school community. During this time, the term DRR was introduced in the programme, such as the anti-earthquake standard for school buildings, evacuation places and teacher training. However, it was considered short-term and project orientated, as many initiated programmes were halted by the end of BRR in April 2009.

The Consortium for Disaster Education (CDE) reproduced and formulated DRR education through the children's rights approach, as an ongoing concern of human rights discourse and movement, as discussed in Chapter Three. The CDE was established in October 2006, to remember

international DRR day, under the theme 'DRR from school'. This CDE consisted of 59 organisations including the UN, Government, Red Cross, besides NGO's which focused on school based DRR. CDE aims to develop policy and the practice of DRR in national and local, formal or non-formal, building capacity, coordinating between parties to sustain DRR in schools (Ikeda and Mulyadi, 2012). As organisation members they worked together to develop and document teaching materials, sharing information and ensuring the sustainability of DRR education Indonesia. The CDE has a focal point and secretariat, which has positively contributed to the development of DRR education in Indonesia. The CDE has moved DRR education from the global arena into the Indonesian system, through positive collaboration between global, national and local agencies (Interview with Ninil Jannah).

The CDE has played a significant role in the development of the DRR concept into the school system in the early stages. Members of the CDE have conducted DRR education activities through several approaches, whether the 'top-down' approach or the bottom up approach' so as to strengthen integration of DRR. Hence, it is evident the CDE network has contributed to strengthening the implementation of DRR education in several areas, while advocating for a national policy regarding DRR to become Law 24/2007. Even the momentum and the positive response from the government to encourage DRR education as an additional topic and also intra curricular has been relatively successful as part of the CDE programme, though the idea of placing DRR education as a mandatory subject in schools, has not yet been achieved (CDE, 2011).

This consortium has contributed to increased awareness concerning disaster risks and the necessity to improve disaster preparedness in communities which are experienced and/or are vulnerable to various disasters like Indonesia. However, the community itself has unable to produce a sufficient field concerning DRR education, as it needed extra inter-relationships with other agencies.

Another distinguished agency which supported DRR education was LIPI. Based on the lack of preparedness of many communities to cope with disasters in Indonesia, LIPI, a science agency, supported by UNESCO, reproduced

knowledge and skills for disaster preparedness in 2005-2006, which was piloted in several schools in selected areas of Indonesia. The support includes technical intervention and advocacy approaches into various government institutions. Nevertheless, no research has been conducted to measure how effective this has been thus far. The role of LIPI in supporting DRR education (in public and in schools), has gradually declined due to budget restraints. This would need research institutions including universities to have greater roles and conduct more researches in DRR education. Afterward, LIPI supported by the UNESCO collaborated with Syiah Kuala University in Aceh through the TDMRC developed capacity building training for university students and volunteers, known later as the Aceh unit of COMPRESS and termed TDMRC-KOMPAS (Rafliana, 2017). LIPI was a medium for the transformation of global knowledge on disaster into the Indonesian system.

In 2012, JICA and LIPI which also developed a guideline for the SSB programme, introduced the science of disaster, and shared lessons learned in responding to such disasters both in Japan and Indonesia (Aceh) (Ikeda and Mulyadi, 2012). It is important to note that LIPI has played a pivotal role in establishing a foundation for DRR knowledge, preparedness, and develop pedagogic devices to communicate with schools and the community. LIPI had numerous roles in the first stage of DRR development in Indonesia, but it became problematic and declined was replaced by the BNPB and other institutions. The role transfer from LIPI to other institutions was not obvious, so that it became a discrepancy and overlapped the DRR education system and its implementation.

In terms of DRR education in Aceh, the TDRMC has become the leading source of DRR information in Aceh province and it launched the first master's programme on Disaster Science and Mitigation. For the school programme, the TDMRC conducted socialisation and coordination with schools, such as a needs assessment and the availability of schools to implement the program. Moreover, in the implementation process, the TDMRC implemented the SSB programme by modifying the method that was previously developed by LIPI during the pilot project. The implementation of the SSB programme conducted

by TDMRC includes first aid training, School Watching, art workshops on disaster mitigation, mentoring and training and simulation (v), the provision of disaster related equipment for schools, such as tents, etc., and DRR festival (Rusydi et. al., 2015). There are 24 elementary schools, 13 junior secondary high schools/middle schools and 2 junior high schools selected in this programme. All the schools are located in Banda Aceh and Aceh Besar area and both senior Secondary High Schools are located in Banda Aceh[7]. Hence, the TDMRC has to some extent transferred the disaster knowledge and the teaching model created by LIPI and reproduced it in the Aceh context and delivered an educational process in the province.

The Circular 70a/2010 and Perka BNPB 4/2012 as the highest policy in disaster education and school safety components, it is rather weak in the application. It will not work effectively since the decentralised system gives a limited authority to central government over education content, financial and school practice.

Hence, those regulations are not strong enough to ensure disaster education is fully connected with the education stakeholders and institutional networks. Chandler (2014) argued that resilience governance is against top down institutional measures which often fail to produce the intended result, simply because of a lack of the government capacity in managing and controlling the situation. For Chandler, resilience approaches are how governance can operate through the 'reality' of process and relations with the individual and/or society rather than a government top-down imposition seeking to direct, manage or assert control over the situation. By emphasising the role of the individual in building resilience in the community, the process of 'resilience thinking' to some extent can emerge and be transformed into society. Additionally, resilience thinking is expected to increase individual conscious and capable of influencing resilience capacity in the community (Chandler, 2014).

[7] The data gathered from the TDMRC during the field trip in Banda Aceh, October 2014.

5.5. Toward a Pedagogic Re-contextualisation of DRR Education

Re-contextualisation is a process of knowledge production and reproduction in the sociology of education, as highlighted by Bernstein. This process is comprised of two divisions: specifically, the official re-contextualising field (ORF) and the pedagogic re-contextualising field (PRF). The ORF includes 'specialised departments and sub-agencies of the State and local educational authorities together with their research and system of inspectors' as discussed earlier (See Bernstein, 1990, 192), while the PRF consists of: (1) university departments of education, together with their research; and (2) 'specialised education media, weeklies, journals, and publishing houses together with their readers and advisers' (Bernstein, 1990, p. 192).

Concerning the DRR knowledge process, there has been a gap between the ORF and the PRF. Thus, it is essential to distinguish agencies of pedagogic reproduction which can determine their own re-contextualising, independent of the government and its agencies which may have a relatively stronger measure of control over their own re-contextualisation process. Bernstein (1990), stresses the transformation of institutionalised knowledge to official pedagogic discourse and practice, by arguing that 'the link between power, knowledge and conciseness is established by the pedagogic device, which is a symbolic ruler of the construction and distribution of forms of the specialising of subjects and is thus the precondition for the production and reproduction of culture' (Bernstein 1990, 198-205).

Through re-contextualisation, DRR discourse is moved from its original site (LIPI) of production to another site (TDMRC Aceh), where it is transformed, seeing as it is related to another discussion. The re-contextualised discourse no longer resembles the original because it has been 'pedagogised' or converted into pedagogic discourse. The lack of a role for universities (faculty of education) has led to a lack of the pedagogical concept in teaching DRR in the Indonesia curriculum. The situation means that DRR education is not seen as a priority with regards to being taught**.**

The current development of the PRF of DRR education in developing the graduate school (master's in disaster preparedness) at Syiah Kuala University

Aceh, was considered limited and obscure in terms of scope, pedagogical philosophy and process. The master's programme is less focused on the development of DRR education in particular schools, was for pragmatic reasons without any foundational system relating to knowledge and for employment reasons (working for the government). These fields are hierarchically related, in that the re-contextualisation of knowledge cannot take place without its production and reproduction cannot take place without re-contextualisation. Hence, DRR education may be identified in three main fields of the pedagogic device; particularly, production, re-contextualisation and reproduction (Bernstein, 1990; 2001).

Hence, despite the contextualisation of DRR, education has been progressing, while re-contextualisation has been slow in making progress. Furthermore, no pedagogic device has been developed, while the issue has become a short run and politically–economically orientated. The building of the DRR pedagogic device is fundamentally to do with the movements of meanings and their selective reconfiguration as a discourse – the things that can be put together and those to be kept apart. As the discourse moves from its original site to its new positioning as pedagogic discourse, a transformation takes place (Bernstein, 2000: 31–2).

This chapter has shed light on the missing part of the pedagogic device for DRR educational transformation. It would be a large project and require limitless effort, as Bernstein's theory of 'vertical' and 'horizontal' discourse, along with 'condensed' and 'elaborated' knowledge of DRR education, as it was not clearly defined and visible. Bernstein's theory was originally developed to assess the reality of social class and identity. Consequently, the theory is not a specific concept related to DRR education**.** Rather it is more of a general concept of sociology of education in terms of communities which have experienced or are susceptible to disasters, and their inherent knowledge of disaster, along with the external explanation from LIPI-UNESCO in the first instance. Despite no formal recognised class, in reality many people still adhere to the traditional doctrine of fatalism and lack of formal education. This teaching of DRR to such people is therefore more challenging.

Re-contextualisation can be referred to as the debate that texts produced by LIPI-UNESCO and practices are transformed as they are moved between contexts of their reading or enactment. Re-contextualisation is achieved by agents in the official re-contextualising field (ORF), policy makers and administrators and the pedagogic re-contextualising field (teacher educators, the authors of textbooks, and so forth). Moore suggested that 'the principle of 're-contextualisation' is crucial because the pedagogic device acts selectively across available discourses to draw out from them and configure the elements of what counts as legitimate knowledge and its effective realisations' (Moore, 2013, 155). Thus, there is a need to shift from 'formal educational knowledge codes' into 'formal educational pedagogic codes'. That is the official knowledge of DRR in COMPRESS-LIPI, the Circular and BNPB guidelines, suggest that curriculum is reformulated in a more obvious context. In chapter seven, this initial effort to develop a pedagogical device through the science curriculum the missing part of DRR education in the curriculum**.**

Bernstein's theory has helped to illustrate this picture, that is the accumulation of the inter-relations of many locals, nationals and global agencies, has contributed to the re-contextualisation of DRR knowledge into the official frame, though it remains stagnant when transformed into the pedagogical process. Bernstein (1990), emphasises the transformation of institutionalising knowledge to official pedagogic discourse and practice, that 'the link between power, knowledge and conciseness is established by the pedagogic device, which is a symbolic ruler of the construction and distribution of forms of the specialising of subjects and is thus the precondition for the production and reproduction of culture' (Bernstein, 1990, 205). The involvement of the UN, NGOs and the government (LIPI, Ministry of Education, BPBN) in the transformation process of the DRR idea to be DRR knowledge in Indonesia has been progressive to the level of what Bernstein called 'official knowledge'. However, this has been a dilemma when another step to transform the knowledge to the school's system remained missing.

5.6. DRR education in Policy and Practice in Aceh Province

DRR education in Aceh initiated after the disaster in 2004, by international NGOs, such as the Irish Red Cross, implemented DRR knowledge for communities through radio programmes, bulletins and newspapers. Likewise, the German and American Red Cross conducted DRR education in schools with teacher training and evacuation drills (UNDP, 2012). However, considering the uncertain situation in the first year of emergency process, this DRR education was conducted in temporary schools and with limited resources.[8]

Since 2007, the government of Aceh has made DRR one of its seven development priorities. The governor of Aceh, Irwandi Yusuf, was an advocate of DRR education due to his personal experiences, as he survived the tsunami when he was a political prisoner being held in the LP Kedah prison, located near the beach in Banda Aceh (Aceh Baru, 2016). Disaster management in Aceh province started with the Governor of Aceh's Regulation 102/2009 on the establishment of BPBD Aceh (BPBA, Aceh province disaster management agency), followed by the local regulation of Qanun[9] 5/2010 on disaster management in Aceh province and Qanun 6/2010 on BPBA. Furthermore, the Governor of Aceh's regulation on school operational support (BOS) fund 1/2012 and the Governor's Instruction for integrating DRR into the provincial education system 2/2012 were established during the DRR-A programme in Aceh (the UNDP and GoI 2012, 9).

The initiative was led by the UNDP under the DRR-A (Disaster Risk Reduction-Aceh) programme, 'Making Aceh Safer Through Disaster Risk Reduction Development. This project was designed to make risk reduction a regular part of development in Aceh by equipping the government and communities with the skills and knowledge for disaster preparedness, mitigation and emergency response. Supported by the Ministry of Home Affairs and the Provincial Government, Disaster Risk Reduction Aceh (DRR-A) has

[8] I can confirm this situation, as I was in Aceh during this time and worked in humanitarian projects (2005-2009).
[9] Qanun in this thesis, refers to provincial legislation in Aceh province Indonesia

accomplished several programmes, i.e. gender sensitive community led initiatives, enhancing the capacity of the Tsunami and Disaster Mitigation Centre (TDMRC) in Banda Aceh and fostering a culture of safety in Aceh through public awareness, as a process to examine the previous failures more positively (UNDP and GoI, 2012).

The programme generated various issues regarding DRR related legislations in Aceh, such as Qanun Number 5/2010 on Disaster Management; Qanun Number 6/2010 on the Establishment, Organisational Structure and Management of the BPBA; Governor Regulation 43/2010 on Standard Operating Procedures for the Tsunami Early Warning System; Governor Regulation 51/2011 on Provincial Disaster Management Plan for 2012-2017; Governor Regulation 48/2010 on Local Action Plan for DRR from 2010-2012; and Governor Decree 360/6a/2011, on the Establishment of the DRR Coordination Forum. Thus, two institutions now remain active pertaining to DRR activities in Aceh province; specifically, BPBA and the TDRMC. The strategy in relation to DRR Aceh 2012–2017 is to assure the internalisation of local wisdom in the creation of people's collective memory of the disaster through formal education (See Aceh Governor Regulation Number 51/2011, 53). However, it was not really obvious how this objective would be implemented. There is concern about the coordination issue within national and local government, and the NGOs in the dissemination process. Thus, this condition has caused the delay in the implementation process in schools.

DRR education remains problematic both in regard to national level and its application. Some issues, such as the uncertain position of the Ministry of Education and BNPB, sometimes overlap each other. The lack of teacher capacity since teacher education, the failure to develop the teachers' curriculum in the university, suggests that DRR education is only considered a project and is not sustainable (Interview Ninil Jannah).

Table 5.1 showed an overview upon the progress that has been made and the challenges face in national level and its application. Some issues, such as the overlapped role of the Ministry of Education and the BNPB in the implementation level, lack of teacher capacity, DRR education conducted as

project based has caused the delay in the implementation of DRR education in the school level. Although Wilmot considered the lack of strong policy from the Ministry of Education, (Wilmott, 2014), this research found it is not a main issue, as there has been several legislations and regulations enacted. It is an issue of searching for an ideal formulation of interrelations between the global DRR education concept and the national one. Consequently, the current development of DRR education in Indonesia is premature. Moreover, it must understand the nature of global DRR education, in terms of the scope and content and the extent to which this will match local and national values, by which enhanced policy and the institutional networks of DRR education would be improved by the inner and outer reflective thinking of 'resilience governance' (see Chandler, 2014)

Table 5.1. Review of Stakeholder Interviews on the implementation of DRR policy and the Institutional network.

Description		Recommendations
Progress	Challenge	
The formation of the COMPRESS programme by LIPI in 2005, was crucial in the initiation of Safe Schools in Indonesia. The development of Disaster Preparedness knowledge: Five parameters for safe schools by LIPI-UNESCO: knowledge and attitude; policy, emergency plan, early warning system and capacity for resource mobilisation.	Lack of DRR stakeholders' capacity on understanding DRR education in Central Government. Lack of research on DRR education (knowledge) has made this new subject hard to develop. It appears no institutions focused on the pedagogic development initiative initiated by current DRR stakeholders.	Improve collaboration between DRR education stakeholders. Develop further researches on disaster science and preparedness knowledge, included in the technical guideline (juknis) for schools. Use BOS (operational school budget) to support DRR activities should be officially justified.
DRR was a national priority from 2005-2010. This was translated into a legal framework with the	The integration of DRR into the school system is really dependent on the provincial leaders' and	Improve the capacities of DRR stakeholders at the provincial level,

enactment of Law Number 24 of 2007 on Disaster Management. In 2009, the Ministry of Education supported by UNESCO, LIPI and the TDMRC established a SSB pilot project in several schools in Aceh. The issuance of 2010 Circular gives official guidance on how DRR can be integrated into the school system. Perka BNPB no 4/ 2012 about safe schools.	education authority's commitment. It refers to their capacity to encourage DRR education in the provincial strategic plan. The Circular and Perka BNPB 4/2012) made DRR education in schools optional. It is not included in the current national strategic priority 2016-2021. Hence, progress has been slowing at the national level.	including the Education authorities and BNPB. It should be included in the national and provincial priority/plan. Teachers need continued support and to be encouraged to develop DRR in lessons. The module should be accompanied with the technical guidelines for both teachers and students.
DRR education has been assigned as part of the special education service under the MoEd. Offers more opportunity for policy and institutional support. Regular external support, such as local NGO's and the university in initiating and assisting the SSB programme, such as Khadam Nanggroe and TDMRC in Aceh. The establishment of the Disaster Library (SDN 2, Banda Aceh).	Frequent changes to the curriculum and the responsibility to cover different topics (maritime, character, disaster, etc), means only selected topics will be taught depending on the priority of the local government and school. Frequent changes to school management. Lack of measurement to assess effectiveness/impact of intervention in schools.	Integrated DRR as compulsory subject for teacher education in university. Involve teacher training institutions, such as the Accreditation Centre and LPMP (*Lembaga Penjaminan Mutu Pendidikan*/quality assurance of education institutions) to support the processes.
Various external support (International and local NGOs) including the development of modules and assistance	It was not clear how this coordination between government and non-government agencies can be coordinated in practice, specially in the local level.	The formation of Secretariat for Safe Schools in provincial and district level. Dissemination and technical support and to

The formation of the CDE, comprised of various stakeholders. The formation of Secretariat for Safe Schools which involved 6 Ministries (the Ministry of Education, BNPB, Ministry of Religious affairs, PU, Women and Children, Social Welfare) and partners (NGOs and Universities) across Indonesia in 2009. SEKNAS has been repositioned for the period 2017- 2019.		enable schools to be more independent and be able to integrate DRR. Schools require more autonomy to initiate and develop their own DRR project based on their context.

5.7. Conclusion

A massive casualty in December 2004 of earthquake and tsunami in Aceh showed that disaster knowledge had been missing in the Indonesian education system. Since then, a legal framework and the institutionalisation of the DRR network was initiated. Despite that, the development has been more formalistic, subject to external funding, lacks conceptual development, centralistic and emergency focused.

DRR education is considered to be new knowledge. LIPI is the lead and be the first institution to formulate DRR education in Indonesia with the support of UNESCO, which was subsequently legalised by the Ministry of Education under the 2010 Circular Letter, and in 2012 adopted with several modifications by the BNPB to be a national programme.

Hence, the process of contextualising of DRR education was primarily influenced by the collaboration of UNESCO and LIPI science experiences. However, still a limited effort was made to elaborate the inherent knowledge of local communities to be part of the official knowledge. LIPI played an essential role in advancing DRR education in the early stages (2005-2010), but after the Law 2007 on national disaster management when the BNPB officially took over;

LIPI had to refer to its origins as a science agency, instead of an agency of education or disaster preparedness. This gap poses a policy and institutional discrepancy with respect to DRR education development in Indonesia, in terms of knowledge, institutional and pedagogical processes. It can be understood that is LIPI basically a national science agency, which does not have a primary role on disaster preparedness and education. In this context LIPI could develop more scientific research on disasters, which then communicates into the education system through the MoEd and BNPB. Thus, the nature of DRR education in Indonesia was a disaster-triggered response from the national government. It was an emerging national awareness and development of the previous failure to effectively respond to the disaster in Aceh, and now prepares preventive and mitigation measures for other disasters. So, it remains embryonic and under development.

Prior to the disaster in Aceh, DRR education remained limited in scope and content as part of special service education in the National Law of Education 20/2003 in terms of education for children in emergency situations post disasters, as it was part of the transformation and the consequences of the ratification of the rights of children since the Reformation Era in 1998. Hence, DRR education is not really evident in the National Law of Education 20/2003 which prevents enhancing the culture of awareness at the school level**.** Therefore, to integrate this knowledge into education system needs various approaches and stakeholders. In particular the Faculty of Education at the University that produces knowledge on teaching, so disaster knowledge can be developed in various subjects.

The DRR education sector suffered from a lack of coordination, as it has been decentralised to some extent. It should have a positive impact when regional government is seriously concerned about DRR in its region. Such challenges have posed a question on the importance of DRR education, in particular within the school system. Therefore, further development and innovative approaches are necessary to introduce DRR into the education and teaching process. -

All stakeholders are inter-related in forming DRR knowledge. However, LIPI is considered a distinguished agency here, as it played almost every role in the early stages of the birth of DRR knowledge in Indonesia. LIPI has developed a basic science knowledge related to disaster, communicating with factual reality of community, an agent of transforming global knowledge from UNESCO to develop five indicators of disaster preparedness. It subsequently applied these indicators to assess the community and accordingly, re-contextualised them into the COMPRESS programme, by developing modules, training teachers and students, and finally, getting an official cover of SSB. It is argued that LIPI has played the role of ORF into PRF from 2005-2012. In Aceh there is a distinctive agency for DRR education, the TDMRC, though again it failed to clearly identify its function regarding the re-contextualisation of official knowledge into pedagogic knowledge relating to DRR. Moreover, the development of the master's programme for disaster preparedness as an agent for transforming and reformulating DRR knowledge has obscured its identity. Therefore, there has been repetition of the LIPI-UNESCO structure of knowledge, and no significant progress has been made.

The expertise of global NGOs, such as Save the Children and the UN have transferred global DRR knowledge into the Indonesian school system, as discussed in Chapter Four. UNESCO as an international institution also has an important role in transferring DRR education as a global issue to LIPI and then developed by the CDE**.** Subsequently, this coalition supported the government to establish the national law on disaster management and its institution (BNPB), in which SSB became a platform for DRR education. The MoEd justified this SSB and other approaches to DRR education integrating it into the curriculum and partnerships under the Circular**.** LIPI then collaborated with the TDMRC to engage with the University in Aceh to develop the master's programme for disaster management. This institutional network had been supportive in the early stages of DRR education, but apparently declined when the BNPB approach lacked coordination with other institutions, in particular university education.

The BNPB as a new institution has less capacity to implement DRR education as schools are under the Ministry of National Education. Even so, the BNPB then focused mostly on emergency response and physical aspects (infrastructure) rather than non-physical aspects (education).

A stronger and harmonised DRR policy is required to ensure that DRR education is effectively applied at regional levels and in school systems along with sufficient capacity building at the school level, particularly the headmasters, school management and teachers. It has to make it clear the leading institution for DRR education since the decline of LIPI's role, and several stakeholders may overlap in practice. Further discussion relating to SSB will be elaborated upon in Chapter Six.

CHAPTER SIX
SCHOOL-BASED DISASTER PREPAREDNESS (SSB) IN INDONESIA

6.1. Introduction

This chapter focuses on the application of DRR education in terms of School-Based Disaster Preparedness (SSB-Sekolah Siaga Bencana) in Indonesia. This is to answer the research question on the meaning of SSB, its development, the challenges it faces in Indonesian context. This chapter highlighted that the mainstream DRR education in Indonesia is SSB, however, it missed a connection during the shift from LIPI-UNESCO into the new institution of The National Disaster Management Agency (BNPB), which became more formalistic under independent projects within extra-curriculum activities and some spaces in the Local Content Curriculum (LCC) for a certain period of time. Moreover, the notion of integrating it into the curriculum as stated in the 2010 Circular was dismissed. This chapter will initiate discussion on the origin of SSB, and subsequently discuss its evolution and framework, based on a case study in Aceh province in conjunction with its application and various constraints. Finally, some insights are formulated in the conclusion.

6.2. The Origins of SSB

The Government of Indonesia is committed to the implementation of the Safe School policy to ensure an environment safe from disaster, as referred to in Law 24/2007. This is in line with the initiative of the UNISDR (Priority 5) of the HFA 2005-2015: Strengthening Disaster Preparedness for Effective Response at All Levels and Priority 3 of the HFA: to 'use knowledge, innovation and education to build a culture of safety and resilience at all levels'. This involved a campaign of one million safe schools and hospitals in 2010 set out in the Dakkar Framework of Education for All (UNISDR, 2005; 2010).

The term School-based Disaster preparedness initially means to protect the rights of children to basic education during or post disasters. However, the

concept subsequently developed to include knowledge and skill transfer on DRR issues (preparedness knowledge) for students in disaster prone areas. While geographical conditions of an area may cause high vulnerability and children at risk are especially vulnerable to the threats posed by disasters that may be increased due to their limited knowledge of potential disasters surrounding them. Lack of children's knowledge and understanding of disaster risk may lead to the lack of disaster preparedness (CDE, 2011).

The SSB is a component of the Comprehensive Safe School program that covers three major components/pillars including safe school facilities, school's disaster management and disaster risk reduction education (GADRRES, 2014). The aims are to minimise death and injuries in schools, to plan for the sustainability of education in the face of danger, to protect investment in the education sectors and to strengthen community resilience towards disasters (Jannah, 2014).

SSB has two main objectives. Firstly, to promote the integration of disaster risk in school curricula in areas vulnerable to natural hazards and to promote safe learning facilities. Secondly, to develop a culture of preparedness and safety in schools as well as the resilience of school communities.[1] It has several indicators including the availability of knowledge regarding the hazards, vulnerability, disaster risk and history surrounding the school. In the implementation in Indonesia, the SSB would also need include eight values which are: 1) the change of culture, 2) empowerment-orientated, 3) independence, 4) rights-based approach, 5) sustainability 6) using local wisdom 7) partnership and 8) inclusivity (CDE, 2011). In general, SSB is the capacity of the school to manage disaster risks in its community. The school not only focuses on the preparedness aspect, but also attempts to develop knowledge to improve the culture of safety and resilience for all school communities. It is a comprehensive approach to DRR education, covering teachers, students, parents, school committees and the community where the school is located (CDE, 2011; Ninil Jannah).

1 Global Alliance in Risk Reduction and Resilience in the Education Sector. 2013. Comprehensive School Safety.
http://www.preventionweb.net/files/31059_31059comprehensiveschoolsafetyframe.pdf

Since the earthquake and tsunami in Aceh, many initiatives to educate the community and schools emerged as part of the recovery process. These initiatives were subsequently gathered by LIPI to provide preparedness knowledge to the community via the COMPRESS programme (See Triyono et al., 2012, 4). The lack of school's preparedness was scientifically proven during the first assessment of disaster preparedness conducted by LIPI in 2006 in the piloting areas: Bengkulu City, Padang City and Aceh Besar District. These assessments specifically aim at assessing the level of preparedness in government institutions, schools, households and communities by using five parameters: 1) knowledge, 2) policy, 3) emergency plan, 4) early warning system and 5) resource mobilisation. As a result, it was ascertained that the level of school preparedness was lower compared to that of communities and government apparatus (Hidayati et al., 2006; Hadi, 2009; Triyono & Kusumawati, 2011). Furthermore, The National Disaster Management Agency (BNPB) noted that there are 20 provinces in Indonesia has categorised as high risk to earthquakes, in which many school buildings, their facilities and students are potentially at risk (BNPB, 2014). Its mean that school is not a safe place for children to study when a disaster occurs. Indeed, it was then shown by the 2006 earthquake in Yogyakarta which damaged approximately 2900 schools and resulted in the disruption of the teaching and learning process. From this fact, the initiative to develop SSB became more important. Due to the assessment finding, LIPI initiated a Programme of Community Preparedness, in the form of School-Based Disaster Preparedness (SSB) in 13 schools in several areas in Indonesia, as seen in Table 6.1 (Mulyadi et al., 2010). These are considered as the forerunner of SSB in Indonesia.

To support the SSB programme, in 2006, the Consortium for Disaster Education (CDE) was established as a joint advocacy group for establishing umbrella policies for school safety initiatives by way of its 62 member organisations. This body was the primary advocacy body for SSB in Indonesia until 2012. The programme was implemented by local government, 33

provinces and more than 360 cities/districts. As a result, in 2012, up to 301 primary schools, 103 middle schools and 62 secondary high schools across Indonesia, had set up SSB programmes (UNDP internal report, 2013, Jannah 2014). From the experience gained from the piloting in 2012, LIPI developed guidelines for the implementation of SSB, the criteria of the school to be SSB, schools' assessment standards; specifically, structural (infrastructure) and non-structural (education) aspects, options to increase preparedness standards, besides monitoring and evaluation. Since then, LIPI-COMPRESS conducted capacity building for more than 50,000 students from SD, SMP, SMA, teachers and communities and piloting SSB in several regions (See, Yulianto et al., 2009; Triyono et al., 2012).

SSB is considered an indicator of the comprehensive DRR system in the school context. Lingkar, a national NGO, has implemented the 'safe and prepared school' programme in particular areas in Indonesia. In undertaking the SSB programme, Lingkar developed teaching materials for students in elementary, as well as junior and senior high school, together with teaching guidance about how to integrate DRR into the school curriculum. This programme also applies the entire school management in order to achieve the goal of developing schools as centres for DRR that motivate communities around school to be engaged and provide support (enabling environment) and engage stakeholders in DRR activities. This is intended to prepare schools' communities for natural disasters, specifically earthquakes and tsunami and to have the ability to manage disaster risks in communities (CDE, 2011; Jannah, 2014). An effective SSB can increase confidence in safety for the school's community, especially the students. Moreover, students can also transfer DRR knowledge into the wider communities.

The programme was conducted as a top-down approach to prepare the community in which SSB was being implemented. Schools selected to participate in the programme are typically selected based on the recommendations of the local education offices and /or disaster management offices, based on their exposure and vulnerability to disasters hazards. To date, no evaluation has been conducted thus far (Triyono et al., 2012).

6.3. The Transformation of SSB

6.3.1. LIPI-UNESCO SSB

The SSB programme was not really clear until LIPI conducted preliminary studies for hazard and social vulnerability assessments in 2006 in Aceh, Bengkulu and Padang with the aim of developing public education interventions. The results were used to designed education activities for public interventions including schools. It comprised training for students, teachers, community leaders and local authorities. LIPI's intervention and its approach were used as the model for the development of SSB in Indonesia. It aims to simplify the message concerning risks to develop preparedness in schools. Currently, the SSB model has been adapted by several organisations that worked in DRR in Indonesia (Rafliana, 2012; 2017).

In 2009–2010, the national fund for SSB was discontinued because of the lack of political drive to extend the programme. At this time, it also believed that public education should be placed in a structural position within BNPB, as LIPI was not an implementing agency that can conduct preparedness activities on a continuous basis. However, LIPI still wanted to work in this area. Therefore, LIPI was able to continue its role. Certain activities were conducted including the development of the National Tsunami Risk Assessment Guideline, the development of the SSB Model in Aceh and Maumere with support from the UNESCO. The disaster that also occurred in Mentawai on 25 October 2010 changed the situation; consequently, the President of the Republic of Indonesia called for 'the leading agencies related to disasters to pay serious attention to developing communities' capacities for self-evacuation. Furthermore, LIPI was positioned to play an active role in conducting this. The president's exhortation put disaster management as a national priority under BAPPENAS, which allowed LIPI to secure funding from 2011 to 2013 and continue its DRR activities (Rafliana, 2011; 2017).

According to Triyono et al. (2012), LIPI formally initiated SSB for 13 schools in 6 district/cities in 2008 (see Table 6.1). In 2009, LIPI was invited by the TDMRC Unsyiah to help them in DRR capacity building. It was a challenge for the COMPRESS LIPI team, which based on practical

knowledge, trained TDMRC staffs from various academic backgrounds (Yulianto et al., 2009). From this, LIPI then used the 'cloning programme' for SSB in Aceh. Additionally, the Banda Aceh Education authority recommended 3 pilots schools for SSB: SD Negeri 2, SMP Negeri 1 and SMA Negeri 1, which were severely affected by the Aceh tsunami. SSB in Aceh has progressed much further, as there is more enthusiasm and innovation to sustain the programme. However, there has been several shortcomings as the lack of teachers' ability to develop DRR knowledge continuously, meant that SSB in Aceh gradually disappeared, as the government appeared less concerned, lack of the budget and legal framework (See Triyono et al., 2012, 8).

Then in 2010, the National Education Ministry issued a Circular to mainstream DRR in schools, but until 2012 only a few regional governments responded to that specific letter. The Circular was not strong enough to encourage all the provinces to implement the SSB programme and the implementation of SSB was generally initiated by NGOs rather than the government. However, Mejene District voluntarily requested LIPI to implement SSB in its area. Consequently, Mejene District has sustained the SSB programme, as it is continuously proposed in their schools' budget. While other areas were stopped due to the lack of budget and support. Therefore, sustainability became a major concern for SSB in general (Triyono et al., 2012).

Table 6.1. SSB-LIPI Schools' Pilot Project in Indonesia(Triyono et al., 2012)

No	Year	School	Province	Supported By
1	2008	SDN 57 Kota Bengkulu	Bengkulu	Compress-LIPI
2		SMAN 6 Kota Bengkulu	Bengkulu	Compress-LIPI
3	2009	SDN Inpres Wai Oti Maumere	Sikka/NTT	LIPI, UNESCO, PUTER FOUNDATION, Jakarta Tsunami Information

				Centre, CIDA
4		SMPN 1 Maumere Sikka	Sikka/NTT	LIPI, UNESCO, PUTER FOUNDATION, Jakarta Tsunami Information Centre, CIDA
5		SMAN 1 Maumere	Sikka/NTT	LIPI, UNESCO, PUTER FOUNDATION, Jakarta Tsunami Information Centre, CIDA
6		SDN 2 Banda Aceh	Aceh	UNESCO and TDMRC
7		SMPN 1 Banda Aceh		
8		SMAN 1 Banda Aceh		
9	2010	SMAN 6 Banda Aceh	Aceh	JICA-JST, and TDMRC
10		MAN 2 Banda Aceh		
11	2012	SDN 4 Tanjung Batu	Majene, Sulawesi Barat	LIPI
12		SMPN 3 Pamboang		
13		SMAN 1 Pamboang		

6.3.2. Ministry of Education Legalisation (2010 Circular Letter)

Disaster risk mitigation in schools aims to develop cultural awareness, preparedness, safety and resilience to mitigate the potential risk of disaster. While the specific objectives of this strategy are to empower institutional and community schools, integrate DRR into intra and extra curricula and build partnerships with other actors (Ministry of Education, 2010). From the previous implementation (pilots conducted by LIPI) since 2008, in 2010, the Ministry of Education then issued Circular Letter Number 70a/MPN/SE/2010 to suggest regional government (governors and majors) in all areas in Indonesia mainstream DRR in schools. The Circular was to encourage local government to mainstream DRR education at all school levels across

Indonesia. However, the autonomous government paid little attention to this Circular. Furthermore, under the autonomous system, many heads of schools insisted that DRR education could only be implemented when the formal approval letter from the Provincial Education authority was issued and it has become more formalistic (FGD, See Triyono et al., 2012, Nurdin et al., 2017). This means that without adequate support from local authorities, the integration of DRR into the school curriculum will remain slow. Thus, it is important for local government to focus more on implementing this regulation in their area. It can be accomplished by including the programme in the provincial strategic planning agenda and allocating a specific budget to support the programme.

The circular was poorly disseminated across Indonesia, particularly in remote and marginalised regions. Consequently, many schools have no information about this circular and DRR knowledge is still considered “a new topic” for teachers. Likewise, there was a lack of support from local education authorities to addressing the issue. To integrate the DRR requires permission from local education authorities as all the school in under provincial education authority, so without any clear instructions from local government the process of the integration of DRR into school will remain static (FGD, Triyono et al., 2012).

Triyono stated that many local governments considered the SSB programme as project-orientated rather than to save people from disasters. Consequently, the circular had no significant effect on encouraging schools to voluntarily consider DRR education. In fact, it has only highlighted encouraging local government to mainstream DRR education in schools, without explicitly mentioning the budget or how the programme will be conducted. Even in practice the Education Consortium actively participated in disseminating this circular, but the MoEd has not provided a clear role for the dissemination and application of this this circular. Thus, it can be understood that the circular remains formalistic, as there is no effort to ensure its dissemination at a lower level. Nonetheless, it would need the intervention of

foreign agencies, such as the UN and NGOs to foster the process of implementation (Triyono et al., 2012).

6.3.3. Safe School - BNBP

Due to the lack of response from local government and schools to the Circular Letter 2010, The National Disaster Management Agency (BNPB) issued a new guideline for Safe Schools in 2012. The term School Based Disaster Preparedness programme (Sekolah Siaga Bencana) also changed to become 'Safe School and Madrasah'[2] (Sekolah Madrasah Aman Bencana - SMAB) under the Regulation Head of BNPB number 4/2012. In this regulation, The BNPB divided the term of Safe School into three different meaning; specifically, general, special and the meaning in association with disaster risk education. The general meaning is that schools must recognise and protect the rights of children to education by providing safe conditions and the environment for the learning process, health and security of children at all times. Special specifies that schools need to provide standards for structural and non-structural aspects, which are able to protect the school and its surrounding community from disaster risks. While, the meaning in association with disaster risk education is concerned on health and safety, risks awareness, and producing an appropriate plan before, during and post disasters for the school and its community (See Perka BNPB, 2012).

The 2012 Safe School guideline should be seen as the national policy to build safe schools in the future, while for existing schools it would be more complex as it may be difficult to remove schools located in places that are categorised as 'unsafe areas' (very high risk to hazards) to more safe areas. The programme should be conducted regularly**,** however, in practice BNPB applied this programme as ad-hoc support (a month) to selected schools, without involving LIPI and the Ministry of Education (Interview with Anwar).

The 2012 Perka also set out the framework for Safe School covering both structural and non-structural aspects to ensure a safe learning

[2] Madrasah is a term used for Islamic school in Indonesia. Generally, the schools have the same curriculum as general public schools. The difference is this school (madrasah) has more additional Islamic lessons compared to general public schools.

environment for school communities. The structural aspect includes the construction of schools, location, safe structure, class design and layout, and other supporting facilities. The non-structural aspect means to develop attitude and action on risk preparedness to the entire school community in facing disasters, specifically to prepare human resources through education: increasing knowledge, attitude and actions; Safe School's policy, preparedness planning and resource mobilisation (BNPB, 2012).

One of concern was that the existing schools had not yet considered disaster risk, as it would be contradictory to the Safe School concept. For example, some schools were built very close to the sea and would be prone to tsunami and many schools in Indonesia have very limited space for evacuation site, particularly in urban areas like Banda Aceh. The failure to locate schools in safe locations has contributed to the failure of the implementation Perka 2012. Additionally, the rampant corruption in school construction has made schools more vulnerable.

It should be noted that it was an improvement in Safe School in terms of concept and its application. However, according to the FGD and interviews with teachers the implementation of Safe Schools remained extracurricular and was very limited in formal lessons. The different characteristics of regions may also have contributed to different types of Safe School's programme. It depended on the support of regional leadership (See Triyono et al., 2012).

The lack of human resources at regional levels became a factor and DRR was not really implemented without external support. Even though there is a Circular Letter (2010) and BNPB guidelines, however schools remained confused regarding how to mainstream DRR in schools, in practical ways. Thus, without the self-initiative of school management, particularly head masters and teachers, DRR education would not be implemented in schools, especially when budgets and the lack of DRR knowledge are the key issues (FGD with school representatives; Hidayati et al., 2010).

The ineffectiveness of these two legal bases of Safe School are caused by: firstly, the lack of legal weight of these sources, so it is not a priority. Secondly, the absence of a specific national budget in regular basis and it also was not supported by regular School Operational Budget (Bantuan Operational Sekolah/BOS) activity guidelines (See Triyono et al., 2012, 2). However, Nugroho from BNPB stated: “Safe Schools has been budgeted in Special Funding Allocation under BNPB (Dana Alokasi Khusus /DAK) in 2011 (Rp.10 trillion), and it is predominantly utilised for the non-physical aspects” (Kompas, 2011b.). It is unclear how such a large budget can be spent on the non-physical aspects of Safe Schools, when in fact very limited DRR education has been introduced in schools. It is common knowledge that non-physical projects require incredibly small budgets in comparison with physical projects. Thus far, no explicit investigation and reports can be found that will assist the public to understand this discrepancy. Thus, it would need a stronger legal basis either at the national or regional level for Safe School to be implemented along with the budget allocation. Also it requires an integrated programme between the physical and non-physical aspects, so the DRR aspect is more reflected in school.

Apparently the BNPB intended to clarify that DRR should be integrated into curriculum as one project. In fact, based on the FGD, the DRR integration is still a separated project, with focusing more on emergency drills and a tendency to embed DRR in extra curricula activities or local content space, while curriculum integration into a formal lesson has received less attention. The integration of DRR into the existing curriculum demands more effort and skill from teachers. It needs teachers’ ability to understand the basic concept of DRR concept, so the programme would become more continuous rather than a short term project of Safe School, as will be discussed in Chapter Seven.

6.4. The Implementation of SSB

6.4.1. Lack of disaster knowledge

Even though it is stated as the right of every person to receive DRR education in Law 24/2007, there are difficulties establishing such understanding, as there is no instrument and capacity to introduce every person in Indonesia to DRR education. In the formation of SSB, it is important to address Law Number 24/2007. Consequently, it is understood as a vehicle to disseminate DRR from schools into the wider community in which every person can receive the minimum standard of DRR education.

From Lingkar's experience, in regard to implementing SSB, the shortcoming of formalistic SSB is limited to exploring basic science and environmental hazards, before moving to the development of safety measures. Hence, the learning has not yet explained the preventative action. It does not appear sufficient and does not encourage participation, therefore, it should build proactively by exploring the locality of hazard, community vulnerability as well as wider political and economic capacity, as will be discussed in Chapter Seven (Jannah, 2014).

It should also be noted that the passive attitude of the school community means that there is a lack of engagement approaches regarding the local context. In this context, Jannah suggests 'capitalising on local and indigenous knowledge and wisdom concerning hazards and disaster prevention, as well as long-proven local coping skills' (Jannah, 2014). Additionally, the implementation of SSB, demands more coordination with different stakeholders, both government and non-government organisations to develop training and conduct monitoring. Furthermore, communities need strengthening and to be ready for potential disasters by identifying specific threats and developing action plans to mitigate risk in schools (Ministry of Education, 2010).

The implementation of SSB can adopt indoor and outdoor activities to increase the knowledge and awareness of disasters for students, teachers and the school community. Indoor activities can be conducted by using text and animation movies in classrooms, while outdoor activity can be conducted

by visiting disaster affected areas, museums and learning how to save coastal zones by planting mangrove trees. Other methods, for instance music performance and art activities such as drawing would make students enjoy the programme and assist them to remember the knowledge (Rusydy, et.al., 2015). These methods can be effective ways in delivering disaster related knowledge to the students in more entertaining ways. An example of this as described in the previous chapter is the folk song called 'Smong' that is sung on Simeulue Island.

Although the current progress of the BNPB programme on Safe Schools relates to non-structural aspects, which means BNPB has essentially taken a major role on DRR education rather than the safe infrastructure aspect. BNPB has recruited national and local facilitators who have spent the considerable budget of trillions, but it is uncertain whether these facilitators have been effective (Interview with Robi). The concern is that the recruitment of these facilitators and its facilitating process lacks coordination with the MoEd, which has formal link with schools. Additionally, BNPB, a new institution has no experience of DRR education, as it was developed in 2007 to manage post-disaster recovery.

6.4.2. Preparation Phase

If a school want to participate in SSB school, the school can apply to the Local Education Authority and BPBD (Provincial Disaster Management Agency). When there is a commitment to SSB, a school would be required to develop an Action Plan (Rencana Aksi Sekolah/RAS) as the guidelines for the school to implement the SSB programme. It should be authorised through school policy, so that it becomes integrated to enable resources to be sufficiently prepared and to show the significance and readiness of schools with respect to the wider community. This Action Plan should be planned democratically and transparent. The action plan is adopted based on vulnerability to certain hazards, which might be different from one school to another school**.** It would include the aspect of the physical and non-physical.

As many schools' lack understanding and expertise, authorities need to provide support from the early stages (Perka BNPB, 2012).

The initial analysis is essential to understand the demography, social and economic context of schools, existing management and policies, disaster risk around schools, historical disasters and its impact on schools and school facilities. This analysis will need support from various experts, seeing as many schools have no resources and/or time to seriously conduct it (Ministry of Education, 2010). For example, at the beginning of the formation of SSB, SMK Nasional in Berbah, Sleman stated its commitment to joining the SSB programme in local Education Authority in Sleman District. After the initial assessment, the SMK Berbah was declared the first official SSB by the Regent of Selman District on 19th January 2012 (Baskara, 2016).

6.4.3. Education and training implementation

Once the preparation has been made, the second phase comes next. It covers: training for the teachers and schools management and the integration DRR into the school curriculum. The DRR integration into curriculum as set out in the 2010 Circular can be completed in three methods: integrate DRR into main subjects, local content and via extracurricular activities.[3] The significant topics included in the DRR training such as knowledge about hazards, an example of how to implement DRR in the schools, etc. Thus far, no evaluation has been conducted on this process, so it is hard to measure its progress (Triyono).

6.4.4. School Watching

School Watching was considered one type of activity the Safe Schools programme adopted from Town Watching, which was founded by Prof. Yujiro Ogawa from Fuji Tokoha University in Japan. School Watching means a programme for school communities to identify schools elements and the environment from the perspective of risks and the impact, along with finding solutions (Triyono & Kusumawati, 2011). The School Watching programme

[3] Activities such as the Scouts, Red Cross unit in school.

can be conducted regularly through indoor and outdoor activity to raise awareness of the school community towards disaster risk. The activity includes producing a risk and evacuation map of the school. It is a participatory initiative that assists school communities to understand, be aware and prepare for any potential risk around their school. Prior to this programme, basic knowledge of disaster risk and DRR should be introduced to students.

School Watching can be part of Safe Schools and refers to five parameters of disaster preparedness by LIPI-UNESCO, in particular the parameters of knowledge and attitude and emergency plan (Triyono & Kusumawati, 2011). School Watching can also be conducted prior to supporting evacuation simulation. This can be placed in extracurricular space, such as the Boy Scouts, School Red Cross, and the likes. This observation comes under government authority and the school community discuss with the authorities the best way to mitigate any risks.

The School Watch programme is strongly linked to structural aspects of the Safe Schools initiative under Perka BNPB 2012. The government (BNPB) can respond to this report, schools would be at an advantage. Nevertheless, without direct links to policy makers, any potential risks to schools remains an issue. Indonesia has faced a big challenge regarding the safety of school buildings, as it was government project that was poorly supervised and possibly corrupt. Hence, School Watching is less benefit to the school community without support from the local authorities.

6.5. Progress and Challenges of SSB

During implementation, some national NGO's had concerns pertaining to community-based disaster risk management, climate change adaption and sustainable development, such as the Lingkar Association (Perkumpulan Lingkar) based in Yogyakarta. The Lingkar Association was formed to respond to the earthquake in Yogyakarta Province in 2006. It focuses on disaster risk mitigation and sustainable development. The organisation implemented the SSB programme in several schools in Yogyakarta province.

Research conducted by Lingkar in 3 villages in Bantul District and Yogyakarta Province on the causes of disaster, showed that the deterministic doctrine that disaster is related to fate that cannot be avoided covered 38%, 14.2% because of poor spatial planning with less consideration given to the environmental impacts, 3.7% climate change (global warming), 14% was natural conditions that cause disasters, 0.3% the failure of technology, 1.5% supernatural powers and 27.1% answered more than one cause. Lingkar conducted participatory workshops, training, FGD, facilitation and mentoring, and the development of school networking and advocacy. In implementing SSB, Lingkar set out the following core competencies: to implement disaster risk analysis in the neighbourhood or school with specific indicators to identify natural hazards, identify vulnerabilities, identify capacities and undertake evaluations (Jannah, 2014, 60-65).

Table 6.2. Evaluation of the implementation of SSB Parameter (LIPI/CDE/Perka BNPB) in the senior high school in Indonesia.

Parameter	Indicators	Verification	Evaluation	Output
Knowledge, attitude, skills	Students recognise the hazards around school; vulnerability and capacity and have the skills/attitude when facing disaster.	The availability of lessons/programmes on teaching-learning hazard; teacher training on DRR and regular simulation.	Student Test / FGD with teachers.	Lack of teacher knowledge and learning material has caused the learning to be less associated with the issue of disasters. No regular training provided by local Education authority related to DRR.
Emergency Plan	Availability of emergency plan which has been discussed with all	Documentation of emergency plan.	Questionnaires for school management and FGD with head teachers/school	Most of the schools official are not familiar with the documentation of emergency

	stakeholders in schools and communities.		representatives	plan.
Early warning system	Signs and evacuation map, access to emergency information, students and communities understand the early warning system.	Signs and evacuation map, applicable emergency signs and symbols.	FGD involving head teachers/school representatives	Most of schools officials are less familiar with early warning system.
Resource mobilisation	Support from school stakeholders, coordination with local emergency unit, emergency tool kit and basic skills to cope in an emergency.	The availability of emergency equipment, trained emergency team/teacher, number of simulations conducted.	FGD involving head teachers/school representatives	No regular (tsunami) drill /training conducted at schools.
School policy	Policy on the sustainability of SSB.	Formal letter from the head of school, and funding availability for the sustainability of SSB.	FGD involving school representatives and Interview education stakeholders	Lack of the legal framework in national and local level to support school policy and funding.

The five parameters mentioned above aim to measure the efforts made by schools in developing School-based Disaster Preparedness, parameters, indicators and its verification. Each of them is not a stand-alone parameter but linked to one another. It provides means of verification to measure and communicate impact or outcome of a program, its process as well as the method used. Indicator can be either qualitative or quantitative (CDE, 2011). In this study, the researcher used different methods to measure including student test to assess the knowledge of students, questionnaires and FGD involving head teachers/school representatives to asses the preparedness

planning, the resource mobilisation, the early warning system. This includes the FGD which involved school representative and interview with education stakeholders to assess the school policy. This measurement required to enhance the school resilience toward hazards.

The Disaster Management Agency can use these five parameters in an annual evaluation of every school. The subsequent report can be published independently, and schools and their associated authorities can respond appropriately.

It should be mentioned that SSB should be initiated from local risk assessment and disaster preparedness programmes in schools to learn how to minimise the effect of hazards. Poor quality DRR education research is evident in Indonesia. For instance, Suhada (2014), indicated the lack of conceptual understanding of DRR education in Indonesia, in a survey completed to assess disaster knowledge that reached 61.41% of respondents in school communities. Research by Suhada on the capacity of SSB school; specifically, Senior High School North Kluet 2, South Aceh, concerning earthquakes and tsunami revealed some basic understanding of DRR knowledge regarding school communities, but it will need more support to sustain this achievement. However, Suhada's work was not actually clear in what capacity the schools need to improve.

In Aceh, from 2013 to 2018, the Local Education Authority has continued replicating the SSB programme. This programme is being implemented by a local NGO (Khadam Nanggroe) that is also the TDMRC's partner in the development of the SSB programme. The NGO has been replicating the steps of a programme that is similar to the TDMRC programme, as mentioned previously. They are still conducting the programme in six districts and it will continue next year in different districts. Up until 2018, Aceh Province has developed 114 SSB programmes that cover Banda Aceh, Aceh Besar, Simeulue Island, Aceh Jaya, Pidie Jaya, and Aceh Utara (Khadam Nanggroe, 2018).

One concern about the implementation and evaluation of the SSB programme in Aceh Province is the sustainability of this programme (Rusydy

et al., 2015). In Aceh Province, of the 114 schools (Appendix 3) that have implemented the programme, including the simulation exercise, only a few schools continued using it. The Local Education Authority of Aceh has allocated funds to the programme since 2013, but it only accommodates ten schools each year. In fact, there are many schools in Aceh Province located in the disaster prone area that need the programme. Despite the fact that there are regulations from the Ministry of Education to develop the SSB programme, local government need to make local regulations and ensure that local public schools will follow the regulations. This regulation will be used by schools to plan the budget to conduct school based disaster preparedness programmes in their schools (Khadam Nanggroe, 2018; Interview with Yanti).

Several researches have shown the positive impact of disaster education on school's preparedness to disaster. The models were developed with interventions based on the critical parameters which include knowledge and attitude, policy statement, emergency planning, warning system and resources mobilisations developed by LIPI (Hidayati et al., 2006).

A survey conducted with 372 junior high school students from SSB and non-SSB in Banda Aceh showed that students in SSB who had prior knowledge of disasters, were more actively involved in disaster preparedness activities such as first aid training, disaster meetings and also in disseminating information to their friends, family and neighbours (Oktari et al., 2015). An additional study in Jogjakarta, Indonesia, which involved 239 junior high school students from SSB and non-SSB schools in the survey, showed that students from SSB who learned hazard education through the earthquake module had improved knowledge and levels of risk perception, critical awareness and attitudes in relation to earthquake preparedness than their counterparts who did not receive hazard education. Hence, it can be seen how implementation of curriculum-based disaster issues was effective in mitigating risks, enhancing disaster knowledge, increasing the level of risk perception, and individual and school preparedness. The effect might play an important role in raising public awareness, spreading accurate knowledge about disasters and promoting behavioural preparedness on disasters in the

wider community rather than being limited to school (Adiyoso and Kanegae, 2013). This evidence indicates that SSB can be an effective method to increase knowledge, attitudes and awareness regarding disaster risks.

Regarding the survey conducted in the Banda Aceh area from 1-15 October 2014, where the researcher invited 30 schools' representatives, only 17 schools responded to attend FGD, and 12 schools returned the survey form**.** The schools selected were profoundly affected by the 2004 tsunami and previously involved in DRR activities with consideration given to their familiarity with the research theme and the importance of it; the suggestions and data from the local Education Authority and are possibly at risk according to the multi-risk. The result of the survey generally showed the limitation of DRR education in Aceh Province, as follows.

Figure 6.1. School preparedness programme in Banda Aceh

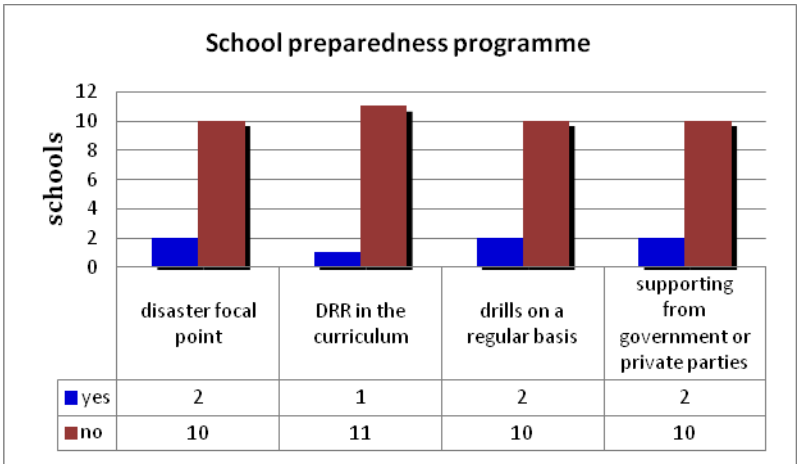
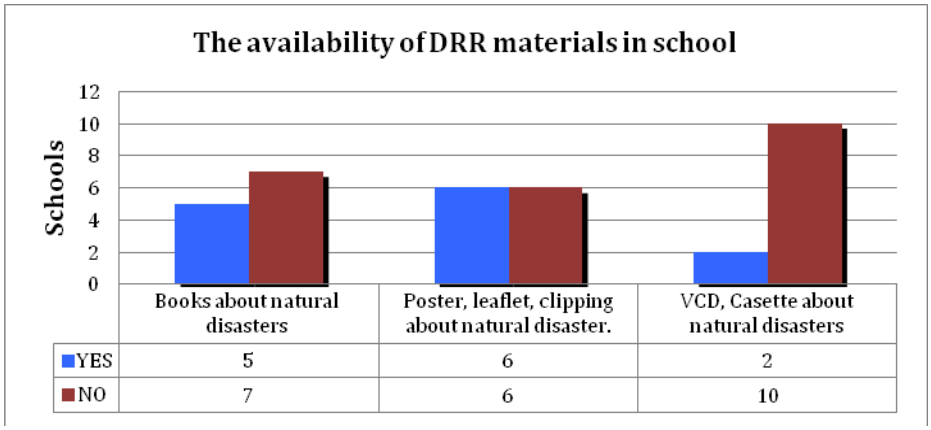


Figure 6.1 describes the existence of supporting information on DRR from 12 representatives of the Senior High Schools, as respondents. Of the 12 people who were questioned about the general condition of the disaster programme in the schools, only 2 schools confirmed having a disaster focal point, regular drills and support from the government or other related parties in running the programme. In contrast, 10 schools stated that they would not be able to participate due to the lack of guidance and financial support for the programme. It also shows that the mainstreaming DRR into the existing curriculum has not yet been achieved, except for one school which indicated

that DRR has been integrated in biology. However, it needs further clarification the extent to which this integration has been done.

Figure 6.2. The availability of DRR materials in school



The data show that the majority of the Senior High School representatives who participated in the research do not have a VCD or cassette about natural disasters, which is one of the media that can be used by the chemistry teachers during the learning process. In addition, only five schools have books about natural disasters in the library, while the rest do not have any printed materials in their schools. The books cover the knowledge about natural disaster such as tsunami, earthquake, landslide, fire and flood.

Similarly, the dissemination of the information by poster, leaflet or clipping is only available in six schools, while students from other schools do not have any information of this type related to natural disasters.

Figure 6.3. Disaster preparedness-related training

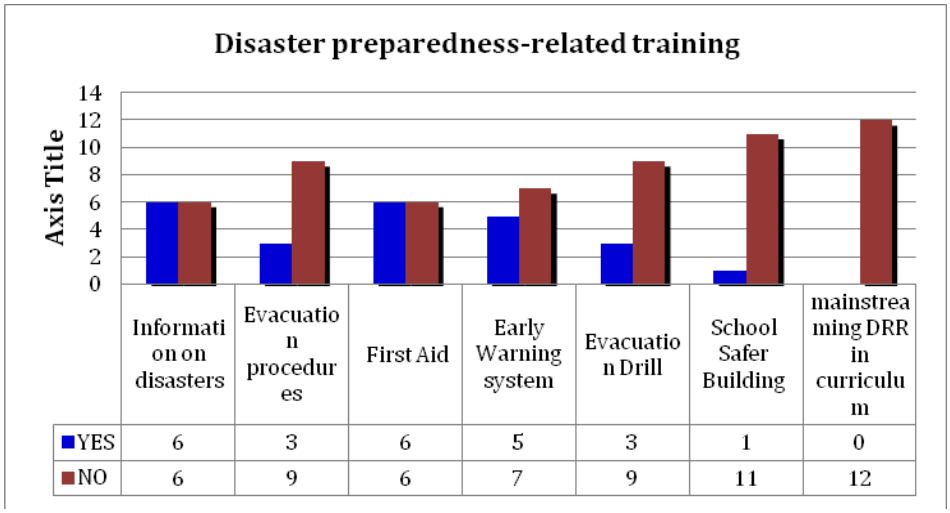


Figure 6.3 describes the frequency of the disaster preparedness-related training events attended for various topics for the Senior High School in Banda Aceh based on 12 schools' representatives as respondents. All the respondents emphasise that no training has been conducted so far on mainstreaming DRR in the curriculum and only one school attended the safer building training. The chart also shows the same six respondents received information on disasters and first aid training. Three respondents recorded training on evacuation procedures and five schools hold training in early warning systems. These results show that the DRR concept is not available yet as part of the curriculum in Senior High School in Banda Aceh. However, the respondent believes that mainstreaming the DRR into the curriculum would benefit students particularly those who live in disaster prone areas. This evidence is supported by the overview of FGD with school representatives (see chapter three) that only two schools involved in this study. They have been involved in several projects on the disaster preparedness, however because lack of support given by the local government regarding the implementation of Disaster education at school, the program was not continued.

6.6. Sustainability Concern

SSB remains project based and is predominantly support by external funding. Despite developing Safe Schools, BNPB has faced a lack of coordination from the Ministry of Education, strict rules on using the BOS budget, is centralistic rather than decentralised; no autonomy for schools to initiate and develop the DRR programme; lack of local NGOs interested in schools instead of the community (Interview with Adelina).

This supported the argument that DRR is considered external interference rather than internal domestic values. Thus, it needs more time to internalise DRR in education, as described by Rafliana (interview). As an external concept DRR has low motivation and initiatives from both the central and local level. The responsive project based DRR programme which has operated since the Aceh tsunami in 2004 continues to make slow progress.

However, the recurring disasters in various regions of Indonesia would expand on positive awareness which increased the willingness to prepare and respond well to disasters. Adelina suggested providing more autonomy for schools to develop their own DRR initiatives, like autonomy in villages. Nevertheless, it appears that this autonomy was provided to schools under the 2013 curriculum, but the lack of pro-active, creativity of the teachers/schools remains a constraint. Therefore, the recommendation to mainstream DRR for teachers' candidates in university level is considered more reasonable in the current context.

In rural areas such as Mentawai West Sumatra, even the teachers have strong initiatives for DRR related programmes, but poor resources and facilities remain challenging. For example, in rural areas, there are sometimes only 3-5 teachers available to teach an entire school**.** Working with local people/at the local level is easier and promising for sustainability even if the government is unsupportive. The opinion that 'teacher has understood this issue' was not fully proven, as many teachers have a lack of capacity and knowledge on DRR so far (Interview with Rafliana and Adelina; FGD).

Many SSB pilot projects have been finished. Only a few schools still applied in small portion of DRR knowledge due to the lack of teacher capacities and support from regional government. However, the lack of a legal framework for the current national policy on DRR education, i.e. the 2010 Circular and the 2012 BNPB SSB guideline can be supported by the progressive 2013 curriculum, which has opened spaces for this integration in several science subjects. Additionally, integrating DRR education in the school curriculum depends on teacher capacity. However, it has been recognised that Indonesian teachers' capacity remains low in general. Therefore, it should be inserted in the curriculum of the faculty of education which produces teachers for schools, and in teacher training concerning capacity building. Thus, when there are an appropriate qualified number of teachers, it can be integrated in various ways: either integrated in the curriculum, or extra curriculum. For example, some teachers can address flood disaster preparedness within curriculum activity on 'reading and

discussing its contents', in the Indonesian language, in which child friendly pedagogies, group work and rising meaningful question were encouraged (Interview with Zamzam; UNISDR, 2007). However, the programme has still not been evaluated, so there is no further information on whether or not it has been successful and met its aims.

Table 6.3. Review of Stakeholder Interviews on SSB

Description		Recommendation
Progress	Challenges	
The increasing awareness among school management and teachers that schools should be a safe place for teaching and learning for children and ensure the rights of children are fulfilled. It has been integrated through various extracurricular activities such as dance, the scouts, environmental projects, etc. Under the 2013 curriculum, some subjects have been integrated and have the potential to be integrated. Biology, IPA in SMP in Semester 3 has been integrated.	Lack of teachers' capacity and school management on understanding DRR; particularly in remote areas where they are unresponsive to disaster issues. BNPB has never trained teachers. It has only developed safe schools and hired facilitators who provide general support. The DRR integration in the school is "only a recommendation" for schools, as mentioned in the 2010 Circular. The commitment of schools and teachers' motivation to integrate DRR education can help to foster the progress of the implementation. However, this condition should be supported by the relevant knowledge. The lack of awareness and willingness of school/teachers to look for resources by themselves is	Strong legal binding, as a compulsory subject in the National Curriculum at all levels. DRR should be included in the technical guidelines (petunjuk teknis/juknis) for schools. Using BOS to support DRR activities.

The integration of DRR knowledge can influence the paradigm of students and improve their awareness about a problem that occurs around them in daily life (case study in Bandung).	a challenge for the integration of DRR into the school system.	
The establishment of 2010 Circular which provides official guidance on SSB by way of three different approaches: subject, local content and extra curriculum. Perka BNPB 4/ 2012 about Safe School, to introduced school as part of DRR management.	Main challenge related to sustaining the programme is weak legal binding (Circular and Perka BNPB No. 4/2012), which was set up as a recommendation for schools to implement. It has been not included in the national strategic priority. The implementation of SSB is dependent on the education authority at provincial levels and school management. However, only some areas in Indonesia focus on this issue.	Improve capacity at provincial level, including the education authorities and BNPB, plus, school management. It should be included in the provincial priority/plan. Improve the role of the National Secretariat for Safe Schools to stimulate the implementation and to ensure the programme is sustainable in schools. Teachers need continued support and encouraged to develop DRR in lessons.
The willingness of	Lack of teachers' capacity	The module should

school management and teachers to continue Safe Schools activities as part of the school programme. The establishment of the Disaster Library which helps to improve students understanding on disaster related knowledge (SDN 2, Banda Aceh) 2006-2007 assessment of disaster preparedness level in community LIPI 2008- SSB developed and introduced limited piloting projects; 2009 the Curriculum Centre developed a Module; 2010 MoEd issued Circular Letter; 2012 Perka BNPB	and creativity in integrating the topic in the curriculum, as a result of the teacher education system in Indonesia where the education faculty in university has a very rigid teaching system but forget to develop teachers' creativity. Similarly, only the schools' curriculum has been developed, while the teacher's curriculum has remained the same. Teachers have to accomplish many administrative works but lack of incentives which caused low of intention to explore/learn new topic. Frequent management changes in schools. Lack of ability to include DRR in RKAS. Lack of measurement to assess the effectiveness/impact of intervention at schools It is more project orientated and only selected schools assisted and no evaluation conducted so far.	be accompanied with technical guidelines for both teachers and students. Integrated in teacher education in university. Involve teacher training institutions such as the Accreditation Centre and LPMP (*Lembaga Penjaminan Mutu Pendidikan*/quality assurance of education institutions) to support the processes. It requires a strategy to embed the DRR knowledge from the teacher recruitment and any capacity training aimed at teachers. It needs to identify spaces in the curriculum to insert DRR education in detail and provide national guidelines for the implementation. More autonomy for schools to initiate and develop their own DRR project based on their context.

Apart from some challenges addressed such as lack of teachers' capacity and creativity in integrating the DRR topic in the curriculum, the interview with stakeholders (table 6.3) showed that some developments of DRR education in Indonesia has been achieved. The progress means here as the improvement and development of DRR education since 2004 tsunami in Aceh to 2017. For example, the development of DRR module, the establishment of Circular Letter 2010 and PerKa BNPB 2012 for institutional support, the willingness of some school to continue Safe Schools activities as part of the school programme. For example, 16 days were set aside to support the SSB programme in Sikka district in 2009 (Kodijat and Rafliana, no date). The facilitating support from LIPI-COMPRES-UNESCO can be considered as an institutional support for the official body of BPBD Sikka District. Thus, then in 2010 BPBD Sikka proposed certain budgets to regional government to sustain and scale up this Safe Schools programme in the wider community and to the official government. At this point, no report has been published to disclose how far this programme has been sustained in Sikka District.

When LIPI discontinued support of DRR education in schools, BNPB as the new body established in 2007 for disaster management should be considered as the institution that was responsible for the sustainability of the DRR program in school. However, BNPB's engagement in Safe Schools remains questionable due to its lack of expertise, experience and coordination with the Education Ministry/Local Education authority. Therefore, this research suggests transferring knowledge from LIPI to BNPB on DRR education in particular regarding the Safe Schools programme should be .

Furthermore, the country faces some challenges in scaling up programmes and ensuring sustainability, as shown by the lack of published research assessing challenges associated with the implementation of DRR within school curricula (Amri et al., 2017). The Indonesian situation may be a typical case, whereas internationally the guarantee of effective outcomes, sustainability and scaling-up are the main issues related to DRR implementation within the school curricula (Ronan, 2014). From the point of

view of the government, the issue of lack of coordination between central, provincial and local government was acknowledged, although the policies claimed to be in place at the national level (Suharwoto, 2014).

The lack of training and the introduction of the new curriculum has also contributed to teachers' lack of understanding. Some teachers might learn individually, however appropriate training is required. For example, there is no continuation of the SSB programme where several high schools such as MAN 2 and SMA 6 were pilot projects for LIPI in 2006 (FGD).

Picture 6.1. With students and teachers from MAN 2, one of LIPI's pilot schools in Aceh.

The lack of sustainability has become a concern and more practical approaches in teaching DRR may be essential to fill this gap. The UNDP also confirm that:

> "Although integrating DRR into school is a sustained approach to raising awareness amongst school aged children and teenagers, it does not facilitate an understanding of a 'culture of safety' and how that translate into daily activities and is not restricted to the classroom" (UNDP, 2012, 14-15).

It can be said that there are concerns in relation to the ineffectiveness of DRR education. Hence, it requires different approaches and fundamental action to improve the situation.

6.7. Re-contextualisation of SSB

The re-contextualisation of SSB as the applicative framework of DRR was an accumulation of the facts of the severe impact of the disaster in Aceh in December 2004 and the low level community disaster preparedness based on assessments in 2005-2006, conducted by LIPI-UNESCO. It subsequently contributed to the development of the SSB framework and piloting in some schools in several regions in 2008-2009. During two years of this specific implementation, the Ministry of Education formally issued Circular 2010 to legalise and encourage local government to mainstream DRR education in the school system. It was a progressive development, though this letter was not binding, not associated with the national budget and was not sufficiently disseminated to cover all Indonesia's territories.

Even though Indonesia has made enormous efforts to reduce disaster risks at the school level and has achieved major milestones, further effort is required to educate students about hazard related knowledge, especially those who are living in high-risk areas (CDE, 2011). The limitations include the lack of disaster risk information facilities in schools, as it has not been incorporated into schools and subjects at all levels. Furthermore, the disaster-related curriculum content was implemented into social and physical education only, which is focused more on the lower level than the higher-level grades (Pandey, 2007; BAPENNAS, 2010). This situation has meant slow progress in the achievement of the Hyogo Framework for Action Priority 3, as the progress rate is still at level 3 due to the lack of institutional commitment made in this sector (Triutomo, 2013). Level 3 means that institutional commitment was attained but achievements are neither comprehensive nor substantial.

6.8. Conclusion

SSB is an explicit accumulation of DRR education, transformed from global experience into the Indonesian context. It was a development stage from 2005-2007, in terms of formulating DRR knowledge based on LIPI's assessment on the preparedness level of school communities. In 2008, this

SSB was piloted in some schools voluntarily. Two years later, the MoEd legalised it under the 2010 Circular, which encouraged all regional governments and schools to adopt and support the SSB programme. Hence, it became an umbrella for DRR education to implement in the school system within the curriculum.

The active engagement of LIPI and CDE to promote DRR education has contributed to forming the SSB frame. It subsequently attracted the national policy of SSB from the Ministry of Education (Circular Letter) and BNPB (Guideline for Safe Schools). The latest guideline from the BNPB in 2012 has encouraged the SSB to be more obvious in terms of budgeting under national disaster management. However, the concept of Safe Schools in BNPB has slightly moved from the previous concept of SSB applied by LIPI. Safe school from BNPB uses a top down approach by hiring and training several individuals as national facilitators. This facilitator then recruits people at the local level to be facilitators. The focus remained on the preparedness knowledge and skills of facilitators but there was lack of coordination with LIPI and MoEd when facilitators were recruited.

It should be noted that SSB under the Circular has a lack of entry points to access the national budget; otherwise, when BNPB issued the guideline for Safe Schools in 2012, it was allocated a national budget. It was the national emergency fund allocated by Ministry of National Development Planning (BAPENNAS) to initiated DRR education in the first stage. After five years, (2010), this budget was terminated, while many international agencies in Aceh had also finalised their projects; hence, SSB-LIPI gradually decreased and was uncertain from 2010-2012. However, there was a new movement under the Law 2007 on disaster management in which the new national DRR institution was established, i.e. BNPB and in 2012, BNPB adopted the newly modified SSB programme called 'Safe Schools', to cover the physical and non-physical aspects of schools. Nevertheless, as BNPB's Safe Schools was implemented independently, the top-down approaches and lack of coordination with LIPI and MoEd, reveal that it has been less effective.

SSB-LIPI has very strong identity as a reflection of the actual condition post-tsunami with the support of national and international actors organised under the CDE and legalised by the MoEd by way of the 2010 Circular. When SSB was superseded by the BNPB in 2012, the identity became more formalistic and project orientated. It seems teachers, students and school communities played a passive role and relied on support from external facilitators. Many books or booklets on SSB published by LIPI between 2008-2012 was reproduced without any significant development. It is therefore suggested LIPI and the university of education evaluate these publications and simplify them so that they are easy to read and to follow in terms of understanding and implementation. In practice, many schools have been unable to utilise these resources from LIPI without sufficient support

The Circular has suggested that to maintain sustainability, the SSB need to implement three aspects, which include the enablement of school society, curriculum integration and establishing stakeholder partnerships. So far, the SSB is treated as an independent project in a certain part of the school programme and it is expected to continue without any further assistance. Nonetheless, it depended on the quality of knowledge and awareness of the school stakeholders, in particular the head of school and the teachers.

Following the meaning and application of SSB/Safe School, this chapter is concerned with the development of disaster knowledge and its integration into the school system initiated by LIPI, which has not yet been completed and it still experiencing a lack of support from different stakeholders in this area. The Ministry of Education (The Curriculum Centre) also has played a limited role in integrating DRR into curriculum. Such a discrepancy has contributed to the lack of local government understanding and slow progress in disseminating knowledge at the school level.

The current Safe School is a repetition of that designed previously by LIPI-UNESCO. Lack of human resources would attract serious attention to prepare a sustained support and capacity building for school's management and teachers. Furthermore, it is essential to focus on other natural disasters,

besides earthquakes and tsunami. For this reason, SSB should aim to cover more on DRR knowledge to improve school resilience.

Although the formal meaning of DRR education expanded from the independent system of SSB into integrated DRR in the teaching subject (curriculum), under the Circular Letter 2010, it was not actually evident in the curriculum development and the term 'non-structural' aspect of 2012 Perka BNPB. It was the missing link between LIPI and the Ministry of Education in terms of material and methodological context. It needs multiple approaches and stakeholders to integrate DRR knowledge into the system. In particular, in the University of Education which produces teachers, so that a teacher has the basic DRR knowledge which can be developed in various subjects or occasions.

Since the 2010 Circular Letter, SSB was introduced as independent, outside intervention into the existing school system but it has not yet been integrated into the school curriculum or teaching subjects. The current mainstreaming of Safe School-BNPB is still an impartial, infrequent programme of extracurricular activities in terms of disaster preparedness knowledge, skills and early warning systems in a certain period. Nevertheless, SSB should be a frame where DRR knowledge can be disseminated to students in Indonesia. However, without the significant steps of the DRR integration into the school level, SSB would simply be a more official and bureaucratic, as part of the BNPB project. The lack of DRR knowledge development and transformation into efficient sources and the lack of the DRR pedagogic device has made SSB unsustainable, instead of increasing awareness and its distribution to the wider community.

This chapter also highlighted the current challenge of SSB under BNPB, which is more formalistic, while the notion of integrating it into the curriculum as stated in the 2010 Circular has been dismissed under the term 'non-structural' as a complement to the physical aspect of 'structural'. In practice, the 'non-structural aspect of Safe Schools has only adopted the meaning of SSB from the 2010 Circular, which is an independent programme

within extra-curriculum activities, or in Local Content Curriculum (LCC). DRR integration into the curriculum become more challenging as a school under the Ministry of Education and BNPB has no direct association with a school including teacher and curriculum. Thus, the current application of SSB/Safe School has increased in number, although the quality and sustainability is questionable. Furthermore, DRR is a growing subject, both as an independent subject, or a topic integrated with other science subjects, as natural disasters can now be identified by the development of science and technology. The foundation to integrate DRR into the science curriculum requires a systematic approach where the DRR knowledge can be well embedded. Such issues will be explained in Chapter Seven.

CHAPTER SEVEN
INTEGRATING THE DRR CONCEPT IN THE HIGH SCHOOL SCIENCE CURRICULUM

7.1. Introduction

Following chapter six on the application of School Based Disaster Preparedness (Sekolah Siaga Bencana/SSB) in Indonesia, this chapter will investigate the development, challenges and strategies related to integrating DRR related knowledge into the science curriculum in senior high schools, based on the Focus Group Discussion (FGD), content analysis, interview and the teaching intervention in classroom in high school in Banda Aceh, Indonesia. This chapter argues that the integration of the Disaster Risk Reduction (DRR) concept in the science curriculum in high school can improve students' understanding of disaster risks and sustains DRR education in Indonesia. It will answer research question five on how to effectively integrate the DRR concept within the science curriculum within the 2013 national curriculum, so that students' understanding of disaster risks in Indonesia is enhanced. This study used the climate change issue to explain hazard phenomena, because teaching climate change is seen as a paradigm in teaching related to the risks secondary high school students in Indonesia are confronted by.

The structure of the chapter is as follows. Section two discusses the conceptual integration of DRR and the options related to integrating DRR into the curriculum, particularly within the science curriculum. Section three presents the results of the case study undertaken in Aceh on the implementation of disaster education via science curriculum interventions in the classroom. Finally, the chapter identifies the challenges and recommendations regarding the effective integration of DRR into the senior high school curriculum system.

7.2. Integrating DRR into the School Curriculum: Opportunities and Challenges

A diversity of research has pointed out that incorporating DRR into formal education can be an effective way of reducing risks (Petal and Izadkah, 2008). The Indonesian government has been aware of the urgency of embedding the issues of disaster risk in the national education curriculum. In 2010, with the support from the Indonesian Disaster Education Consortium, the Ministry of Education and Ministry of National Development Planning (BAPENNAS), collaborated to incorporate DRR knowledge into the school curriculum through the "Circular of the Minister of National Education No. 70a/SE/MPN/2010 on Mainstreaming Disaster Risk Reduction in Schools." The vision of this strategy is to achieve a culture of disaster-awareness, preparedness, safety and resilience at the schools' level to prevent and reduce potential losses from natural disasters. The Circular addresses three aspects:

1. Empowerment of institutional roles and the capacity of school communities.
2. Incorporation of DRR into the school curriculum, both intra and extra-curricular.
3. Establishment of partnership and systems to support the implementation of DRR initiatives in schools (Ministry of Education, 2010).

To support the action, the National Curriculum Centre has made the topic of DRR harmoniously integrated into basic competencies in the 2013 curriculum, for instance topics about global warming in physics (see Table 7.4). However, due to the lack of teachers' knowledge on DRR, teaching and learning about global warming is not linked with understanding hazards/disasters (Interview with Samsul Bahri and Zulfiyani).

National policy has adopted DRR knowledge into the curriculum, though it faces challenges in its implementation at the school level, due to the lack of guidance and teachers' ability to integrate DRR related issues in classroom activities (FGD and interviews). Hence, the knowledge and skills to integrate DRR in classrooms has not developed. Consequently, this chapter

will attempt to develop an example of an integrated DRR concept in the science curriculum in senior high schools in Indonesia.

7.3. DRR Integration into the Science Curriculum

Integrating DRR into formal education and curricula has been suggested as one strategy to help increase knowledge and understanding of disaster risks. There has been some initial progress in initiating DRR integration into the school curriculum in Indonesia. However, few studies attempt to analyse the integration of disaster knowledge into the school curriculum comprehensively, from national policy level to local implementation in schools, especially the integration of DRR knowledge into the science curriculum or related topics, such as climate change.

The study indicates that climate change is the major driving factor in increasing the probability of climate related disasters, such as forest fires. The disaster creates economic damage as well as harming people's health, not only in Indonesia, but also in neighbouring countries due to the increasing in emission from the forestry activities. The impacts of the forest fires within the country and other countries in the region have forced the Government of Indonesia to strengthen its efforts to reduce the risk of forest fires (Agung et al., 2014).

In the maritime sector, climate change is also held responsible in part for increasing sea level, ocean acidification, reducing biodiversity, ecosystem stress and risks to the human support system (World Bank, 2013). Ocean acidification is referred to a reduction in the pH of the ocean over an extended period, typically decades or longer, caused primarily by the uptake of CO_2 from the atmosphere. It is acknowledged that the oceans are absorbing roughly a third of CO_2 from the atmosphere. When CO_2 dissolves in seawater, it forms carbonic acid, which then will dissociate from the water and release ion hydrogen and bicarbonate. In the ocean system, when more hydrogen is released in the water, the sea becomes more acidic, which in turn effects the chemistry of the ocean system. Over the past 300 million years, ocean pH has

been slight basic, about 8.2. However, it has dropped 0.1 pH units to 8.1 in the last few decades (Gattuso, & Hansson, 2011).

Indonesia is one of the most vulnerable countries affected by escalating levels of ocean acidification. In Indonesia, the fisheries sector has contributed positively to increasing employment and reducing poverty. Additionally, more than a billion people worldwide are relying on food from the ocean as their primary source of protein. Ocean acidification can have an impact on the ocean ecosystem to varying degrees. For example, studies have shown that a more acidic environment has an intense effect on some calcifying species, including oysters, corals and plankton. When some organisms in the food web are at risk, the entire ocean system may also be at risk (NOAA, 2017). Considering this, teaching DRR through climate change issues increases the urgency to address knowledge and communicate risks to reduce the vulnerability of people in all sectors. To that end, disaster risk reduction and science education together can play a crucial role in educating society and younger generations.

Understanding climate change as global issue required global awareness and DRR integration with scientific subjects will make it easier for students to understand. Climate change demonstrates the need for positive action on all levels and, as such, it is an ideal theme to bring a school community together to explore issues of sustainable development (Wade, 2007). The need to strengthen the school curriculum towards disaster response and management programmes has long been demonstrated. Various literatures show that incorporating DRR into formal education can be an effective way of reducing risks in disaster prone areas. However, there is a shortcoming in advancing this notion into the development of classroom activities, as there has been limited empirical analysis of DRR education in Indonesia, particularly in Aceh province. Teaching DRR is very challenging, especially in areas where the customs are traditionally conservative and teacher's knowledge on hazards remains limited. Moreover, in Indonesia 's curriculum, teaching about climate change is seen as a paradigm to teach DRR in secondary high school in Indonesia.

The DRR integration into the formal curriculum can be accomplished initially by means of defining the scope and sequence of knowledge, skills and competencies using a standardised curricula as points of entry to incorporate new content. This DRR education should be integrated and taught as part of the school curriculum from elementary school through secondary school. It should be harmonised and contextualised. Teachers should have opportunities to develop skills and competencies and access materials for teaching disaster risk reduction through intra and extra-curricular activities (Ministry of Education, 2010).

In terms of incorporating DRR into the curriculum in Indonesia, the National Curriculum Centre has offered three main approaches (Sutjipto et al., 2008). *The first* is the separated subject approach. DRR is taught through extracurricular activities that take place during the academic school year. Extracurricular activities are activities outside formal study hours to develop the potential capacities, interests, talent, cooperation and independence of the pupils. Extracurricular activities can be in the form of scout training, leadership training, organisational skills, scientific events for students, sports, culture, arts and religious events, etc. It is a self-development programme that takes place during the academic school year (Sutjipto et al., 2008).

The second is the correlated subject approach, where DRR is taught as a special subject within Local Content Curriculum (LCC). In the Indonesian education system, the decentralised curriculum framework allows for the elaboration of specific issues, such as DRR specific to local needs. The schools have the authority to adapt their own curricula by taking into consideration the problems around the community (including locally specific disaster risks). LCC can be developed by analysing specific problems and cultural needs, assessing and developing standard and basic competencies, developing guidelines, a syllabus and lesson plans. Thus, it may vary in each school, based on the school concerns and the availability of resources, including locally specific disaster risks, local culture and natural needs and the circumstances of the learners (Pandey, 2007). Similarly, under the Ministry of Education Regulation Number. 79/2014, LCC can be integrated into art,

culture and entrepreneurship, physical education, sports and health. This new education unit (KTSP) was introduced in 2006 for primary and secondary schools through the National Education Minister's Regulation No. 22/2006 and improved for the 2013 curriculum. It provides a significant level of autonomy and flexibility for each school under the framework of the general Content Standard (Standard Isi) and the Graduate Competent Standard (Standar Kompetensi Lulusan) (Putrawidjaja, 2008).

The third is the integrated subject approach. In Indonesia, the disaster–related curriculum is restricted to social studies, science and physical education, in which it appears in all grade levels. Using this approach, DRR topics are integrated into the existing subjects. This approach can be conducted by analysing the Content Standards, preparing teaching materials and developing lesson plans. Students' achievements need to be assessed based on the indicators, by using both test and non-test methods. It can be a written test or verbal test, and non-test methods consist of performance observation, attitudes measurements and work assessment. The assessment should include cognitive, affective and psychomotor aspects, according to the characteristics of the subject (Sutjipto et al., 2008).

The DRR concept can be incorporated in different subjects. It is not limited to science lessons but could be in every subject. It can be included within a particular topic in the curriculum. For example, by letting students create posters about hazards in art class, by calculating disaster risk or disaster statistics in mathematics, or by designing a safe school in vocational training class. In science and technology, DRR can be studied by learning about the mechanisms of climatology and geo-seismic natural phenomena, and learning about the effects of human activities on ecosystems (UNESCO/UNICEF, 2014). According to Selby and Kagawa, the "key dimensions" of an integrated DRR education curricula (Selby and Kagawa, 2014) are understanding the science of natural hazards, learning and practicing protective and safety behaviours, and understanding the drivers of risk and how hazards become disasters. The study of hazards and risk

reduction should be promoted in schools, and schools should be protected as a national and local priority (Wishner, 2006).

Nevertheless, there is no comprehensive approach to introduce DRR in the Indonesia school system yet. For example, in Grade VI elementary school the basic competence mentioned: 'recognise measures taken in the event of a natural disaster', without knowing what a disaster is and the hazards surrounding them. Another example is with regard to Grade IX (middle school), the learning objective is to 'understanding various dangers of natural disasters and understanding methods in dealing with various natural disasters.' There is no systematic knowledge mentioned information in relation to natural hazard mechanisms. Being a disaster hot spot country, Indonesia faces multiple hazards and students are ideally supposed to have fundamental knowledge on how and why disasters occur. Furthermore, in high school, there are only a few competencies on environmental issues and nothing was mentioned about DRR. The study also pointed out that the most disaster related content was embedded in physical education and health; however, the basic competency related to DRR in this lessons was still very general and subject to teachers on how it should be interpreted and implemented (Pandey, 2007). However, science can offer more opportunities to understand the science of disasters in terms of the underlying nature of natural disaster knowledge, as developed by LIPI (see Chapter Five).

Teachers are a key element of disseminating DRR knowledge in the school level. However, this research found that the inadequate understanding of teachers on the disaster education in the curriculum has delayed in the DRR learning processes and achieving maximum benefit from DRR knowledge in the school system. It should be mentioned that teachers realise the importance of mainstreaming the DRR concept into school subjects; however, the process of addressing the topic should not interrupt the learning process and it should be more practical for student's lives. Therefore, using media would probably be one option that can be employed to disseminate the DRR concept in formal lessons, besides creating a workbook to monitor the process for both student and teacher. Another practical option for this

research, also suggested by the SMA Lab-School is a short-term project, lasting approximately 4-6 weeks in a specific topic, which will be run in Lab-School each year. However, to set such a programme requires permission from the local education authority, so the activity can be counted as a point for the teacher certification (FGD with schools' representatives, 2014).

7.4. Potential for Integrating DRR-Climate Change issues in the Curriculum

Following the nature of the Indonesian curriculum as discussed in Chapter Three. This section will discuss the potential integration of DRR in the 2013 Curriculum. The 2013 Curriculum provides more comprehensive in the assessment of student performance compared to the previous curriculum (KTSP 2006). It covered four core competencies (KI/*Kompetensi Inti*) that comprised four dimensions of students' learning: Spiritual attitude (KI-1), Social attitude (KI-2), Knowledge (KI-3), Skill (KI-4). Consequently, DRR integration needs to be included in these four competencies. In this way, the new curriculum provides more opportunities to address various issues and can be tied to extrinsic outcomes like changing attitudes towards climate change (Rozamuri and Suradi, 2015). So, DRR integration also needs to be included within these four competencies.

In undertaking the integration of the curriculum Quillen (2001), asserted, the first part of the integration process is to understand the theoretical and practical basis of a competency based educational system. Hence, this strategy for integrating DRR into the curriculum needs to take place within the four aspects of curriculum development: lesson planning, design of learning materials', design of educational methods and techniques and revision of assessment guidelines. All of them are discussed below:

7.4.1. Lesson Plan (RPP/Rancangan Rencana Pembelajaran)

The lesson plan is the first procedure to provide strategic steps in the implementation of the learning process. In the lesson plan, there is always a connection between the objectives, materials, methods/techniques, media,

evaluation tools and schedule for each learning activity. The RPP compiled for each basic competence (KD/ *Kompetensi Dasar*), can be implemented in one or more meeting. Teachers designed a piece of RPP for each meeting which is adjusted with time allocated for the lesson**.** The integration of DRR into RPP should be prepared based on the basic competence (KD) in the National Curriculum (Ministry of Education, 2014a, b, c).

7.4.2. Teaching methods

The 2013 curriculum mainly uses a scientific approach or science process-based approach in teacher-students interaction during the teaching/learning process. In implementing the scientific approach, learning materials based on facts or phenomena that can be explained by particular logic or reasoning, which deviate from the flow of logical thinking are used. It includes observing/asking, collecting information, reasoning/associating and communicating. The learning outcomes have been set to produce affective, creative, innovative and productive behaviours to strengthen the attitudes, skills and knowledge.

The attitude domain is supposed to make the students 'know why', while the skill domain aims to make the students 'know how'. The knowledge domain seeks to make students 'know what it is.' It is stated in the curriculum, that to achieve the quality that has been designed in curriculum documents, learning activities should promote: competence-based learning; integrated learning, skills-based learning; promotes the cultivation and empowerment of students as lifelong learners; uses information and communication technologies to improve the effectiveness of learning; recognises the individual needs and cultural backgrounds of students; and, is fun and stimulating (Ministry of Education, 2013a, b, c, d).

7.4.3. Learning material

The development of learning material is desirable to form the knowledge, creativity and attitude that must be achieved by students to meet specific basic competencies. The learning materials should be developed

based on the following principles. *First*, relevancy: learning material should be relevant to the achievement of core competences and basic competences. If the expected ability that is achieved by students is in the form of memorising facts, then the learning material that is taught must be a fact, not a concept or principle or any other sort of material (Santiago-Fandino and Spiske, 2016). *Second*, consistency: there are four types of basic competencies that must be achieved by the students, the materials use should include these four types of competencies. *Third*, adequacy: the material should be sufficient to assist students to achieve basic competencies in the lesson with consideration of the level of the physical, intellectual, emotional, social, and spiritual development of students (Ministry of Education, 2013a, b, c, d).

Table 7.1. An example of Learning Materials on DRR in terms of Adaptation to Climate Change Education in grade X (Hidayati and Sayekti, 2015).

Chapter	**Learning Materials**	**Learning Objectives**
Definition and impacts of climate change toward disasters.	Definition of climate change. Factors causing climate change. Impacts of climate change on energy consumption, biodiversity, water resource, transportation system, coastal areas, agricultural sectors, and forests and health.	Students understand the meaning of climate change, its causes, and its impacts to energy consumption, biodiversity, water resources, transportation system, coastal areas, agricultural sectors, and forests and health.
Adaptation of climate change for DRR.	Adaptation in agricultural, infrastructure, coastal area, fishery, water resource, transportation, energy, tourism and forest sectors. Activity to change attitudes, such as saving energy and natural resources, planting	Students understand the adaptation practices in different sectors and have better understanding and awareness that reflected in their attitude in the daily life

	trees, reducing emissions and using renewable energy.	
Mitigation of climate change impacts and DRR.	Preventing carbon dioxide being released into the atmosphere. Reducing greenhouse gas production, including learning about the causes of climate change, early signs, and the further impacts of climate change.	Students understand and able to develop mitigation measures of climate change impacts and DRR in their daily life.

7.4.4. Learning Assessment

The assessment of students in disaster education is still considered to be less developed. To date, in formal education, schools use formative, summative or a balanced assessment (both formative and summative assessments) to measure students' understanding of the elements of hazards (Selby and Kagawa, 2012). The formative assessment is defined as processes for providing feedback to enhance student performance and to enable pupils to make an improvement during the teaching and learning of the process, while the summative assessment is based on judgments on learning outcomes and teaching effectiveness (Schafer, 1997; Bell and Cowie, 2001). Nevertheless, the assessment tools should always be adapted to reflect the information required in specific contexts. By the end of the lesson, the understanding of knowledge can develop critical thinking, creativity, problem-solving, and the ability to share information, raise self-awareness, demonstrate moral and civic competencies, as well as environmental awareness (INEE, 2010). An example of a tool to assess School-based Preparedness (SSB) was developed by LIPI in 2012 (Triyono, et al., 2012). However, the tool was mainly focused on general aspect of student's preparedness rather than the entirety of disaster risk management including the effectiveness of disaster risk reduction education (Nurdin et, al, 2017, Interview with Rafliana). Therefore, to evaluate of the effectiveness of DRR Education in Indonesia, the researcher applied field assessment as the framework for evaluation. This cover students test

(pre and post-test), interview and FGD with teachers and national stakeholders.

The incorporation of DRR into the context of the school curricula in Indonesia should pay attention to the basic competencies (KD) in the applicable curriculum. Assessment is conducted in the form of written or oral observation of performance, attitude measurement, assessment of the work in the form of assignments, projects and/or products, the use of portfolios and self-assessment. The achievement assessment of students is conducted based on indicators with the goal of infusing important values (preparedness, adaptation and mitigation) for students and their families in everyday life, especially in the school environment. However, few studies have been conducted on student assessment in DRR education.

7.5. Potential Integration of DRR related knowledge in the science subjects: Case Study of Aceh Province.

This section presents an analysis based on the key themes that arise from the classroom intervention, as explained in (Chapter Two, point 2.3.3). It presents the strategies for integration into science subject first, then outlines key findings from implementing those strategies.

Based on the overview of the finding from the FGD, respondents in the research had a clear understanding of what a disaster is, and they examined the possibility of integrating DRR into school lessons This finding is also in line with the analysis of the syllabus and teaching material used by teachers. However, the teachers mentioned that the integration of DRR should be considered as new knowledge for teachers and students, so it would be likely to integrate this within well-defined tools for both of them. Certain topics have also been considered as possibilities in introducing DRR content in science lessons. This included hydrocarbon in chemistry, ecology and ecosystem in biology and global warming in physics.

In general, the teachers believe that DRR can be taught in the science curriculum and act as a tool to increase student's awareness of disaster risks. The participants believe that the DRR concept has the potential to be

disseminated into the curriculum. The participants have varied perceptions and understanding of the new 2013 curriculum. This is because of the lack of training on the issue, as well as the considerable problem that the curriculum lacks technical guidance regarding its application. Some problems might be encountered while introducing a certain topic, because the schools need more time to adapt to the new curriculum (K13).

In the science curriculum in secondary high school, hazard or 'natural disaster' has no explicit wording in the standard and basic competencies in the science curriculum, at any stage. DRR related content is expressed in terms of environmental issues covering greenhouse gas emissions, the rise in sea level, air pollution, which are taught through science subjects, i.e., biology, physics and chemistry, and framed under the theme standard and basic competences developed by the National Curriculum Centre. However, in practice the inclusion of knowledge about hazards remains very limited. It indicated that it would mostly depend on the ability of the teachers to develop DRR education as part of the lesson, based on the national competencies in an effective way.

Table 7.2. Identification of potential basic competencies in teaching disaster-related content in the science curriculum in secondary high school (Ministry of Education 2013d).

Basic Competencies	**Core Lesson**	**Learning Activities**
Physic Analysing global warming, greenhouse effect, climate change and its effect on life and the environment.	Global warming and the rise in sea level. Greenhouse effect The effect of carbon emissions and climate change on global warming.	Propose a question on the causes and effect of global warming, greenhouse effect and climate change on our lives. Propose a question on what should be done to prevent the increasing impact of global warming Explore the phenomena of global warming by investigating the impact of increased temperature over the sea water.

	International agreement: Intergovernmental Panel on Climate Change (IPCC)	Discuss the result of the experiment in groups with the requirements of the climate change agreement (IPCC). Discuss the impact of global warming and problem solving to decrease the impact of greenhouse effect and carbon emissions. Discuss various proposals and ideas to solve global warming and its causes.
Chemistry To evaluate the impact of burning hydrocarbons on the environment in conjunction with ways to surmount it.	Hydrocarbons within daily life. Impact of oil consumption and ways to resolve it.	Find information on the impact of using hydrocarbons over the environment by observing situations around their life or from the media. Discuss the impact of hydrocarbons over the environment and health. Collect information on the effect of hydrocarbon combustion by conducting an experiment. Discuss the impact of hydrocarbon combustion on living organisms.
Biology To analyse data on environmental change and its impact on daily life	Environmental balance, Environmental degradation	Observe the issue of the degradation of the environment from media reports and discuss the topic in groups. Propose a question on what environmental imbalance means, as well as the causes and impact on humans. Discuss about global warming, ozone layer depletion, the greenhouse cause and its effect. Discuss air and water pollution and its relationship with environmental degradation. Explore ways to mitigate it. Produce a written report from the observation, an oral presentation on environmental degradation, the causes and how to deal with the situation.

Using the case study of schools in Aceh Province, the research conducted by way of the FGD with teachers, interviews and analysis of teaching material (lesson plan) used by teacher shows that concerns about DRR have not fully demonstrated and addressed in the school curriculum at the local level. For example, in chemistry, learning about hydrocarbon is associated with the impact of burning carbon compounds which include the perfect and imperfect combustion reaction of hydrocarbons and the nature of combustion products (CO_2, CO, particulate matter) and develop ideas on how to overcome the impact of burning carbon compounds and its relationship with the environment and health. A further example is from biology: the topic, the changes and conservation of the environment. The learning objectives include identifying the environmental damages and explaining environmental pollution and a discussion about the causes and how to prevent and overcome global warming, ozone depletion and the greenhouse effect.

Even the words “environment” and “global warming” are mentioned in the learning objectives; however, this can be interpreted by teachers according to their knowledge on the topic. From the FGD and the interviews, the researcher ascertained that the teachers did not make any association with hazard/disasters due to limitations in their knowledge. The explanation is limited to the impact of pollution on human health in chemistry and the impact of environmental degradation in biology. This is one of the key findings why DRR education is still making relatively slow progress at the local level because teachers do not have sufficient knowledge pertaining to DRR.

Considering the finding about the complexity of the challenge related to the integration of disaster education in the intra curriculum, the researcher conducted a classroom intervention to increase student interest about disasters, which involved 164 students from both SSB and non SSB. The activity including pre-test, intervention and post-test is conducted based on the existing syllabus.

The test consists of the seven questions shown below:

1. What do you know about climate change?

a. Climate change is a natural phenomenon d. Other
b. God's will
c. Climate change because of human induce

2. What can cause climate change?
   a. Human lifestyle
   b. Air pollution
   c. Deforestation/land conversion
   d. Forest fire/haze
   e. Use of fossil fuels (gas and coal)
   f. Industry growth
3. Climate related disaster:
   a. Volcanic eruptions
   b. Floods
   c. Landslides
   d. Drought
   e. Forest fire/haze
   f. Earthquakes
4. What can cause floods to occur more frequently?
   a. Increasing rainfall because of changes in global temperature
   b. God's will
   c. Littering
5. The average concentration of carbon dioxide (CO_2) in the atmosphere has in recent years.
   a. Increased
   b. Decreased
   c. Remained constant
6. Increasing carbon dioxide (CO_2) in the ocean results in…
   a. Higher salinity
   b. Lower salinity
   c. Benefits for the ocean's ecosystem
   d. Problems for the ocean's ecosystem
7. The impact of climate change can be minimised through …

a. Planting trees/reforestation
b. Manage garbage/waste/use recycle material
c. Manage garbage/waste/use recycle material
d. Use alternative/renewable energy
e. Reduce private car/motor use
f. Use public transport.

The main idea of the integration is to help teachers to develop ideas pertaining to teaching DRR related knowledge, which is easy to implement and can be part of the lesson rather than a separate research project which is predominantly discontinued when the programme is completed.

The figures below show the results of the pre and post intervention for 164 students from SSB and non-SSB schools. The intervention constitutes hand on activities relating to the rise in sea level and ocean acidification which were conducted and discussed with students to improve their understanding of hazards. The topic was selected based on analysis of the document (i.e. syllabus), which shows that this topic was addressed in the science curriculum.

The numbers show the percentage of students answering seven different questions from the pre and post intervention and various answers to distinguish natural disaster knowledge and awareness among students.

Figure 7.1 The result of the pre-test from the SSB schools

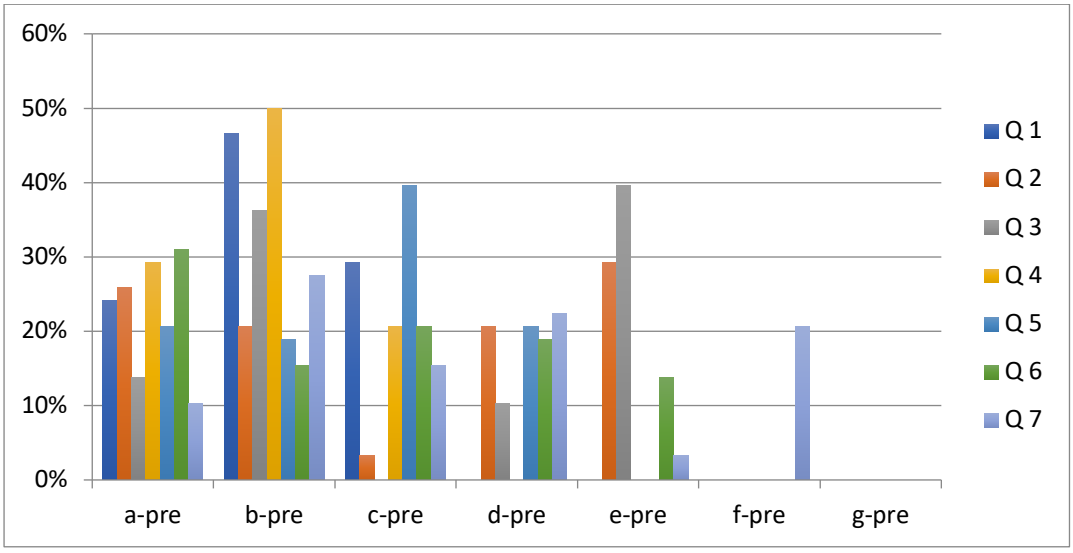
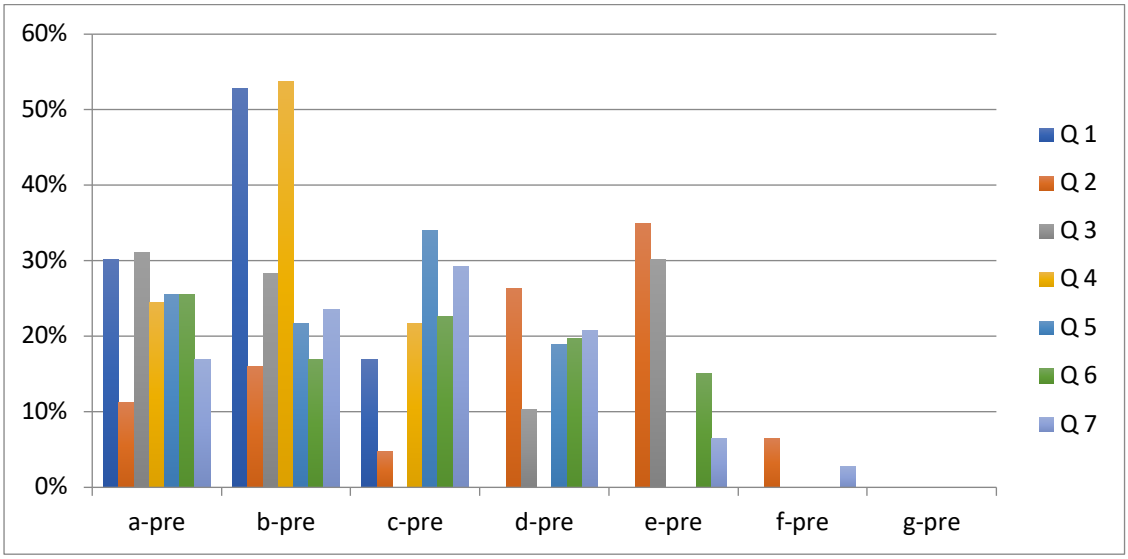


Figure 7.2. The result of the pre-test from the non SSB schools



Overall, we can see a different result between pre-test from students in the SSB schools and non SSB schools. Students in SSB shows better understanding in some concept about cause of climate change and the action to reduce the impact. However, there is also the similarity in a certain question. The pre-test reveals that about half of total participants from both schools believed that climate change, including frequent flooding, occurs because of God's will (Q4). This is one of the main challenges in teaching about disasters in Indonesia when the religious belief still influences people's perception, as described in chapter Five. This requires teachers' creativity to increase the level of student's knowledge on hazards and disasters.

Figure 7.3 The result of the post-test in the SSB school

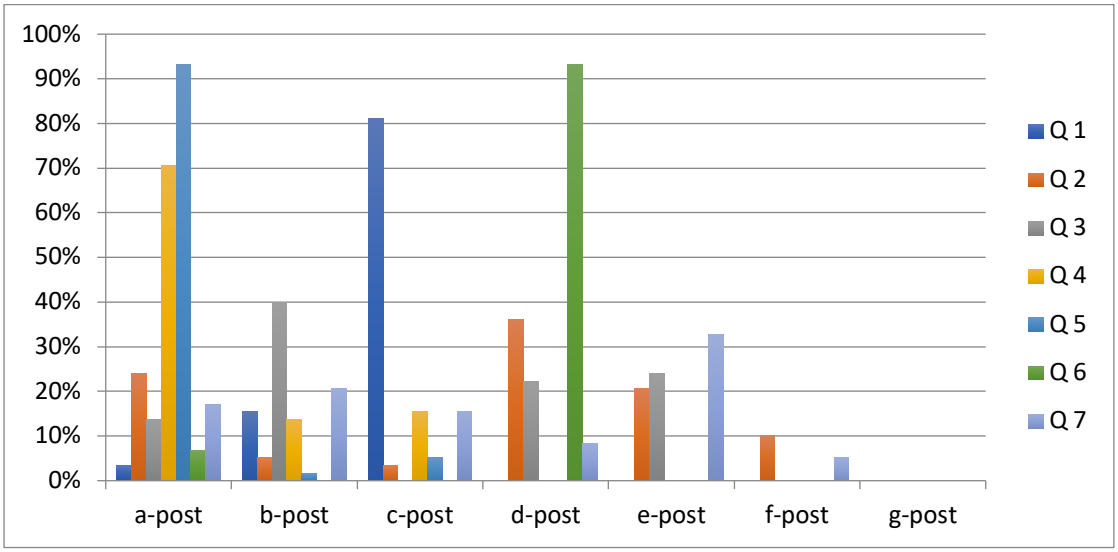
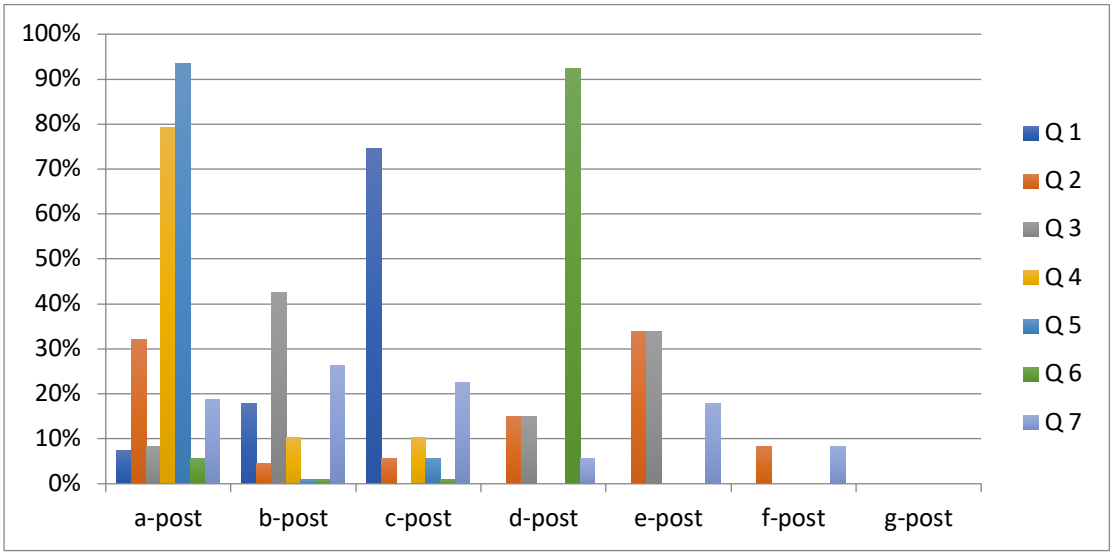


Figure 7.4 The result of the post-test in the non SSB school



The SSB and non SSB post-test bar charts (figures 7.3 and 7.4) illustrate a similar trend between both schools. After the intervention, both SSB and non SSB showed an improvement in answering some questions. For example, there is an increase in the number of students that chose a different answer for Q4 where more students choose increasing rainfall because of changes in the global temperature has caused flooding rather than God's will. The result also revealed there is a significant change in student's views on the hazards, believing that climate related disaster is a result of human action (Q1 and Q2). This might have happened because after the experiment was conducted, students gained a greater understanding that the increase in CO_2 in the atmosphere will harm the ocean ecosystem. Hence, the intervention is seen as an effective approach to enhance students' disaster knowledge.

The improvement in the test result post teaching intervention may reflect that this aspect of classroom learning has been effective in improving students understanding of hazards. It is necessary for the Curriculum Centre to support teachers so that they can improve their disaster knowledge and teaching as a means to transfer knowledge to students through science and ensure it is included on a regular basis in lessons.

Supporting the finding obtained from the intervention, six senior high school science teachers interviewed in early 2017, in Banda Aceh, confirmed that they are highly likely to integrate the model of intervention into their teaching (see Table 7.2). In fact, one teacher, Mrs. Isma explained that climate change related issues are included in the chemistry subject, even though DRR is not formally stated in the curriculum. Due to the lack dissemination of DRR education policy from national to local level (schools), so teachers might have difficulty in understanding what DRR means and how to integrate it into curriculum. However, the integration of DRR issues in the curriculum is considered more effective, given that it does not require additional times (such as drills) to conduct the activity (Interview with Isma, Jamaludin and Samsul Bahri).

Samsul Bahri also pointed out that teachers need to receive more support in terms of training on how to integrate DRR knowledge into the science curriculum. The topics such as global warming requires a greater proportion, as the current physics content is not actually relevant for students. Students are merely required to have a basic knowledge of physics and knowledge that is more applicable to their daily life. Equally, Bahri highlighted some essential points that the current physics curriculum in senior high schools should comprises some more concepts such as the sea level rise (Interview with Samsul Bahri).

For example, in junior high school, students have been introduced to the concept of climate change and its impact on ecosystems. It has been set as one of the core competencies needed to be developed by students during the learning process. By understanding this concept, students are expected to understand the risk of climate change on the ecosystem and improve their awareness of the issue. Another example is from the chemistry curriculum in Grade XI in senior high school (SMA, aged 16-18). Students learn about fossil fuels and the cycles of CO_2 in the atmosphere, risks associated with global warming and aspects related to the increasing acidification of the oceans from increases in dissolved CO_2. As a maritime country, Indonesia will be severely affected by the escalating level of ocean acidification and the condition will

influence the economic sectors. Hence, Indonesian students may benefit even more from DRR and climate change education by learning about the ways in which climate change affects their population directly (BKPM, 2011).

Table 7.3. Overview of the science teacher's interviews

Issue	Current mechanisms of responding the issues	Recommendation
Some teachers noted that sometimes they make an association with hazards such as flood in the subject lesson. However, it is very occasionally.	Teachers used the previous knowledge from the focus group discussion(it was conducted by the researcher as part of the preliminary study) and training from Education authority/ BNPB. So far, the training is still focusing on two hazards (earthquakes and tsunami)/simulation.	Teachers understanding of the importance of the topic influences their decision to integrate DRR related knowledge in lessons. This situation should be supported by school management via regular internal discussion among teachers/knowledge sharing and internal evaluation.
Teachers concerns about the limited knowledge on DRR and teaching/learning materials. There is no training on how DRR knowledge should be integrated into the curriculum, specially in developing the lesson plan (RPP), which leave teachers with their own interpretation of the topic. The different performance rates/ability of the students is also the main concern. Hence, teachers principally focus on achieving the learning goals and targets for the national exam.	The integration of DRR into the subject should be initiated by identifying each basic competence where the DRR concept can be covered more Engaging students in collecting any DRR related information from different resources, i.e. newspapers or the Internet, might help with a basic understanding of disasters.	Providing enough materials/ modules/media for teaching and learning in the school. One example has been undertaken in an elementary school (SDN 2) in Banda Aceh, where the school built disaster library, which can be used by teachers/students to learn about various types of disasters.

None of the subjects are clearly associated with any type of disasters, the process is extremely dependent on the teacher's initiative and creativity to integrate the DRR into the curriculum. They understand the importance of disaster related knowledge and the negative impact of disasters for them and their students (all teachers are tsunami victims).	Reading books, newspapers or using search engines to obtain more information about the topic. Use a certain topic in the Physics, chemistry and biology lesson that potential to address the disaster related knowledge, such as ecology and ecosystems in biology, hydrocarbons in chemistry and global warming in physics.	Collaboration with different education institutions, such as the Faculty of Education in University. Technical guidance and intensive support from the Local Education authority and BNPB will help during the process.

7.6. Challenges of Integration of DRR in the Classroom

Following the FGD, interviews, and class room intervention it is found that DRR issues have been poorly incorporated into the school curriculum, particularly in teaching/learning classroom activities. However, there is a potential space to embed it within the general nature of the national basic science competencies and environmental subjects. It will need creativity and strong commitment from education stakeholders at local and school levels to develop and support this integration.

Hence, although integration of DRR into the curriculum has become a formal strategy of DRR education in Indonesia, beside SSB, awareness of developing a strategy, technique and capacity building for school science teachers remains limited. However, in contrast, progress on the institutional development for emergencies and rehabilitation, reconstruction has greatly improved both at national and regional government levels under the Law 24/2007.

However, some challenges have been identified, with respect to integrating DRR into the school curricula. The challenges identified include limited teacher capacity, a lack of practical guidelines, limited financial support

and a lack of a unified set of criteria and guidelines for DRR education. Each of these challenges is discussed in detail below.

7.6.1. Lack of Teacher Capacity

Cole & Chan (1994), assert that effective teaching is defined as the actions of professionally trained persons that enhance the cognitive, personal, social and physical development of students'. From enhancing teacher capacity, it contributed to '… effective classroom communication, lesson planning and preparation, demonstration and explaining, questioning, assigning work tasks, feedback and correctives, assessment and evaluation, motivation and reinforcement, class management, and the promotion of self-directed and independent learning' (Cole & Chan, 1994).

The integration of DRR into the curriculum needs appropriate support from the school community, especially teachers. The main problems which probably appears from the implementation of the programme is the lack of teacher's knowledge on DRR. The study pointed out that the difficulties in the implementation of the "new topic" in the curriculum are principally because of the lack of knowledge and guidelines. Nevertheless, if they have adequate training and guidelines, they believe that the integration process would be easier. The teachers believe that the combination of new topics such as disaster education and climate change adaptation would benefit students in Indonesia (Rudini, Samsul, Isma, Soraya, Zulfiyani). Additionally, the teachers are frequently poorly trained and have 'a very narrow range of teaching methodologies'. They tend to think of students as passive receivers of information and expect them to memorise facts passed down to them (UNISDR, 2007, 17). Despite this, Sri Hidayati, stated that 'the dissemination of the 2013 curriculum, has not faced any problems, seeing as the teacher training in Indonesia is very good', (Interview with Sri Hidayati). Nevertheless, in reality, based on the FGD and interviews with teachers, teachers appear to lack knowledge with regard to DRR education, and no evaluation has been conducted.

To implementation the programme is needed a support from school management. Mr. Anwar, school committee from MAN 2 reflected on the willingness of schools to adopt DRR education, as he realised that his schools (MAN Model) are located in disaster prone areas. It also reveals that none of the school in this study mention the Circular or Perka BNPB 4/2012, due to the lack of dissemination this policy in the field. For instance, Mr. Jamaluddin ,a chemistry teacher in MAN Rukoh, confirmed that he has never heard of any national or local policy on DRR education and he has no formal specific knowledge and training on DRR issues. However, he acknowledges he has at the very least, generally integrated DRR and climate change issues in some chemistry topics. Additionally, Samsul Bahri also stated that no DRR related information from national and regional government was disseminated to them in their schools, including the circular letter, Perka BNPB and other modules. Such a situation shows the absence of disseminating DRR education policy and resources to areas that are prone to disaster, let alone to those which are not potential disasters areas. More importantly, teachers need more support in terms of training, on how to integrate DRR knowledge into the science curriculum.

The school management and teachers indicate the idea to integrate DRR into the existing curriculum is most welcome and feasible, rather than it being seen as an independent subject, but due to the lack of their capacity this integration has not been very effective(FGD and interviews).Schools need to make sure that the curriculum is not to overburden the students. Consequently, there needs to be a more effective way to sustain DRR education in the school system(Interview with Samsul Bahri, Anwar and Ruhdini).

The lack of teachers' capacity is a national concern in Indonesia, without a clear solution for the future. Some of science teachers such as Soraya a biology teacher, who received training on DRR from the Aceh Disaster Agency (BPBA) and Rukhdini were quite positive when looking at the integration of DRR in the science subject. They confirmed that when teachers gain knowledge and understand DRR issues and how important it is to

integrate it in the school system, teachers will be willing to integrate DRR knowledge into relevant topics and disseminate it in the school, so that teachers can absorb and disseminate DRR education effectively in schools. From this interview it was also noted that only two schools were recently selected by BPBA. Nonetheless, it was unclear how these schools were nominated and sustain the programme (Interview with Soraya).

Currently DRR education has merely been disseminated to a few pilot projects since the 2004 tsunami, and no area/school's development has so far been identified(FGD with school representatives). The uneven distribution of DRR knowledge in schools should be a concern for education stakeholders. The Circular lacks legal weight and is not supported by the national budget. While, the Safer Schools programme has been primarily managed by BNPB and supported by the national budget. It need be a better coordination between the local Education Authority and the National/Regional Disaster Agency to combine both Circular and Perka BNPB 4/2012. However, there is not really a clear connection between the BNPB and Ministry of Education in conducting the programme, in particular at the regional/local level so far.

This study has demonstrated the positive impact of providing teachers with DRR knowledge. Rukhdini, chemistry teacher from MAN 2, has been creative and proactive in replicating the intervention conducted by the researcher in the previous year. This supports the hypothesis in this thesis that the integration of DRR into the school curriculum is a better way to sustain DRR education in schools.

7.6.2. Lack of Practical Guidance/Resources

The implementation of the 2013 Curriculum has given teachers new tasks. It requires enormous effort on behalf of the teachers to understand the changes in the curriculum. If the integration of DRR requires special attention from teachers, the implementation process in the field would be suspended. Thus, the absence of guidelines for developing the new syllabus, as well as guidance on the use of new media and teaching materials is a challenge that hinders DRR integration (FGD). Though the need to include DRR in the

Indonesia education curriculum is evident, there is no explicit guideline on the "what" and "how" aspects, which makes the implementation process unclear, especially given the absence of clear assessment metrics and benchmarks that would establish whether or not the integration is successful. Zulfiani considered that despite climate change being inserted in physics in the 2013 Curriculum for Year XII (Class 2 High School), but it is poorly organised due to the shortage in books for teachers and students. Hence, it depends on the creativity of teachers to search for these materials to give to their students. This issue was also indicated by Sri Hidayati from the National Curriculum Centre, that the independent DRR modules were developed and supported by UNDP, but it has no clear relationship with the integration into the curriculum and classroom learning activities (Interview with Zulfiani and Sri Hidayati).

Table 7.4. Learning Resources for DRR

Module	Sources	Purposes	
DRR teaching modules: the Earthquake series	Curriculum Centre, Ministry of National Education, Safer Communities through Disaster Risk Reduction (SCDRR)-UNDP , Consortium for Disaster Education (CDE)	Available for primary schools, and junior and secondary schools	Teacher resources
DRR teaching modules: Tsunami	Curriculum Centre, Ministry of National Education, SCDRR-UNDP, CDE	Available for primary schools, and junior and secondary schools	Teacher resources
DRR teaching modules: Floods	Curriculum Centre, Ministry of National Education, SCDRR-UNDP, CDE)	Available for primary schools, and junior and secondary schools	Teacher resources
DRR teaching modules:	Curriculum Centre, Ministry of National	Available for primary schools, and junior and	Teacher resources

Landslides	Education, SCDRR-UNDP, CDE	secondary schools	
DRR teaching modules: Fires	Curriculum Centre, Ministry of National Education, SCDRR-UNDP, CDE	Available for primary schools, and junior and secondary school	Teacher resources
DRR teaching modules.	Muhammadiyah Disaster Management Centre (MDMC)	Primary school	Teacher resources
Mobil edukasi bencana	National Disaster management agency	Primary schools, pilot project, 10 primary schools in Bogor, Java Island	Students and teachers resources

7.6.3. Lack of policy and financial supports

The lack of policy and financial support has delayed the implementation process in the school levels. Although schools in Indonesia have operational funds (BOS/*Bantuan Operasional Sekolah*), every school has different priorities. Moreover, the absence of the legal standing for the integration of DRR into the curriculum may have led to the ineffective implementation of the programme. Additionally, the Ministerial Circular is also considered weak as it carries no legal weight. The nature of the Circular is merely 'advice' to include DRR in education, including the curriculum, but there are no legal consequences if schools do not implement it. Therefore, it would be entirely up to schools to decide and be reflected in the school management system. That is why, intensive and continuous technical assistance from universities or non-government organisations is critical in sustaining such efforts.

In terms of budget, no explicit funding has been provided independently for schools, as the MAN model is very dependent on the project run by the Aceh Disaster Management Agency (BPBA). While using BOS was considered restrictive by Saber Pungli (anti-corruption task force).

They have been intensively monitoring the BOS activities, when using for non-explicit items (Interview with Anwar).

Following the findings set out above, the essential strategic entry point to tackle the current bottleneck regarding DRR education in Indonesia, is the teachers. When teachers have sufficient knowledge and understanding of the DRR issues and how important it is to integrate it in the school system, they can then examine how to assimilate DRR in topics that are relevant to their teaching. Consequently, they can act as role models and disseminate DRR education effectively in schools (Interview with Soraya). To support the process is include :

(a). Conduct teacher training on DRR topics in a more practical way. For instance, the teachers should be asked to bring the subjects developed syllabus. Then, during training sessions, teachers are taught to identify competencies related to disaster education that they can teach. Based on the identification results, the teachers are guided to discover the method and media that can be used to teach about hazards/disaster without changing the existing syllabus. This training can be a platform for teachers to find various ways to teach a topic that relates to disasters.

(b). Maintain sustainability by rewarding teachers who make a substantial effort to teach DRR, both in the class and through extracurricular activities. Appreciation can be shown either at the school or provincial level with the support of the education authority, BPBD or NGOs.

(c). Collaboration with the Teacher Training Centre and educational institutions to embed DRR materials in the training.

(d). Collaboration with the university to include DRR topics as a compulsory subject for first-year students in the Education Faculty.

Hence, the absence of DRR education in Education Faculty, as institutions in charge of producing teachers in Indonesia and the teacher's training system in University, has contributed to the stagnancy (Interview with Zamzam). It is essential that Ministry of Education and BNPB engages with the University to develop, transform and link disaster science knowledge and

the development of a pedagogic device, for sustainable and culturally acceptable DRR knowledge in the Indonesian community.

Additionally, there is a different level of government to manage high school and primary school. Senior high schools are under the Provincial Education Department, while the primary and middle schools are organised by the District Education Authority. Furthermore, the general schools are under national, provincial and district Education Authority, while Islamic schools are under provincial and district religious departments. At the national level, this also refers to the different ministries as regulators, i.e. the Ministry of National Education and the Ministry of Religious Affairs. Thus, even integrating DRR in the school system needs to involve both these authorities.

The classroom can be a starting point for disseminating valuable knowledge to children and society and making connections between knowledge and values. It is also vital to consider that methods used in the teaching and learning process should be appropriate to the characteristics of students and the subject of study. It should consist of the scientific learning approach mentioned in the 2013 curriculum that includes observing, asking, trying/conducting experiments, analysing and then communicating. Various learning models can also be applied to teaching and learning activities so that pupils will have meaningful learning experiences that are relevant to their developmental age (Ministry of Education, 2013a, b, c, d). This problem also identified during the FGD, is that it is still unclear how teachers should work to fulfill all the competencies needed and address the issue of climate change/disaster preparedness simultaneously. However, when they introduced DRR integration into science classes, students were enthusiastic about the subject (Interview with Rukhdini).

There is a need for serious effort from all parties to maintain the sustainability of the programme designed for DRR and climate change integration (CDE, 2011; USAID, 2014). The local government, Ministry of Education at the provincial level should pay more attention to supporting the process of integrating DRR and climate change in the curriculum. It can be achieved in several ways including:

(a). Regular fund allocation from the national (APBN/*Anggaran Pendapatan dan Belanja Negara*) and provincial budget (APBD/ *Anggaran Pendapatan dan Belanja Daerah*). Through regular fund allocation, schools can be in a position to incorporate various programmes that focus on training to promote knowledge of DRR and designed for students, teachers and school societies.
(b). Building a partnership with the local community. The local community, schools and other partners need to combine their efforts and work towards seeing a reduction in climate change. As such, the integration of DRR and climate change can be achieved by ensuring a working partnership among the partners. As such, there is a need for programmes where the schools can work with the societies in safeguarding the environment, such as in planting tree programmes.
(c). University, Teacher Training Centre and NGOs. As a national programme, the climate change stakeholders must work towards ensuring that certain milestones are met. To achieve this goal, there is a need to ensure that DRR and climate change information must be available on all platforms.
(d). Formulation of a legal framework to regulate the integration of DRR and climate change into the Indonesian curriculum. On a similar note, the government and other stakeholders need to work together to come up with a robust legal framework to ensure that the integration of DRR and climate change can be a part of national agenda.

7.7. Conclusion

Indonesia is making progress in incorporating DRR into the national policies system. Nevertheless, challenges and gaps in implementation at the school level are identified and require further actions. As identified in several cases, the intervention and development of DRR in the curricula, demonstrates that knowledge has significantly increased, both for students and teachers.

It is obvious that once there is inadequate support of policy at the school level, there is also a lack of encouragement from the district, provincial and national levels. The current regulations do not encourage teachers and

school management to enact DRR and climate change in the school system. It would heavily depend on school's motivation to maintain and update their curricula and to be proactive in seeking relevant tools and materials.

Based on the overview from the FGD, the science teachers and school stakeholders, had a clear view with respect to what disaster meant in the research and they recognised the opportunity to do this in science subjects. Moreover, it suggested to consider the local value that is related to disasters, such as the tsunami museum or other historical buildings associated with disasters to understand the importance of learning the disaster risk reduction concept. The integration of the DRR concept in the science curriculum needs to be considered as new knowledge for teachers and students. Therefore, it would be possible to integrate this within well-defined tools for both students and teachers. The interventions have illustrated the positive impacts both for teachers and student and revealed feedback to strengthen DRR in terms of CCA in classroom activities in senior high schools in the country and may contribute to the achievement of a much greater level of disaster preparedness and climate change awareness.

This study also finds that concerns about the DRR issue have not yet been demonstrated or consistently addressed in the senior high school curriculum in Indonesia. Particular challenges include the lack of teacher training, limited financial support and a relatively disintegrated system. Furthermore, teaching DRR is exceptionally challenging, especially in areas where customs are traditionally conservative and the teacher's knowledge on hazards is limited. Thus, rectifying this through improvements in teacher training, the adoption of standardised and nationally approved disaster education guidelines and engagement with the University, besides an increase in financial support for the DRR initiatives would effectively improve students' knowledge of disaster risks.

Improving disaster knowledge and skills may save many more lives and equip the younger generation with the ability to respond to natural disasters and reduce the losses of lives and property when disasters occur. Moreover, this chapter argued that the integration of DRR into the science

curriculum in senior high school can be accomplished independently without relying on the regular Safe Schools (SSB) scheme. It can be an effective approach to mainstream teachers and schools' management on DRR issues. By then the whole Safe School element can be introduced and sustained. In the next Chapter Eight, the whole idea of this research will be reviewed and highlighted in terms of contribution, limitations and the potential research in the future.

CHAPTER EIGHT
CONCLUSION

8.1. Introduction

After discussing a wide range of issues on Disaster Risk Reduction (DRR) education in the context of global education, and its transformation and application to the Indonesian system, this chapter is the conclusion to the findings and the implications of this study. Additionally, it will explore the challenges, opportunities and limitations and discuss potential researches in the future.

8.2. Discussion on Findings

DRR education originally emerged from knowledge of disasters, which developed through scientific processes, in terms of how and why a disaster occurred. From this basis then technology developed to forecast when a disaster may occur, and what kind of preparation can be put in place to prevent or mitigate such disaster risks. Several terms were initially used to describe this notion within the United Nations (UN) in the 1980s, such as 'pre-disaster planning', 'disaster preparedness' and 'natural disaster reduction'. This initiative has gradually transformed into national policies, institutional networks and the development of School-Based Disaster Preparedness (Sekolah Siaga Bencana/SSB). This thesis covers five key issues: weak and disintegrated policies, institutional support, teacher's knowledge and capacity, SSB sustainability and the integration process of DRR knowledge at the school level. These issues will be discussed according to the five hypotheses stated in Chapter One.

8.2.1. DRR in National Education System

This research has proved the first hypothesis that the national curriculum development and basic competencies of the science curriculum have not sufficiently promoted DRR knowledge for students in secondary high school in Indonesia, particularly before the 2004 earthquake and tsunami in Aceh. The

objective of education in Indonesia evolved in terms of religion, nationalism building and global competition. However, its interpretation may vary depending on the pragmatic political purpose of the ruling regime. These objectives then manifested in ten variations of the national curriculum from 1947 Curriculum to the most recent in 2013.

Having independence from the Dutch, for a certain period, schools in Indonesia still used the same curriculum developed by the Dutch, whereby natural science subjects were not a priority. Similarly, during the Sukarno and Suharto regimes (1945-1998), natural science of disaster did not explicitly emerge, despite numerous disasters and the severe impact that occurred; it was merely a sporadic response to cope with the post-disaster impact, as discussed in Chapter Three. The lack of disaster science development, religious fatalism and limited traditional knowledge, as can be seen from the alienation of science subjects in the school curriculum hindered DRR education from emerging at that time.

Conversely, LIPI, an independent national scientific institution, has developed several development projects concerning natural disaster science which have occurred repeatedly, i.e. volcano, earthquake, floods, etc. This was a seed that blossomed into being disaster preparedness knowledge later on, although LIPI's initiative has no direct access to the school system, as schools are under the Ministry of Education. In school, this disaster preparedness knowledge was marginalised from the other subjects and had no correlation with the Indonesian context. The existence of science subjects in the school curriculum is essential to understand the extent to which the formation of the national curriculum contributed to the absence of DRR education prior to the 2004 Indian Ocean tsunami.

The Indonesian curriculum was primarily concerned with educating students about nationalism and anti-Dutch-colonialism became typical to oppose all Western knowledge. Furthermore, the original National Disaster Management Institution was referred to help victims of the colonial war against the Dutch military; while natural disasters and their impacts were alienated. However, in the decades following, the government began to concentrate more

on natural disasters and established a specific coordination body to cope with the impact of any natural disaster, in particular volcanic eruptions, though preparedness knowledge was not developed.

Despite the unprecedented path of ensuring DRR in development plans, it had succeeded in forcing the Indonesian science Institute (LIPI) to translate disaster science into action and sustain its DRR related studies and science communication activities from 2004-2014. However, in 2014, the administration changed in relation to the newly appointed President of the Republic of Indonesia, Joko Widodo. DRR was then not explicitly mentioned in any national strategic goals, thus, leaving LIPI improperly financial support to continue prioritising disasters, particularly science communication, as instrumental work that related significantly to the development of DRR education. Bureaucracy and structural issues such as internal policies, changes of agents/actors and the lack of national guidance and priorities impeded LIPI projects on the community preparedness programme(COMPRESS) from sustaining itself. However, the Ministry of Education responded by issuing the 2010 Circular Letter on DRR education, as the first explicit addition of DRR education in national policy. This also then transformed into several teaching/learning spaces under the new 2013 Curriculum in relation to disaster risks within the science curriculum. Nevertheless, the spaces were not effectively utilised due to teachers' lack of knowledge and awareness regarding DRR issues.

8.2.2. Global DRR Education and its Transformation

The second hypothesis confirmed that the transformation of global DRR education into Indonesia's national system was based on the development of science knowledge on disasters. This was originally from the development of science in western culture and employed to solve social problems in developing countries. Such issues gradually developed through the UN and its affiliations as global concerns in maintaining peace, security and sustainable development, as initiated from the UN's humanitarian responses to numerous natural disasters in the world since 1945. The accumulation of these long

experiences (1945-2004) has evidently proved that knowledge, awareness and skills to respond to natural disaster was very limited in developing countries.

In the meantime, LIPI was the first science institution established since Dutch colonialism, transformed and developed a scientific explanation concerning the nature of disasters in Indonesia. While the Indonesian community, was considered disaster is a part of nature, so no explicit disaster preparedness knowledge was developed.

After independence, Indonesia considered DRR to be a Western initiative, and the transformation of DRR into the Indonesia system still continues as part of Western domination. However, in the following decades, DRR was transformed through the issue of human rights (the right to children) and sustainable development (environmental protection) that encouraged Indonesia to make a global commitment. Moreover, at that time, the government was under significant global pressure to end human rights violations in East Timor and the economic crisis. It was highlighted that there was limited understanding of DRR and its content as part of the Special Services Education unit as stated in education law Number 20 /2013**.** The term was used as education for children affected by disaster, part of the transformation and the consequences of the ratification of children's rights since the Reformation Era in1998.

Nonetheless, Indonesia was shaken when the earthquake and tsunami occurred in Aceh in 2004. This demonstrated that knowledge, culture of safety and resilience had been missed in the Indonesian system before 2004 and resulted in the deaths of at least 200,000 people and widespread physical destruction. Since then, it has been acknowledged that DRR is crucial for Indonesia, and normative policy and the institutionalisation of the DRR network was initiated.

The 2004 disaster attracted the global community, including assistance from various countries, besides the UN and its associated agencies, to participate in emergency, rehabilitation and reconstruction programmes. Within this massive global mobilisation, DRR education found its place to develop, in which global, national and local collaboration positively occurred. In global level,

it contributed to the global commitment of 168 countries to the third priority for action in the Hyogo Framework for Action (HFA 2005-2014); and the UN Decade for Education for Sustainable Development (2005–2014). While, in the Indonesian national system DRR education concept was developed by LIPI, then managed under the Special Education Service at the Ministry of Education that was responsible for education in emergency/post disaster situations and subsequently moved to a special institution for disaster management (BNPB) under Law 2007.

Despite DRR education in Indonesia being primarily considered external interference, it is not a completely new subject. Nonetheless, due to the lack of dissemination of information, it was scarcely known and orally inherited by ethnic groups and islands in a very limited area. Therefore, DRR education has become more complex, as it is related to the doctrine of religious fatalism, lacks access to DRR materials and a budget. Furthermore, it lacks coordination among stakeholders, lacks of a standardised format and content in modules, whilst it has a shortage of guiding resources for teachers and students. This was mostly an embryonic generation from the meeting of local-national need into awareness of disaster and mitigation risks and transforming global knowledge of DRR through the activities of global NGOs and UN agencies. This situation then developed into policy and the institutionalisation of DRR education initiatives at the national and regional level.

8.2.3. DRR Policy and Institutional Network

The third hypothesis is that the policy and institutional network has been successful in forming the foundation of the development of DRR education in Indonesia. From the accumulation of policy and knowledge on disaster preparedness, LIPI has found the context to apply that framework called SSB in schools. LIPI in collaboration with UNESCO began to assess disaster preparedness in the community and developed the community preparedness (COMPRESS) programme as the first form of community disaster preparedness. The Disaster Education Consortium replicated the SSB LIPI and reformulated DRR education using the children rights approach in the

community. This became a strong reason for LIPI to be the leading and first institution to formulate DRR education in support of UNESCO. Although progress has been relatively slow in DRR education in schools, the development of disaster science under LIPI laid a strong foundation to assist with the understanding of disaster nature in Indonesia.

The re-contextualisation of disaster knowledge by LIPI was considered successful, despite there being no official recognition of SSB-LIPI during 2008-2009, until in 2010, the Ministry of Education then issued a Circular Letter to formalise SSB. The 2010 Circular noted that the SSB should be able to empower school communities, promote curriculum integration and establish stakeholder partnerships. The SSB under the Circular was understood as an integrated and independent project to build a culture of safety in schools. The process was dependent on the quality of knowledge and awareness of the school community, in particular the school management and teachers. The establishment of Perka BNPB Number 4/2012 transformed SSB-LIPI to be a 'Safe School' and covers both the structural and non-structural aspect. Hence, the contextualisation of SSB-LIPI was partly continue when the BNPB's Safe Schools developed. Each agency faced challenges and made some progress, although it seems the overlapping roles of these institutions contributed to discrepancies in the implementation.

8.2.4. School-based Disaster Preparedness (SSB)

The fourth hypothesis confirmed in this research is that SSB is an indicator of DRR education in the school system in Indonesia, and students enrolled in the SSB programme have acquired better knowledge of disasters than non-SSB students.

SSB is an explicit accumulation of DRR education, transformed from global experience into the Indonesian context. It was a development stage from 2005-2007, in terms of formulating DRR knowledge based on the field assessment on the preparedness level of school communities. In 2008, this SSB framework was piloting in some schools. It was run voluntarily, until the MoEd legalised it under the 2010 Circular, which encouraged all regional

governments and schools to adopt the SSB programme. The main aims are to develop preparedness knowledge and skills, even its integration into the curriculum is not obvious.

Currently, The BNPB has taken a major role on DRR education. To support the activity, BNPB has recruited national and local facilitators on a short term basis. The concern is that the recruitment of the facilitators and its facilitating process lacks coordination with the Ministry of Education, which has an official link with schools; while the BNPB is a new institution and has no previous experience of DRR education. When national policies on DRR education became more established under BNPB and there were many SSB piloting project across the country, DRR education in Aceh still faced a challenging situation.

The SSB-LIPI has a strong spirit as it reflects from the actual fact of Aceh tsunami victims, supported by national and international actors as organised under the CDE. While it was under the BNPB project (2012), the spirit of SSB declined as it was merely project orientated. Teachers, students and school communities play a passive role in receiving training and support from external facilitators. Despite showing some significant progress, the implementation of the SSB programme was mostly applied over a limited time and subject to funding. It is mostly implemented as part an extracurricular programme, activity during national DRR day, and it was predominantly related to disaster preparedness (drills).

The development of SSB was merely more formalistic and bureaucratic. The slow development of DRR knowledge and its transformation into efficient sources and a pedagogic device has meant that SSB lacks sustainability, in terms of raising awareness and its distribution to the wider community.

The SSB under the Circular from the National Ministry of Education lacked an entry point to access the national budget system; otherwise, when BNPB issued the guidelines for Safe Schools in 2012, it was allocated a national budget, but in practice it recruited national facilitators without connecting to the previous LIPI-UNESCO SSB system. While education, including DRR education (school) is under the Ministry of National Education,

as the BNPB is not an education institution in Indonesia. The combination between the 2010 Circular of Ministry Education and the 2012 Perka of BNPB may support the SSB to be more powerful at the national policy level.

In regards to the level of knowledge obtained by students in SSB school and non SSB schools, the SSB students have better knowledge than non-SSB students. However, after class intervention both SSB students and non-SSB student acquire an equivalent level of knowledge. Therefore, the capacity of science teachers to embed DRR issues in science subjects has great potential for the sustainability of teaching and learning DRR at senior high schools in Indonesia. Particularly in the areas where the SSB programme is not applied, or when the SSB programme has been refused due to limited funding and support from the government. Capacity building for science teachers in terms of integrating DRR related issues in the science curriculum will have the potential to be part of future strategy for advancing DRR education in Indonesia.

8.2.5. DRR Education in the School Curriculum

As the first hypothesis mentioned DRR knowledge has not yet been sufficiently integrated into the national curriculum, however there are potential spaces to integrate this DRR knowledge into the latest 2013 Curriculum. By developing an intervention session in the classroom, within the science curriculum, the researcher has evidently proved the final hypothesis that the integration of DRR knowledge within the science curriculum is successful in improving students' understanding of disaster risks in Indonesia.

From preliminary study and content analysis shows that there is no explicit articulation in the current curriculum and the implementation of DRR education in the secondary high school in Indonesia. The development of DRR integration into the curriculum predominantly focused on primary and middle schools, while there is unclear guidance/modules provided for the integration of DRR into school curriculum (Pandey, 2007). Additionally, the development of DRR education materials has been substantially initiated by the external agencies, both the UN agencies and NGOs. This material was subsequently compiled by the government of Indonesia with some modifications to be used

in schools in Indonesia. Even this material has some positive contributions to enrich the DRR education resources, but there is also some bottleneck because of lack of local knowledge and transitional gap from fatalistic and superstitious culture into more scientific approaches.

The implementation of the 2013 Curriculum has raised concerns among educators, school management, parents and the students themselves about the lack of guidance from the government. It is noted that there is no systematic approach to introducing DRR education in the school curriculum. It would need the creativity and pro-activity of teachers to develop such basic national core competency content in each subject, including science. However, DRR education in the school system developed beyond the curricula, i.e., developed independent modules related to several disaster hazards to be integrated into some schools as a pilot project for SSB, as discussed in Chapter Six. This approach remains problematic in its application as it has overburdened the school stakeholders: school management, teachers, students and community. Likewise, the programme depends on the availability of funding, so there is no sustained effort to make disaster knowledge an integral part of school education.

Following the two FGDs with school representatives and science teachers, it can be noted that integrating DRR into the science classroom has not yet been developed, both in theoretical curriculum development and its application. However, there is a flexible space for senior high schools to integrate DRR into science subjects, implement it into their schools as a pilot project in the initial stage, whilst in the following (long-term) stage it can be combined with the central government unit of curriculum development to be nationally discussed and applied.

DRR integration into the 2013 Curriculum is primarily aimed at increasing knowledge, although there are other opportunities to engage practices and shape attitudes, for example through correlated subjects or integrated subject approaches. Access for available materials is still one of the main issues, yet, the increase in knowledge may not necessarily translate into action. Frequent revisions of the curriculum are also a huge challenge, as it would consume

more time and resources for the DRR initiative to re-adjust. It is obvious that once there is inadequate support of policy at the school level, there is also a lack of encouragement coming from the district, provincial and national levels.

The current regulations are not binding teachers, principals, students or parents to enact DRR in the senior high school system. It would depend heavily on the motivation of schools (teachers) to maintain and update their curricula and seek relevant DRR materials. The 2013 Curriculum emphasised links between local action and global problems, including energy use, environmental problems and global warming. However, even though the term "environment" and "global warming" are mentioned in the learning objectives in the 2013 Curriculum, this study found that teachers did not make any learning associations due to their lack of knowledge on hazard/disasters. This is why DRR education is making relatively slow progress at the school level. Teachers who should be a key factor for delivering DRR knowledge did not have sufficient knowledge on this crucial topic.

The curriculum revision requires considerable cost and is time consuming. The integration of DRR into the current subject of study, local content and extracurricular activities would be better without burdening students and teachers any further. Based on the identified challenges, the researchers propose recommendations for improving DRR integration into the Indonesian curriculum. The presented recommendations are directed towards mitigating the negative impact of challenges currently faced by Indonesian schools in terms of aligning disaster response education with the current version of the Indonesian school curriculum.

The outlined activity in Chapter Seven can help strengthening DRR adoption in Indonesian schools and contribute to the improvement of knowledge and awareness toward disaster risk, for both students in SSB and non SSB. This activity aims to provide a thorough understanding for students through inter-subjects, its relation to disaster risk and their everyday life. Hence, it depends on the creativity of the teacher to search for these materials by him/herself to give to their students, although this has seldom existed. The lack

of teachers' capacity has been an Indonesian national concern and there appears to be no clear solution for the future.

The DRR integration in the classroom conducted by the researcher has had a positive impact both for teachers and students, encouraging them to be more active. This supported the hypothesis of this thesis that the integration of DRR into the school curriculum may be the best way to ensure that DRR education in schools can be sustained.

Hence, the DRR issue has not yet been demonstrated or consistently addressed in the school curriculum in Indonesia. Particular challenges include the lack of teacher training, limited financial support and a relatively disintegrated system. Furthermore, teaching DRR is incredibly challenging, especially in areas where customs are traditionally conservative and the teacher's knowledge on environmental hazards is limited.

8.3. Progress and Challenges

This research found that Indonesia has responded well to the DRR education through developing normative and institutional frameworks for preventive and recovery from disasters risks. However, such frameworks are poorly understood and implemented on the ground, due to the lack of human resources, knowledge, facilities and creative thinking of the educators. Hence, to proportionally link up the local and global aspects of DRR education would need the re-contextualizing of this issue for future research. In particular, the transformation of global DRR knowledge via the LIPI-UNESCO partnership has placed a somewhat complete foundation for DRR education to grow. But when it included the new agency for disaster management (BNPB) in 2007, the role became more bureaucratic and pragmatic.

In general, the significant nature of DRR education in Indonesia was established over the period 2005 to 2016; principally due to the decline in the fatalistic doctrine; a greater emphasis upon piloting projects; the accentuation of using extra-curriculum spaces; increasing knowledge and skill concerning disaster preparedness, as well as the formalisation and institutionalisation of DRR education in national policies.

In Indonesia, 2007 is marked as the year in which the national government pushed through legal reforms on disaster management with the enactment of the National Disaster Management Law Number 24/2007. The Law highlights the importance of risk reduction measures, a decentralised approach and inclusive partnerships in disaster management. This law was a peak of the journey of DRR management in Indonesia that was marginalized in the national system and has adversely impacted on affected-disaster-associated communities.

Strengthening DRR education has shown great advances in Indonesia, especially in the development and adoption of laws, policies and institutions. Integrating DRR into development agendas is the key prerequisite in addressing the underlying causes of national and community vulnerabilities to natural hazards. The paradigm for dealing with disasters and their impacts has started to move from emergency response and prediction to addressing the root cause of disasters and efforts for more comprehensive DRR. The 2005 has shown that the greatest progress for DRR education tends to materialise at the national level. Local governments are still lacking in their capacity to reduce disaster risks, respond to disasters and recover from the impacts. Strengthening risk governance at the local and community level should be completed through strengthening institutions and equipping them with the necessary economic and technical skills to plan and implement DRR. It has also been shown that Law 24/2007 on Disaster Management and Law 23/2014 on Decentralisation are the foremost legal basis for addressing disaster management and clarifying the roles of national and most importantly, local governments concerning DRR. In line with these regulations, the roles of BAPPEDA and BAPPENAS as the two key agencies for development planning, and BNPB and BPBDs, as the two key agencies for disaster management, are the foremost organisations at the national and local level respectively, which hold the greater responsibility, mandate and also roles for mainstreaming DRR into development agendas.

This is considered considerable progress, as it has taken DRR education from the marginalised pack of the special education service as set out above.

However, many challenges have been identified in the application of the 2010 Circular i.e., various natural factor and non-natural factors, the diverse geographical conditions of school areas; lack of financial support and community awareness; overloading students and teachers; lack of a model for the concrete application of this strategy at the national level and furthermore, it is optional in nature.

The MoEd has played an insignificant role as it merely justified the DRR education system developed by LIPI. Since LIPI completed its project, the BNPB officially took on the major role of DRR management. Nonetheless, the transformation of knowledge is lacking, so that the current SSB is replicating design established earlier by LIPI-UNESCO. The shortage of human resources would affect support and capacity building for schools in implementing SSB/safe school programme. Thus, the concept of SSB needs to be clarified for the sustainability purposes. It was the missing link between LIPI, MoEd, and BNPB in terms of material and methodological context. Hence, it has been a major challenge of DRR education in Indonesia and it requires multiple approaches and stakeholder to integrate this knowledge/value into their system, particularly in the University of Education which produces teachers, so a teacher has a basic knowledge which can be developed in various subjects or occasions.

Based on the FGD and interviews with teachers, it is apparent that teachers do not fully understand the 2013 Curriculum and DRR education, as no evaluation has been conducted, in which the national Curriculum Centre lacks knowledge on how far the curriculum has been understood and applied on the ground. DRR education at school remains project based, predominantly support by external funding. Despite BNPB now beginning to develop Safe Schools, it lacked coordination from the Ministry of Education, the strictness of the BOS budget, was centralistic rather than decentralised; no autonomy for schools to initiate and develop the DRR programme; lack of local NGOs interested in school rather than community, as it has more bureaucracy. This supported the argument that DRR education is considered external interference rather than internal domestic values.

These failures and resource constraints are particularly evident in Indonesia where disaster management institutions depend massively on government budgets which are, frequently inadequate. This has reduced the activities of DRR institutions to being merely reactive. It is therefore of much interest not only to governments and institutions, but also to the doctrine of religious fatalism that they are adequately equipped to undertake disaster prevention, management and proper response activities which could be their only means of surviving a disaster.

Even though Indonesia has made a considerable effort to reduce disaster risks at the school level and has achieved major milestones, further effort is needed to educate students about hazard related knowledge, especially those who are living in high-risk areas. The limitations include the lack of disaster risk information resources in schools. Hence, it has not been incorporated into schools and subjects at all levels, and the disaster-related curriculum content was implemented only into social and physical education, which is more focused on the lower level than the higher-level grades. This situation has meant slow progress in the achievement of the Hyogo Framework for Action Priority 2, as the progress rate is still at level 3 due to the lack of the institutional commitment made in this sector. Level 3 means that institutional commitment was attained but achievements are neither comprehensive nor substantial. Six primary challenges have been identified.

Firstly, the the doctrine of religious fatalism prevalent in the community, has to some extent hindered the development of disaster preparedness, but it has positively contributed to the recovery process post disaster. However, this doctrine has now decreased gradually due to Islamic teachings adopting the more modern approach that disasters are also caused by human beings, so that human beings have been given the ability by God to prepare for and prevent disasters. Science subjects also contribute to supporting this notion as it shows the rationale of disaster, in particular environmental degradation.

Secondly, current legislation and policy related to DRR education lacks an entry point to access the national budget system. Only when the BNPB issued the guideline for Safe Schools in 2012, did it allocate a national budget

for developing safe schools, although in practice they provided a budget for the rehabilitation of schools badly damaged by disasters and recruit national facilitators. However, it was not really clear how their designation was related to DRR education, as the BNPB has no background in the education sector in Indonesia. While education, including DRR education (school) was under the MoEd, it was not involved in the recruitment of facilitators organised by the BNPB.

At the national level, the application of DRR education lacked legal standing to allocate the national budget. There was only DAK (special fund) available for physical rehabilitation of school/classroom post disasters. Consequently, since 2006 to date, there is no special allocation budget to accommodate DRR education under the 2010 Circular; while using BOS was considered restrictive since Saber Pungli (the anti-corruption task force) has been intensively monitoring these activities, especially when using non-explicit items. Currently the budget has only been allocated by the main body of BNPB for the whole disaster management in Indonesia since 2007. However, BNPB has failed to coordinate with the National Education Ministry, so the spirit of education in the BNPB programme declined. In this context, National Secretariat for Safe Schools expected to be the meeting point of all the DRR stakeholders.

Initially the budget for the initiation of DRR education in the community, including schools came from the National Emergency Fund from BAPENNAS (National Strategic Planning Agency), as a consequence of the devastating tsunami that hit Aceh. After five years this budget was ended, while many international agencies in Aceh had also finalised their projects. Hence, SSB gradually declined and remained uncertain between 2010-2012. However, there was a new movement under the Law on disaster management 2007, in which the new DRR institution was established (BNPB) and in 2012, BNPB adopted the SSB programme under the new modification termed 'Safe Schools', to cover physical ad non-physical aspects of schools. Unfortunately, as BNPB's Safe Schools initiative was implemented independently, it lacked a top-down approach and coordination with LIPI and the Ministry of Education

and Ministry of Religious Affairs, as it was a new institution, which had a shortage of knowledge, experience and a formal official line into the school system.

Thirdly, policy and institutional network divergence. DRR education remains problematic at the national level and in its application. Various issues such as the uncertain position in the MoEd and BNPB, contributed to an overlap. It can be said that the transformation was institutionally adopted and partly modified for the local school context, in which the capacity to adjust from local schools would be questionable. It can be seen from the absence of sustainability in this SSB in many schools. It shows partial convergence and coherence on disaster education and school curriculum due to contested policy domains of disaster management and education. While a strong ministerial-level regulation is being set (BNPB Regulation 4/2012) by the disaster management policy, there is still no change in its highest policy statement, MoEd Circular Letter 70a/2010 via the education policy, although the former references the latter. The recent development of the Safe School Roadmap has not been finalised as a policy instrument with legal power. That being said, BNPB Regulation 4/2012 will not be able to be fully implemented in every school, unless the education side completes a follow-up, at least at the same policy level, i.e. a ministerial-level regulation. The Circular is only a recommendation in nature without mandatory power or clear expression that it should at least be implemented in disaster-prone areas.

The issue of lacking coordination has also occurred in the DRR education sector, as it has been decentralised to some extent. It should have a positive impact when regional government has a serious concern regarding DRR in its region. Such challenges have posed a question on the importance of considering DRR education, particularly within the school system. Again, in practice, many schools have been unable to utilise these items without sufficient supports.

LIPI has had a restricted role in advancing DRR education from the early stages, after Law 2007 and Circular 2010. This is understandable as LIPI is basically the national science agency, which does not have a clear job

description on disaster preparedness and education. In this context, LIPI should develop more scientific research on disasters in Indonesia, to disseminate knowledge, science and technology. This knowledge could then be communicated into the education system through the MoEd and BNPB.

The Circular less successful to implement DRR education as it lacked legal weight and had no relationship with the national budget. Subsequently, this movement was taken over by the BNPB/BPBA as Perka BNPB 2012 concerning the Safe Schools guideline, supported by its national budget. However, it lacks DRR knowledge and has no direct line to the national/regional schools system.

Fourthly, the absence of DRR education (in the general sense) in education associated universities, as institutions in charge of producing teachers in Indonesia, has contributed to the knowledge gap and skills of teachers vis-à-vis DRR education. Consequently, the attempt to integrate DRR into the school curriculum will not genuinely develop without integrating it into the curriculum at the University of Education. In this context the national curriculum centre under the MoEd should play a greater role in this issue. *Fifthly*, it has been revealed that there has been a failure to disseminate DRR education policy and resources to schools. Teachers are completely unaware of its meaning and how it should be undertaken. Hence, it can be said that very few science teachers are informed on national policy relating to DRR education and a limited number of schools are aware of DRR issues**.** Furthermore, the uneven distribution of DRR education knowledge in schools should be a concern of education stakeholders, as there should be more coordination between the education department and the national/regional disaster agency (BPBA).

Sixthly, the lack of a pedagogic transformation role. The meaning of DRR pedagogic in the early days of SSB was limited within the format of DRR discourse developed by LIPI. This concept was cultivated from the structure of the COMPRESS-LIPI programme for community preparedness. The relationship between them is mediated by the structure of pedagogic discourse as expressed in the modalities of educational transmission means. The crucial

issue is how this mediation regulates access to knowledge for students in different areas in Indonesia. Current development of DRR knowledge, referred to Bernsten's theory as lacking DRR pedagogic identity. It is merely official contextualisation from global (external) knowledge, pioneered by LIPI and no official transformation to other newly established official agencies, i.e., the Ministry of Education and BNPB. It needs multiple approaches and stakeholders to integrate this knowledge into school system.

This research primarily suggests a paradigm shift from the fatalistic to more scientific culture through the integration of DRR knowledge into the science curriculum in schools. The integration of DRR into the school science curriculum can be done independently of the large SSB/Safe School scheme. The integration of DRR into the science curriculum can be an effective approach to improve the ability of schools to understand disaster risk as one aspect of Safe Schools. This activity can prevent overburdening the curriculum and short-term SSB project. However, it is important to maintain all aspects of Safe Schools. This includes zero negotiation on the Safe Schools infrastructure standards and guidelines. It needs to strengthen DRR policy both at the national and regional level, by involving government institutions in teacher training (such as the LPMP and local education authorities), engagement with the Faculty of Education at the University, increase financial support for DRR education initiatives and adopt standardised and nationally approved disaster education guidelines. These are directed towards mitigating the negative impact of challenges currently faced by Indonesian schools in terms of aligning disaster education with the current version of Indonesian school curriculum. The outlined activity in Chapter Seven can help strengthen DRR education adoption in Indonesian schools and may contribute to the achievement of a much greater level of disaster preparedness and awareness. It is expected to have a multi-layered impact for the future of DRR education developments.

There is an increasing demand for strengthening of the network and engagement of more diverse stakeholders at different levels of governance. This means that Indonesia needs to identify, work with and maintain

relationships with more diverse stakeholders. While some groups of stakeholders such as governments and international NGOs have long been involved in DRR, others have been overlooked and underutilised, especially with respect to increasing preparedness at the local and community level. The roles of university, community leaders, civil society organisations, the media, private companies, faith-based organisations, religious leaders, and scientific organisations, are those who act as connectors, creating networks a by which communities can express their needs, potential roles, identify priorities and improve school community resilience. The recent reposition of the National Secretariat for Safe School is expected to be a coordination hub among stakeholder, to continuously improve DRR education in the future.

In terms of national policy, the improvement of data bases on disasters risks, hazards and the potential areas are required in Indonesia, so it can be accessed by education/schools' stakeholders. Multiple national level regulations and policy instruments on DRR, education and public works, although without strong coherence, can still be exercised by local government and even headmasters to establish their own initiative in schools' annual plans. Policy and regulation at the national level are already available to justify the development of local regulation or governor/mayor instruction that can guarantee the mobilisation of local resources or access external resources for all schools to implement disaster education and safe schools. In addition, it is necessary to increase the capability of teachers, school headmasters and school management to implement disaster education and to improve school safety. In this context, National Secretariat for Safe Schools need to establish the evaluation to ensure the process and quality of the programme.

8.4. Research Contribution

This research found that DRR education has essentially legitimised soft national policies, including the integration of DRR into the curriculum (Circular Letter and Perka BNPB), focused predominantly on earthquakes and tsunami, under the SSB system. The integration of DRR knowledge in schools (SSB) is conducted more through extracurricular activities rather than intra curricular.

Moreover, SSB has quantitatively developed but support is intermittent, subject to external support (government, NGOs, funding) or project based, which suggests that DRR knowledge is not simultaneously sustained within schools.

However, under the 2013 Curriculum, DRR related knowledge is mentioned explicitly in the science curriculum, though it has not materialised in classroom teaching and learning activities. As a consequence of an uneven distribution of national DRR policy in schools and lacked of teachers understanding on DRR knowledge. Considering this situation, this research promote the integration of DRR knowledge through intra curricular activities in the school system to sustain knowledge dissemination in school communities.

The study has specifically utilised DRR related topics that can be integrated through the curriculum. In this context, this research has successfully conducted a classroom intervention in a senior high school on DRR in terms of climate change adaption issues. Thus, this research has operationalised DRR education from national policy into school classrooms by introducing a simple and realistic model of DRR knowledge integration, using science subjects to explain disasters risks and eventually asses the student's knowledge pre- and post-intervention. Consequently, teachers' abilities have been developed in terms of developing a simple integration model that allows them to combine DRR related topics into the existing science teacher's lesson plans. Accordingly, many students have improved their knowledge on disaster risks post intervention. Thus, it is important to note that such activities have contributed to promoting the role of teachers as a key point in DRR education in schools, are less dependent on external support, are changing teachers' attitudes and the willingness to integrate DRR into lessons, as it has been clearly substantiated that teachers who have been involved have duplicated the intervention in other classrooms. This sort of action can support the dissemination of DRR knowledge and maintain the programme at the school level.

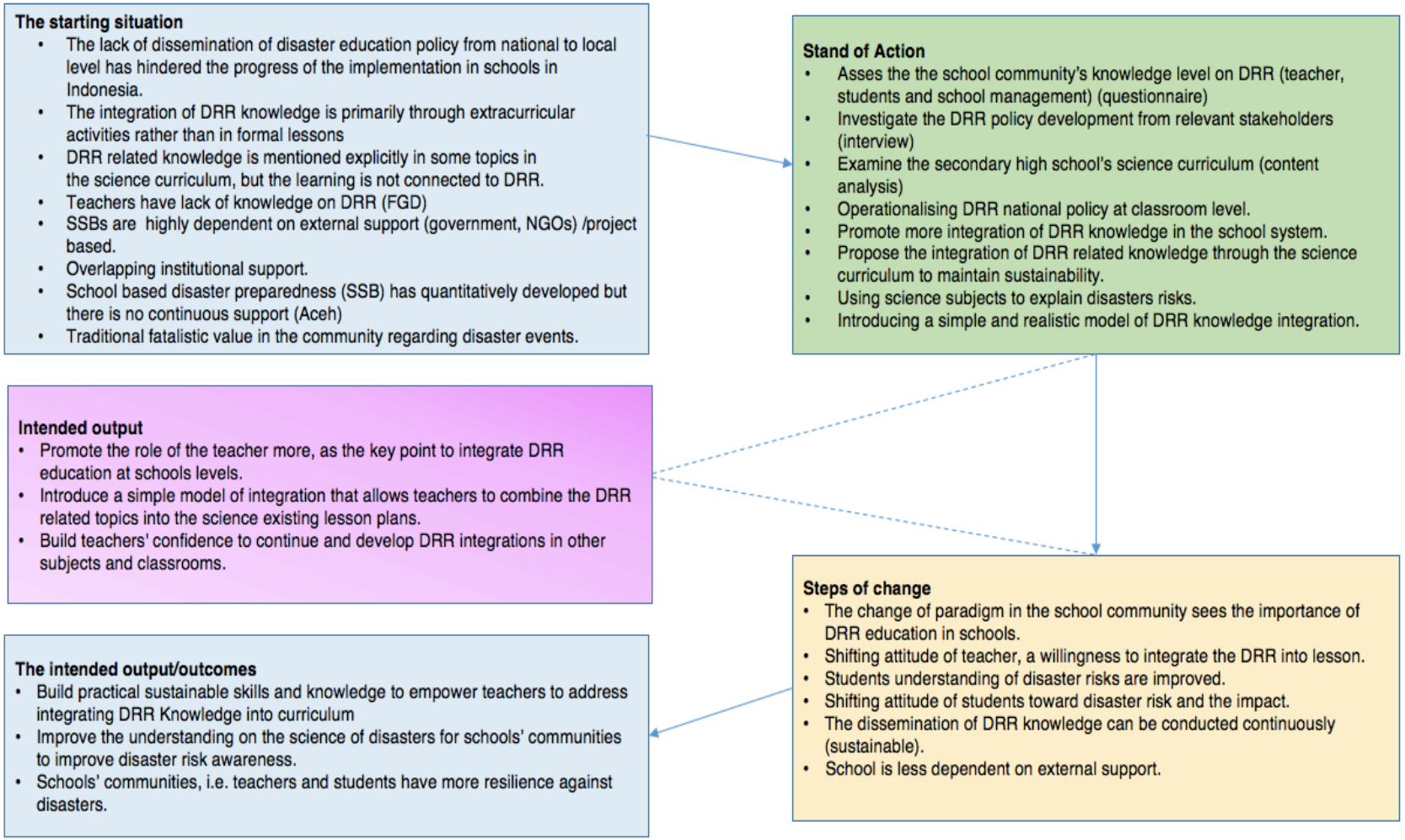
Hence, this research has contributed to shifting the paradigm of teachers to see the importance of DRR education in schools, specifically the changing attitude of students toward disaster risk and the impact, the

increasing confidence of teachers and willingness to continue and develop a similar integration into other subjects and classrooms and the positive perception of DRR stakeholders concerning this intervention. Eventually, the dissemination of DRR knowledge can be conducted sustainably. Moreover, this study will provide critical information and recommendations for governments, especially in Aceh Province and other local governments in Indonesia together with central government, as regards the importance of disaster education in schools. The insight might help in formulating policies and designing programmes on disaster management. The creation of the DRR knowledge approach has been critically analysed to see whether long term sustainability could be addressed through the ´SSB´ method, which has been strongly advocated following the 2004 Indian Ocean Tsunami.

Therefore, a breakthrough proposed by this thesis was to propose a more scientific approach regarding DRR, in terms of integrating DRR education in the science curriculum. As it has been tested in the classroom intervention in Chapter Seven, this approach can be the future of DRR education in Indonesia. Indeed, it will need more research and funding to disseminate national policy at the level and conducting an inventory of DRR related issues in existing subjects and developing teaching methods and tools, as well as capacity building for teachers becomes inevitable. Integrating DRR concepts into the science curriculum is a potential field of study, as this can significantly contribute to introducing DRR in more practical and closely related ways to students' daily life. Thus, this research has been part of the development of DRR education in the science curriculum to be a model that can be disseminated to a wider audience in Indonesia.

Diagram 8.1 gives a description of the correlation change this research has imposed. This diagram benefits from the theory of change, to show how this research has positively impacted on the development of DRR education at the school level (See Laing and Todd, 2015).

Diagram 8.1. The correlation between different stages of the research.



8.5. Limitation and Future Research

This research has focused on DRR education, in terms of disaster knowledge development and transformation of the school's curriculum in Indonesia by way of using Banda Aceh as a case study. Therefore, there are spaces to advance this research, both to cover other aspects of DRR education in terms of skill preparedness, school capacity and policy, and to extend the scope of the area into other regions of Indonesia or other developing countries, so a comparative understanding can be conducted. In particular, the role of the University of Education which produces teachers, as they are the key actors in transferring DRR knowledge to students, can give valuable input on the development of DRR.

Equally the dissemination of DRR education to peers such as parents and family is also essential, so DRR education can be promoted to wider society. Finally, given the observations of a trend towards the new global DRR education, there is a need for cross-disciplinary research to obtain a better understanding of how these ideas are shaping the nature of DRR education more generally. Improving disaster management knowledge and skills may save many more lives and equip the younger generation with the ability to respond to natural disasters and reduce the loss of lives and property during disasters. Accordingly, DRR education in Indonesia needs to evolve to find an ideal formation within the spirit of Ki Hajar Dewantara's philosophy of national cultural-based education and global knowledge transformed by the UN agencies into practice in post-disaster areas throughout Indonesia.

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Appendix 1

Preliminary survey

Name of participant:

School :

1. Have school committees/ staffs/ teachers/ students attended training/seminar/workshop/meeting about safer school?

a. Yes

b. No

If yes, please circle one, of the topics below:

a. Information on disasters
b. Evacuation procedures
c. First Aid
d. Early Warning system
e. Evacuation Drill
f. Safe Building
g. Curriculum design for mainstreaming Disaster Risk Reduction
h. Other topics

2.Does school implemented/involved in safer school program?

a. Yes
b. No

3. How is the process of the DRR integration has been done in school?

a. Formal lessons:
   - Name of subject:
   - Method used:
   - Time duration:

b. Local Content
   - Name of subject:
   - Method used:
   - Time duration:

a. Extra-curricular
   - What is the activity:
   - Method used:
   - Time duration:

4. Has school integrated DRR into the lesson plan?

a. Yes

b. No
Sample of copy available:
Subject:
Teacher's name:

5. What does the learning materials available at school related to DRR?

a. Books related to natural disasters
b. Poster, leaflet, clippings about natural disasters.
c. VCD, cassette about natural disasters

6. Does school have evacuation drills on a regular basis?

a. Yes
b. No

7. Is there any other support from the government/non-government organisation for disaster education programme in your school?

a. Yes
b. No

8. Is there any fund/technical guideline to support disaster education programme in your school?

a. Yes
b. No

9. If your school is selected to be a research school for integrating DRR in classroom, do you agree to support this research?

a. Yes
b. No

Appendix 2

Interview Guidelines

1. Sri Hidayati (National Curriculum Centre) – the head of the Curriculum Division at the National Curriculum Centre. She is actively involved in promoting DRR in the school curriculum. She has also written guidance books to assist schools to implement DRR in the curriculum.
2. Irina Rafliana (Indonesian Science Institute -School Preparedness Division)- Irina Rafliana is a person who was involved in developing the DRR curriculum and the implementation of the School based Disaster Preparedness programme.
3. Ninil Jannah from Lingkar - Lingkar is the NGO that support Safer Schools and the key member of Consortium for Disaster Education (CDE).
4. Zamzam Muzaki (the secretary - National Secretariat of Safe Schools)
5. Robi (BNPB – National Disaster Management Agency, Education Division
6. Yanti – Kerlip (Keluarga Peduli Pendidikan). Kerlip is the NGO that support Safer Schools/Child Friendly School
7. Triono (Indonesian Science Institute - School Preparedness Division) - Irina Rafliana is a person who was in charge of LIPI COMPRESS and the implementation of the School based Disaster Preparedness programme.
8. Anwar - BNPB National Facilitator

A. Interview guidelines (Education stakeholder)

1. When has the DRR concept been introduced in the National curriculum? By Whom and Why?
2. What is basic philosophy of the DRR education concept in Indonesia?
3. Why do you think it is the important to include the DRR concept in the school curriculum in Indonesia What is the rationale/expected outcome of integrating the DRR concept into the curriculum?

4. What are the advantages/disadvantages of integrating DRR into the National Curriculum?
5. What is the principal focus of DRR education in Indonesia?
6. What do students need to know about the DRR concept?
7. How is the current DRR education linked to the purpose of basic formal education in Indonesia?
8. How has DRR has been articulated in the current curriculum? (the Curriculum 2013). Does the curriculum change promote a better understanding of the DRR concept compared to the previous one?
9. What is the main problem with regards to implementing DRR education in schools in Indonesia? How can the problem be resolved?
10. Did you ever involve/work on the development of the School-based Disaster Preparedness Programme (SSB) in Indonesia/Aceh? If yes, when and what kind of support was given? Describe the best practise/lesson learn?
11. What recommendation can be made to foster the integration of the DRR concept in schools?

B. Interview guidelines (teachers)

2 chemistry teachers, 2 physic teachers, 2 biology teachers

Name:

School:

Teaching subject:

Grade:

1. Do you have any experience of teaching disaster-related knowledge in the classroom?
   a. If yes, What and when?
   b. If no, why?
2. In your opinion, is it important to teach students about natural disaster/disaster related knowledge? Why?
3. What outcomes are you expecting if you have to teach DRR in school?

4. What is the main problem with teaching DRR in school? How can the problem be dealt with?
5. What role do students play in learning about the DRR concept? Is it simply to understand them? Or, should they also be taking some responsibility for issues themselves?
6. How does learning about the DRR concept help students understand the problem in their society?
7. Do you think that the current curriculum (K13) sufficiently promotes DRR knowledge to students?
8. Do you have any ideas how to foster the integration of the DRR concept in schools?

Appendix 3 Safe Schools in Aceh

Area	Elementary school (Sekolah dasar/SD)	Middle school (Sekolah Menengah Pertama/SMP)	High School/ Sekolah Menengah Atas/SMA)	Year
Banda Aceh	SDN 2 (2009-2012)	SMPN 1	SMAN 1	2009-2011
			MAN 2	
			SMAN 6	
	SDN 13			2012
	SDN 21			
Banda Aceh	SDN 23			
Banda Aceh	SDN 31			
Banda Aceh	SDN 38			
Banda Aceh	SDN 48			
Banda Aceh	SDN49			
Banda Aceh	SDN 7			
Banda Aceh	MIN Lampisang			
Banda Aceh	MIN Lamtengoh			
Banda Aceh	MIN Peukan Bada			
Aceh Besar	SDN 1 Peuka Bada			
Aceh Besar	SDN 2 Peuka Bada			
Aceh Besar	SDN Lam Awee			
Aceh Besar	SDN Lam Geue			
Aceh Besar	SDN Lambaro Nejib			
Aceh Besar	SDN lam isek			
Aceh Besar	SDN Lam pageu			
Banda Aceh	SDN 65 lampulo			2013
Banda Aceh	SD Methodist			
Banda Aceh	SDN Neuhen			
Banda Aceh	SDN Kajhu			
Banda Aceh	SDN mon Siget			
Banda Aceh	SDN Lamnga			
Banda Aceh	SDN Kota Pasi			
Banda Aceh	SDN 15			
Banda Aceh	SDN 41			
Banda Aceh	SDN 45			

Simeulue island	SDN 1 Simuelue Tengah			2014
Simeulue island	SDN 2 Simuelue Tengah			
Simeulue island	SDN 6 Simuelue Tengah			
Simeulue island	SDN 7 Simuelue Tengah			
Simeulue island	SDN 9 Simuelue Tengah			
Simeulue island	SDN 9 Teupah Barat			
Simeulue island	SDN 12 Teupah Barat			
Simeulue island	SDN 8 Angkeo			
Simeulue island	SDN 11 Naibos			
Aceh Jaya	SDN 1			2015
Aceh Jaya	SDN 2			
Aceh Jaya	SDN 3			
Aceh Jaya	SDN 4			
Aceh Jaya	SDN 5			
Aceh Jaya	SDN 6			
Aceh Jaya	SDN 9			
Aceh Jaya	SDN 13			
Aceh Jaya	MIN Seunebok Padang			
Aceh Jaya	MIN Gampong Baroe			
Aceh Jaya	MIN teunom			
Banda Aceh	SD 63			2016
Banda Aceh	SD IT Al-Azhar			
Banda Aceh	SDN 10			
Banda Aceh	SDN 19			
Banda Aceh	SDN 27			
Banda Aceh	SDN 3			
Banda Aceh	SDN 40			
Banda Aceh	SDN 53			
Banda Aceh	SDN 63			
Banda Aceh	SDN 8			

Banda Aceh	SDN 9			
Banda Aceh	SDN 58			
Banda Aceh	SDN 50			
Pidie Jaya		MTsN Trieng gadeng	SMAN 1 Meuredu	
Pidie Jaya	MIN Beuracan	SMPN 1 Meuredu	SMAN UNGGUL	
Pidie Jaya	SDN 1 Trienggadeng		SLBN	
Pidie Jaya	SDN Kuta Batee		SMKN 1 Bandar Baru	
Pidie Jaya	SDN Tampui		SMKN 2 Bandar Baru	
Pidie Jaya	SDN 2 Trienggadeng		SMKN 1 Trienggadeng	
Pidie Jaya	SDN Peuduek		SMKN 1 Bandar Dua	
Pidie Jaya	SDN Peuduek Baroh		SMAN 1 Panteraja	
Pidie Jaya	SDN Peuduek Tunong		SMKN Ulim	
Pidie Jaya				
Aceh Utara			SMKS Ulumuddin	2017
Aceh Utara			SMAN 1	
Aceh Utara			SMAN 2	
Aceh Utara			SMAN 3	
Aceh Utara			SMAN 4	
Aceh Utara			SMAN 5	
Aceh Utara			SMAN 6	
Aceh Utara			SMAN 7	
Aceh Utara			SMAS Muhammadiyah	
Aceh Utara			SMAS Yapena	
Aceh Utara			SMAS Sukma Bangsa	
Aceh Utara			SMAN Arun	
Aceh Utara			SMKN 1	
Aceh Utara			SMKN 3	
Aceh Utara			SMKN 4	
Aceh Utara			SMKN 5	
Aceh Utara			SMKN 7	

Aceh Utara			SMKN 8	
Aceh Utara			SLBN Aneuk Nanggroe	
Banda Aceh			SMAN 6	
Aceh Besar		SMPN 1 Peukan Bada	SMAN 1 Peukan Bada	
Banda Aceh		MTSN Darussyariah	MAS Darusssyariah	2018
Banda Aceh		SMPN 12		
Banda Aceh		SMPN 13		
Banda Aceh		MTSN Inshafuddin	MAS Inshafuddin	
Sub Total	72	8	34	
Total	114			