Community-Based Preparedness Trainings to Build and Strengthen Local Capacities for Disaster Preparedness

With lessons learned from Preparedness Trainings in landslide risk communities in Sri Lanka

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Abstract

Disaster response is most effective, if a high level of preparedness is in place before natural hazards strike. As many low-income countries are under-financed when it comes to Disaster Risk Reduction, it is lower-cost interventions such as Community-Based Preparedness Trainings that they often rely on to provide strategies to reduce the vulnerability of communities. These trainings are widely used and aim to address risk challenges at a local level.

The purpose of this thesis is to identify key components of Community-Based Preparedness Trainings. A structured literature review provides a significant part of the basis of this analysis. As an additional means of approaching this matter, experts and community members from two communities, one that has and one that has not received Community-Based Preparedness Training, have been interviewed on training related knowledge. The comparison between those communities combined with the information from the academic literature form the core of the discussion as well as the basis for the identification of discourses on and strategies in preparedness trainings. Finally, the conclusion provides a number of key-points that can be targeted in Community-Based Preparedness Trainings in low-income communities.

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LIST OF ABBREVIATIONS

CBDP	Community-Based Disaster Preparedness
CBDM	Community-Based Disaster Management
CBDRR	Community-Based Disaster Risk Reduction
CPBT	Community-Based Preparedness Training
DMC	Disaster Management Centre (Sri Lanka)
DRR	Disaster Risk Reduction
EWS	Early Warning System
HFA	Hyogo Framework for Action
NBRO	National Building Research Organization (Sri Lanka)
UNISDR	United Nations Office for Disaster Risk Reduction

1 INTRODUCTION

1.1 Community-Based Preparedness Trainings

Disasters occur globally in high-income and low-income countries. Following this, a general level of disaster preparedness is essential in all regions of the world. However, low-income countries seem to be more vulnerable to disasters, due to socio-economic-, educational- and numerous other factors. Moreover, low-income countries' governments often have lower investments in the field of Disaster Risk Reduction (DRR). Therefore, it seems that especially in those places, where expensive protective constructions or Early Warning Systems (EWS) are often not provided by authorities, it is essential for a good preparedness training to be in place. If those are in place, disaster response can reach higher effectiveness, and thus save human lives.

Isayama and Shaw (2014) argue that there are a number of reasons for focussing on Community-Based preparedness approaches, such as the locally changing nature of disasters, the diversities of communities (communities differ in many respects; therefore, preparedness training should take place on an individual, local level), National Local Linkages (cooperation of national and local authorities need reliable, trained local contact people), evidence from past disasters (preparedness has actual positive effects), increasing global awareness of local needs (Hyogo Framework for Action (HFA) that support it), sustainability and up-scaling issues (preparedness effects get lost over time if there is no local ownership) (Isayama & Shaw 2014). To reach the goals of higher preparedness, it is imperative that communities are supported in their efforts to develop preparedness and higher resilience. Community members and neighbours will always be the first to deal with immediate risks and dangers. It is this group who will be the first responders after a disaster has occurred (Chen et al. 2006; Isayama & Shaw 2014). Having Community-Based means of responding to disasters, is not a new strategy, but rather a return to a time-honed concept; communities were self-dependent and autonomous, as communities dealt with problems affecting them long before state structures emerged. Consequently, Community-Based activities are deeply rooted in most societies (Shaw 2012a).

Relevant international documents that support a stronger implementation of these strategies are the Hyogo Framework and the later published Sendai Framework, which were developed at the World Conferences on Disaster (Risk) Reduction taking place in Japan (UNISDR 2005; UNISDR 2015). The frameworks encourage a stronger implementation of policies and measures towards higher resilience of nations and communities. They established a number of goals and actions that also push for more Community-Based DRR, preparedness and EWS implementations (UNISDR 2005; UNISDR 2015).

The former political trend of reacting to disasters in a "top down" manner starting on a state or even international level, which has been prevalent for a number of decades now, does not accurately reflect the current challenges and fails to include the most vulnerable members (Anderson et al. 2014). Therefore, the shift back from a state-lead "top down" to a Community-Based "bottom up" process has been taken place over the last 20-30 years. This Community-Based path can achieve more focused outcomes with regards to need-based and context-specific problems. A Community-Based Disaster Management (CBDM) approach with participatory strategies can encourage cultural sensitive, true participation and can give the community better control of their own resources and services (Shaw 2012a; Walia 2008).

1.2 Aim and Objectives

This thesis focuses on Community-Based Preparedness Trainings in low-income countries, with a practical case example of landslide risk communities in Sri Lanka. The aim is to contribute to a deeper understanding of the influence of Community-Based Preparedness Trainings on disaster preparedness in general. The main research addressed in this thesis is:

"*What aspects are important to consider in doing Community-Based Trainings with the objective to strengthen the local capacity of preparedness in risk zones? What can be learned from the effects of preparedness trainings in the case of Sri Lankan communities in landslide risk zones?"*

The questions above have been answered using a combination of different methods. A structured literature study has been conducted, as well as interviews with community members and experts. This will be explained in more detail in section 2 which details the methodological choices made.

1.3 Context of the Study

This section provides general information on what a landslide is, as well as a short overview of the geographical context the study took place in, and the two communities affected by landslides that were interviewed for the present study.

The word 'landslides' is a general term referring to a number of different kinds of movements of soil, rocks or detritus caused by gravity effects (Blasio 2011). Landslides can be categorized with respect to the nature of movement as well as what kind of earth material is involved in the landslide. Certain conditions, such as for example seismic activity, the internal composition of the soil, or interference by humans can increase the likelihood of such events.

Since this thesis does not address technical geophysical details of landslides, but deals with the effect of preparedness trainings on communities affected by landslides, such a general definition suffices. For more information on this issue the book: "Introduction to the Physics of Landslides" by Fabio Vittorio De Blasio (2011) can provide detailed insights.

Sri Lanka faces major impacts by landslides. Every year, a couple of hundred people die in incidences in various regions of the country. Most affected is the hill and mountain area in the central and southern part of the country (Preliminary Hazard Zone Map Badulla District in Appendix D). The number of reported landslides as well as the number of victims has increased over the last decades (Disaster Management Centre & Programmw 2012; Jayathissa 2016). The Disaster Management Centre (DMC) and the National Building Research Organisation (NBRO) has started to conduct CBPT in high risk landslide zones in these areas over the last years.

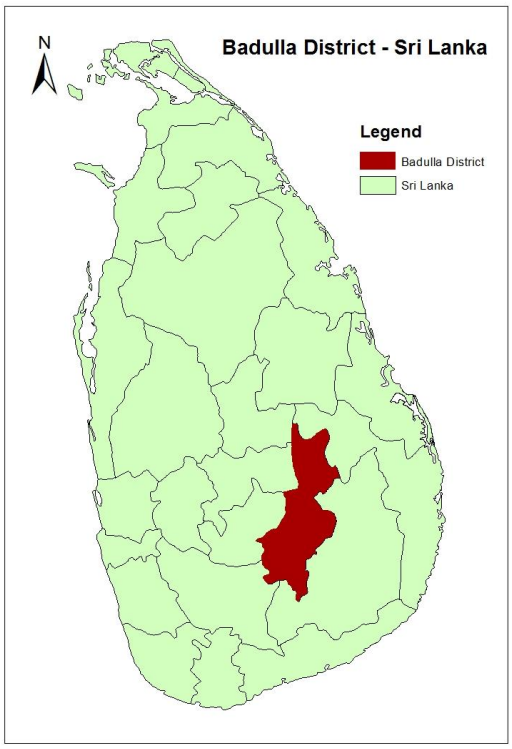

Figure 1: Map of Badulla District in Sri Lanka

The data for the present study was collected in Diagalla and Malangamuva, two communities in the Badulla District. Diagalla is a community located in a tea estate area. According to an NBRO risk assessment report from 2007, the lower division of the community is threatened by a slope that could potentially slip (National Building Research Organisation 2007). From personal observation, it can be said that there certainly are visible tension cracks in the top part of the slopes and regular boulder drops occur. In response to the earlier recognition of the potential danger, Diagalla received CBPT. The community at risk consists of 153 families who live in simple living conditions. The majority of the families work at the tea estate.

Malangamuva Community, which is also located in the Badulla district has not received training by the DMC. Originally, another community had been selected to represent the group of 'untrained communities'. However, this group had to be excluded from the dataset, as it turned out that, contrary to the information I had received beforehand, they had in fact received training. Malangamuva was chosen as the accessible alternative that received no training. In the course of the interviewing process, however, information came to light that in 2014, tension cracks were first observed above the village, which led to a self-evacuation by the community with support of the local authorities, that lasted 3 weeks. This fast reaction was partly related to a landslide which had occurred weeks earlier in the same region and had claimed 80 victims. These previous event in Malangamuva had, in fact, led to a high awareness and fear of landslides in the entire region, and thus make the Malangamuva Community a less ideal control group than one might wish. In other respects, the two communities are comparable, though. The community at risk consists of about 30 families, which have all been provided alternative land by the government to give them the opportunity move to

a safe location. According to information provided by local authorities, 2/3 have made use of this offer and will move in the coming years. The community also shows some of slope cutting failures, which have led to a number of casualties in the past. As mitigation measures, the community has previously improved the drainage system and authorities have filled the tension cracks. At the time of the study, the Risk Assessment report from the NBRO is still in process.

2 METHODOLOGY

In addressing the research questions as detailed in Section 1.2, a triangulated approach was taken, consisting of a structured literature review, expert interviews and interviews with community members.

2.1 Structure and key componence of the research

In the course of the research and interviewing process with experts, four key components of Community-Based Preparedness Trainings (CBPT) have been identified. These key components are in part based on structural classifications made by the interviewed experts and in part are taken from the training material provided by the DMC and NBRO (in the form of Power Point presentations). The components proved to be useful categories in structuring the present research project and are therefore used in this thesis to set focus points of investigation in the attempt to provide answers to the set research questions. Furthermore, the sections will use these four topics as structural guidelines. These topics are:

- Risk awareness (main causes of disasters and warning signs) as an important factor and tool in community preparedness trainings.
- Knowledge of mitigation measures (Including technical knowledge and preventive measures to be taken to cope with disasters) within communities at risk.
- Knowledge on response options (to immediate dangers) and EWS within communities at risk.
- Willingness to relocate from danger zones.

2.2 Structured Literature Review

The literature review comprises a number of articles, reports and books containing secondary data that proved to be relevant for the topic. Some former course literature was used that has been stored in my personal library system. Within this system, key-words were used to search for the relevant literature. The majority of the literature however was collected using the online resources provided through LUBsearch, which has access to 200 Databases and 17 000 e-journals (Lund Univerity 2017).

The keywords used in the literature search were composed of terms from the research question as well as from the four main topic areas that have been identified in the research (risk awareness, knowledge and mitigation measures, response options and EWS, willingness to relocate). Additional key-terms such as, for example 'hazard maps', were used to investigate some key topics that arose from the literature reading process in more detail, or gain access to tools that seemed pertinent. Many of the terms were matched with the words disaster and community, to find relevant literature. Those keywords and the number of search hits are provided in a table in the appendix (Appendix A). In some cases, a great number of matches were found and the search had to be limited to articles, books, journals, and e-books. In other cases, topics similar to that of preparedness training showed up, which derived from other disciplines that were not related to this paper. To limit the number, search strings containing keywords that were to be excluded from the search were used as well. In most cases, the terms 'medical' and 'health' were excluded. These restrictions are also mentioned in the table (Appendix A). If the number of articles still exceeded the scope of this project after the first exclusion round, a second round with a further restriction of subjects was added for some search strings.

The subjects used in the search are key-subject categories that are registered with each of the remaining articles within LUBsearch (Lund University 2017). Each of the primary key-terms provides a different set of subjects. Therefore, the provided subject lists were scanned for relevant subjects that were then chosen. Subjects such as emergency management, community, preparedness and community development were often used. The exact selection of subjects can also be found in Appendix A.

Based on the search restrictions above, a list with relevant literature in LUBsearch was found. The literature was searched in a detailed and structured manner for relevance to the topic at hand. As criteria for the selection of relevance, the title, year of publishing and abstract content were considered. Firstly, literature findings were excluded if the title did not indicate any importance for the paper. Secondly, only literature was used that has been written after the year 2000 to ensure that the findings are of from the recent past and therefore have a higher significance. As a third criterion, the abstracts of the remaining literature were read and evaluated in terms of their relevance. If a text met these three criteria, it was included in the corpus of the study. The fact that articles are placed higher up in the search list if the key- terms used are included more often in an article helped to give special attention to the most relevant articles (Lund University 2017). This set of key texts was further expanded through a careful scanning of the texts reference lists. The above-mentioned criteria were applied to the sources listed there. Using this snowballing technique, more relevant literature was added.

2.3 Interview Process

As one part of the empirical data collection process, qualitative expert interviews were conducted. The selection of these experts was based on the search for individuals of the two institutions that are in charge of CBPT in the selected study area of Badulla District. Those state institutions are the DMC and NBRO. They plan, facilitate and execute the training in the entire district of Badulla. Within the institutions, individuals who themselves conduct CBPT but are also in the highest accessible position within the public institution they work in were selected. The two selected experts are employees at institutions that are responsible for the CBPT at the district level in Sri Lanka. The semi-structured interviews followed a pre-established set of questions that allowed for a certain flexibility to further expand on some questions during the interviewing process (Appendix C). The interviews were recorded on tape and transcribed to allow a better analysis. Additionally, a Power Point presentation on CBPT, which was presented by an NBRO expert, was used in establishing a list of: General landslide factors, Man-made factors for landslides, Signs for future landslides and Reduction Measures for landslides. This information,

which is covert in most of the district's CBPT, along with the expert interviews, provided the basis for establishing a list of indicators used in the community interviews (see Table 1 in Section 5.1).

The experts at the DMC and NBRO provided a list of communities that had received CBPT in the past and a list of communities that had not been trained yet but fulfilled the risk criteria for future trainings. From this list, two communities were selected that are under the same district's authority, are accessible, are in the same risk category, have a population large enough for the case study and agreed to participate in the present study.

To supplement this data, semi structured interviews with pre-established question guides were conducted in the selected communities (Appendix B). These interviews aimed to test the knowledge of the communities regarding four pre-defined topic areas. In each community, only individuals who are currently living in a high-risk landslide area were included as informants. These topic areas are presented and explained in section 2.1.

As an entry point, local authorities established the primary contact and supported the research process while the data was collected. In response to the existing language barriers, a translator was employed to communicate with the interviewees. Twelve interviews with participants sampled to be representative with regards to gender and age were conducted in each community. Additional short surveys were used at the beginning of each interview to collect basic information about the interviewees, as well as their general knowledge regarding risk exposure.

2.4 Analysis of Primary Data

The expert interviews were transcribed and compared to one another. The relevant results are presented in Section 5.1, which deals explicitly with the results from the expert interviews, as well as in the general discussion.

The 24 interviews with community members were quantified as follows: 1) The short surveys were quantified according to the pre-given answer options (Questions 1-9 in Appendix B). 2) Other questions were quantified in 'yes' and 'no' values, if the question was formulated accordingly (Questions 10, 19, 23, 24, 27 in Appendix B). 3) Based on the expert interviews and the provided training materials Table 1 (Section 4) was compiled. It gives an overview of correct

answers to technical questions in regard to landslides. Furthermore, knowledge about the working of the EWS used was collected. Building on this, the community interview partners were asked to name as many indicators as he/she can, to answer the remaining questions (Questions 11, 12, 14, 16, 18, 20-22 in Appendix B). The number of appropriate indicators mentioned were counted. The sum of positive indicators for each question was calculated. This was done for both communities and was further categorization into two groups, that of the “trained” and in the “not trained” community.

Following the quantifying process of the interviews, the answers had to be tested for their statistical significance. This was done using Microsoft Office Excel. As Microsoft Excel contains different sets of t-tests, an f-Test was first conducted for each data set. The results of this f-test indicated if a t-test with ’same‘ or ‘different variables’ would be necessary for the data at hand. Based on these results, the matching t-test was conducted. The values of the t-statistic and the ’critical two sided ‘t-value‘ were compared. Also, the p-value was examined to see if the threshold level of 0,05 (5%) was exceeded. These results defined if there indeed is a statistically significant difference between the communities or not. Table 2 in the Result section provides a detailed list of the results of the conducted t-test. Furthermore, graphs were created to illustrate the mean value differences between the two communities studied (Figures 1-4).

3 LIMITATIONS

There are a number of limitations that should be briefly mentioned in this section. One such limitation is the obvious issue of scope. The literature research relies to a large extent on what can be accessed via the Lund University Database and therefore neglects to include or address information that could be added from other databases. Similarly, it can be said that the selection of just two communities presents no more than an exemplar-based insight into the actual communities at risk from landslides within Sri Lanka, and therefore cannot be representative for all of them.

Secondly, the interview method itself brings with it some inherent limitation. One such limitation is grounded in the fact that there was a language barrier between the interview partners.

Consequently, there is a certain risk of mistranslations or shortened and simplified answers that might have been conveyed by the translator, as well as the generally necessary simplification of the questions in order for them to be more easily and consistently translated. Also, cultural misunderstandings in language and expression have to be considered, both those that apply generally between Europe and Southern Asia, as well as the cultural difference based on the potential power position I have as a white male researcher in a low-income community. For some participants, the situation might have felt like a test. This means that a local researcher conducting the same interviews might have obtained different results. Moreover, the sampling procedure of interview participants was followed to the degree the situation allowed – which was limited - and thereby reached only approximately 95% of the accuracy set out in the sampling goals. Also, the people providing the entry point to the community and the way I entered it could have potential influences on the results of the study, as it shapes the way who in a community has been interviewed.

There are many other complex surrounding factors such as the interviewees personal disaster experiences, their previous exposure to hazards or their evacuation experience that can influence individuals and their responses. Some of those limitations are inherent in any research process, whereas others are due to the limits of the scope of this study. Nevertheless, the combination of the three methods including the extensive literature research provide a well-founded basis for the study conducted.

4 RESULTS OF LITERATURE STUDY

The following structured literature review will give a concise overview of the relevant literature in the field of CBPT and contributes to the general scientific findings of this paper. The first subsection deals with general definitions, political activities as well as mainstream idea shifts and current trends in the field of CBPT. Following this, the results of the more targeted literature research, conducted with the aim of discussing specific components of CBPT, are presented. Those components that were researched in greater detail are Risk Awareness, Knowledge of landslides and mitigation measures (including technical knowledge), EWS and Response as well as Relocation processes. In the final part of this section, the effects of Preparedness Trainings in general as well as the effects specific to CBPT as described in the academic literature are presented. The content of the present section often cuts across many different areas that need to be addressed. The separation into individual subsections therefore rather has to be seen as an element of reader guidance than as a clear separation into individual topics.

4.1 Basic concepts and policies of Community-Based Preparedness Trainings

As a start, we have to ask: what is a community and how do we define such a grouping term? Walia, who researched Community Based Disaster Management, defines 'community' as:

"*… a close knit sociological group sharing an environment and bound together by intent, belief, resources, preferences, needs, risks and a number of other common conditions that affect the identity of those involved and their degree of adhesion* (Walia 2008, p.68)"

Another important term in this context is that of 'preparedness'. Preparedness includes all the activities that have to be taken before a disaster occurs. Such activities could include but are not limited to risk assessments, planning, information management, legal steps, EWS, stockpiling, exercises, public information, educations and trainings (Coppola 2011b; UNISDR 2007). According to the UNISDR:

"Preparedness is the knowledge and capacities developed by governments, response and recovery organizations, communities and individuals to effectively anticipate, respond to and recover from the impacts of likely, imminent or current disasters (UNISDR 2007)"

Those preparedness actions are part of the larger framework of Disaster Risk Reduction (DRR) and support better emergency management in all kinds of emergencies (UNISDR 2007). These definitions of community and preparedness will be adopted within this study.

There are different ideas on how CBPT should be approached. Authors such as Walia (2008) argue that a standardized module for CBPT should be created, which combines the desired outcomes and strengths of already existing programs and thereby also addresses the challenges that have been identified. This standardization should be a process of constant development in which there is enough flexibility for local adaptation. Furthermore, he criticizes that many CBPT lack monitoring processes. To this he attributes the regrettable use of training strategies that have not been sufficiently tested before (Walia 2008).

The building of more preparedness through the formal education system such as schools and universities are also identified as having a potential positive impact. This includes alternative education such as 'life experience', extra-curricular activities or traditional knowledge that can be passed on within family or community systems. They are often identified as vital to sustainable DRR efforts (Asharose et al. 2015). The integration of indigenous and local knowledge combined with scientific findings can contribute to a good CBDM approach, and has been found especially in research on communities facing Climate Change Challenges (Shaw 2012b)

Allen (2006) generally supports CBPT as an important step towards vulnerability reduction. He also criticizes a number of factors that are related to it, such as a lack of legislative power and the limited decision making abilities that actors at the local level often encounter when it comes to CBPT processes. The agenda for those processes is mostly set by NGOs, donors or governments rather than by the local communities themselves. Therefore, it can be the case that the responsibilities that are placed upon communities might strain them, as they lack representation of local interests and needs (Allen 2006).

Furthermore, a wider involvement of stakeholders in general, their integration into government policies, and an effort to put grass-root work into development policies, lead to improving CBPT results (Shaw 2012a). Measures ensuring this make the community the main actor within DRR and preparedness. At the same time, there is a need for strong support from authorities and

especially from local governments in order to achieve quality outcomes (Ishiwatari 2012). To put it in an even bigger context, Anderson and Holcombe (2014) argue that in many cases people live in danger zones because property there is cheaper to rent. Therefore, these authors see a close connection between preparedness and general poverty reduction (Anderson et al. 2014). Additionally, a linking between community based approaches and other sectors such as education, housing, health and livelihood can lead to better CPBT outcomes (Isayama & Shaw 2014).

4.2 Components of CBPT

4.2.1 Risk Awareness

There seems to be a certain degree of disagreement between scholars whether risk awareness leads to higher preparedness or not. Mwera (2013) sees a clear connection between risk awareness and a higher level of preparedness. So do Lin and his colleges (2008), even if they argue that it is not a really strong one (Lin et al. 2007; Mwera 2013). Scolobig et. al. (2012) on the other hand note that they could not find any connection in their case study that links risk awareness and preparedness (Scolobig et al. 2012).

The first question to be addressed in this context is if awareness is indeed desirable. Enander (2010) adds to the field of perception of risk that people generally tend to think that they themselves are less likely to be personally affected by disaster events. This is explained by some researchers as the 'invulnerability feeling', which might be necessary for our mental well-being. Breaking down this 'invulnerability feeling' contains the risk that the new feeling of vulnerability can lead to negative psychological and social consequences (Enander 2010). She furthermore argues that disaster events that have happened in the recent past and have had major impacts are often really present in the minds of communities. In those cases, individuals judgments on how likely those events are and how frequently they happen can be grossly exaggerated (Enander 2010). This might lead to undesirable feelings of insecurity. Generally, the benefits of awareness do seem to outweigh its risks, though.

Enander (2010) point out that due to the possible negative consequences to people's psyche, awareness can sometimes be difficult to take root (Enander 2010). The second question raised in this context is how awareness can be established in the first place, which necessitates a discussion of the impact prior experience of disasters has on people. Scolobig et al. (2012) convincingly show that in their research in an Italian Alpine communities there is a positive connection between experience of floods and a higher risk awareness (Scolobig et al. 2012). In his article on risk communication, Maidl and Bucjecker (2015) also addresses that experience of disasters has an impact on preparedness. However, that link might not be strong. Regardless of his comparatively weak findings, he argues that risk communication has to find an effective channel to spread knowledge so people can be informed, as, in his opinion, this would have a positive effect on risk awareness and preparedness even if not all studies corroborate this idea (Maidl & Buchecker 2015). Sattler et al. (2000) have also discovered that previous disaster experiences have a positive effect on the level of preparedness of a community. However, this effect often fades after a while, as experience does not necessarily lead to lasting awareness(Sattler et al. 2000). CBPT can potentially have a more long-lasting effect.

Karanci et al. (2015) argue that awareness through experience is not sufficient, since a disaster experience and just simple awareness of disasters does not lead to a higher level of preparedness (Karanci et al. 2005). They find that participants in Preparedness Trainings have a higher threat perception and disaster expectation than untrained groups (Karanci et al. 2005). Interestingly, higher formal education seems to correlate with preparedness behavior and a general level of less concern with regards to disasters, as well as with a sense of control when it comes to preparedness and mitigation (Karanci et al. 2005). Young people have a lower preparedness level, as they often lack the understanding of the devastation of such events, do not perceive the danger as present, or have the feeling that they are not sufficiently in control to have effects on their own levels of preparedness (Sattler et al. 2000; Enander 2010).

Taking these considerations into account, factors other than previous experience need to be addressed when it comes to awareness raising. In practical terms, there are various forms of presenting information and materials when it comes to raising awareness in CBPT. Print material

such as handbooks or posters play a role, as well as non-print materials such as games and activities. Also, modern technology such as social media or short YouTube clips can be used to spread information and share experiences from past disasters. Many CBPT lectures use graphical materials such as pictures and videos, followed by interactive discussions and activities. Also, going on field trips and visiting local surrounding helps to create greater knowledge of the local situation and awareness raising (Asharose et al. 2015; UNISDR 2015). Trainers should keep the information interesting and attractive for listeners and follow the open flow of information, so that not only expert knowledge is spread but local needs and traditional knowledge can be included in the discussion as well. This creates opportunities for bottom-up influence and owner-driven learning experiences, which, in turn, can enhance policy-changing processes (Asharose et al. 2015; Shaw 2012b).

Another step in this training process is the establishing of group discussions as well as the formation of disaster management groups with different responsibilities, tasks and processes to arrive at solutions to problems. Providing a well-suited and functional CBPT also means taking the local context and the respective vulnerability of each community into account and targeting the CBPT towards its specific audience (Asharose et al. 2015; Chen et al. 2006; UNISDR 2015). A group activity, which has established itself in this context is the creation of hazard maps for the actual area the community is located in. This method has successfully been employed by governments, NGOs and other stakeholders. Such hazard maps are drawn in participatory activities. Through these, participants get a better feeling for the areas in which they are living and working, and how these overlap with danger zones within their community (Asharose et al. 2015; Maceda et al. 2009; UNISDR 2015). This process of map-drawing can produce a deeper understanding of the capacities in a communities and their exposure and vulnerability (Maceda et al. 2009). Based on this information, evacuation routes and safe places to seek shelter in critical situations should be identified together. Such processes contribute to a deeper understanding and an ownership connection to the material and help to raise the level of Risk Awareness when it comes to the specific risks the individual community has to face (Asharose et al. 2015; Maceda et al. 2009; Mwera 2013).

4.2.2 Knowledge of Mitigation Measures (including technical knowledge)

Risk awareness is an essential element within any CBPT. However, there are other important components such as DRR methods and local mitigation strategies that should be addressed on multiple levels as well. It is important to show what strategies have worked in other parts of the world and where actions taken by the community or by individual households can reduce vulnerability. For this, structural measures like improving drainage system or non-structural ones like insurance contracts or support networks can be effective (Coppola 2011a). In this context, the functioning of potential technical EWS should be introduced, together with naturally-occurring warning signs for upcoming disaster events. As an example of natural early warning, the retraction of water from the shore before a tsunami or opening cracks in the surface that indicate future landslides, can be named (Asharose et al. 2015). Karanci et al. (2005) found that participation in a CBPT has a positive impact on mitigation and one's belief in one's own preparedness (Karanci et al. 2005). Risk reduction measures have shown to be most effective if they actively involve the communities that are directly affected by risks and are built on high-participation activities. The communities should be included in decision making, planning and operational activities (Anderson et al. 2014).

Lin et al. (2008) have identified a number of indicators that can lead to better hazard mitigation measures of individuals. Such factors include education, income and social trust in addition to risk perception. However, these researchers acknowledge that the link between risk perception and mitigation measures is far from ideal (Lin et al. 2007). As negative impacts, the authors present psychological vulnerability such as the feelings of helplessness and powerlessness. The authors suggest to rather look for factors that hold individuals back from mitigation and try to reduce those factors. Therefore, it seems that psychological factors are more relevant for preparedness than socio-economic ones (Lin et al. 2007).

According to Anderson and Holcombe (2014), there are a number of challenges that have to be addressed in the field of mitigation. First of all, according to them, there is little evidence that mitigation has a significant impact on the risk in communities. Secondly, they stress that there are many challenges to adopting mitigation actions in the community. Thirdly, they point out that

there is a certain lack of standards when it comes to Community-Based mitigation measures. Furthermore, for Community-Based mitigation measures to be effective, a number of external resources are needed, which often cannot be made effective use of within communities. Among these are, for example professional hazard mapping of landslide areas that require geologists and engineers for their correct interpretation (Anderson et al. 2014).

Walia (2008) points out that Community-Based mitigation techniques have a natural place in the organization of a community and should thus not be disregarded. Communities in risk zones have in the past often created their own strategies and coping mechanisms to deal with hazard situations. He argues that this form of indigenous or local knowledge has for centuries been effective in many places of the world in reducing the impacts of disasters. Therefore, these should be utilized in a mitigation and DRR process; people should be nudged towards ownership-driven processes that are based on local resources. That way, they are prepared for a cases of emergency's were external intervention are needed but might not always be at hand (Walia 2008).

4.2.3 EWS and Response

Another critical component of CBPT is the installation and response to some kind of early warning system (EWS) for future disaster threats. The UNISDR defines an EWS as:

"*[a]n integrated system of hazard monitoring, forecasting and prediction, disaster risk assessment, communication and preparedness activities systems and processes that enables individuals, communities, governments, businesses and others to take timely action to reduce disaster risks in advance of hazardous events* (UNISDR 2007)".

The basic function of an EWS is to alert communities and individuals if a threshold of hazard risk is reached. The message implies that steps of protection and response should be taken (Mwera 2013; Basher 2006). Media through which EWS can pass on information could be TV, radio or sirens to reach a significant number of people (Mwera 2013).

Basher (2006) explains that EWS consist of four different components: risk knowledge, monitoring and warning services, dissemination and communication and response capacity (Basher 2006).

Communication and preparedness are the components that often fail in an EWS (this is said to, for example, have been the case when Hurricane Katrina struck. There was adequate warning from the metrological side, but the response chains and communication to the public failed). To improve public awareness and recognition of EWS, it needs political commitment and institutional capacity. Basher furthermore argues that the linear EWS paradigm of end-to-end user, where forecasts are mainly models, based on reaction chains, with little public interaction, should be restructured. He calls for a more people-centered concept where the actual context and vulnerability of a community is taken into consideration, and a shift from an expert-focused to a more ownership-driven concept, where public engagement is promoted, should be encouraged (Basher 2006).

There are many EWS systems for different kinds of hazard risks (Basher 2006). As CB landslide risks are the focus of this paper, the following paragraph will take a closer look at CB landslide EWSs. To make such systems effective in communities in low-income countries, the systems cannot require experts that have to be paid specially. Therefore, the systems need to be simple and easy to operate and maintain, so that the people living in the community can do so themselves (Karnawati et al. 2011; Ishiwatari 2012).

As a Community-Based EWS for landslide hazards, rain measure equipment's are a commonly used technology. They trigger an alarm system when a certain amount (usually 100 mm) of rainfall has fallen within a limited span of time. Such system can be trigger automatically or manually, depending on the gauge. Extensometers are another common EWS. These are installed over land cracks and trigger an alarm when the slope moves to a certain predetermined extent (Karnawati et al. 2011). These are general examples for EWS. However, the best way of approaching establishing an EWS system for a community is to support the community in finding their own approach in accordance with their own capacities (Ishiwatari 2012). The more the communities are involved, the better the collective coordination of actions in cases of emergencies will function (Walia 2008).

Once an EWS is installed, the evacuation itself should ideally also be done by the people themselves – with the support of authorities if needed (Mwera 2013). In order to train this, as

well as gain a deeper understanding for EWSs, practice drills are essential tools. Such drills, or 'simulations', are a significant part of Preparedness Training. They give a community and other relevant actors an opportunity to practice their response plan and test the relevant materials for the emergency. This increases the cooperation between the different stakeholders and strengthens the teamwork skills of each group. Furthermore, such an exercise creates a 'learning space' in which mistakes can be made without dire consequences. At the same time the confidence to act appropriately is increased, especially amongst the volunteers and civilian groups (Perry 2004; Lee et al. 2009; Chen et al. 2006). Drills and exercises also increase awareness of present hazards within the population and show that governments or other stakeholders are engaged in a process to reduce disaster risks (Perry 2004). A personal family emergency plan that explains what should be prepared beforehand and what measures should be taken in the case of an emergency can furthermore increase the level of preparedness (Mwera 2013).

4.2.4 Relocation

A fairly effective way of reducing the risk of a community to be affected by a disaster is for the people living in it to move to another location. However, while this might seem like an easy or obvious solution from an outside perspective, it often goes against the wishes of the community. One approach to how this option can be made more attractive to community members is discussed in brief in this section

Studies show that most individuals living in high-risk areas for disasters or climate change effects prefer engineering solutions over relocation. If engineering solutions are impossible, then people living in risk zones tend to opt for the establishment or fortification of natural barriers such as wetlands or plant vegetation. Bukvic and Owen (2016) find that relocation, which people generally seem to see as a last-resort option, is something where communities wish for, or even expect, state support. Such support includes help with the relocation processes or even financial compensation for potential losses (Bukvic & Owen 2016).

There are a number of other specific personal factors that participants named as a push factor for voluntary relocation. Those were analyzed by Bukiv, Smith and Zhang (2015) in their study on

willingness to move after the experience of a disaster event. Economic factors are drivers for relocation, as are personal safety, lower crime rates and better property protection (Bukvic & Owen 2016; Bukvic et al. 2015). Especially personal safety is an issue when it comes to communities relocating. Despite the difficulties, a move brings with it, relocation is a measure that communities accept if need be. In fact, despite the media and political actors focusing on natural hazards more than on long-lasting climatic changes, it is rather the long-term environmental changes that lead to peoples more permanent displacement (Bukvic et al. 2015).

In Bukvic's and Owen´s (2016) opinion, relocation still might be the safest and most efficient long-term solution for some hazard zones, so external support should definitely be provided. To encourage a relocation process, she supports a bottom-up approach, which creates a dialog between the community at risk, various stakeholders and the decision makers, to target individual concerns. A case-by-case approach is necessary to create a holistic picture for a successful relocation processes (Bukvic & Owen 2016).

4.3 Effects of Training

This section lists the findings of the literature study on the effects of CBPT. It presents data from past studies on the measurable outcomes of trainings, the factors that influence these outcomes and what positive and negative lessons can be learned from them.

Brito Junior et al. (2014) have conducted a study on victims of floods and landslides in Brazil. They argue that certain factors such as gender and age are highly significant when it comes to a person's vulnerability during disasters and stress that Preparedness Trainings should be tailored to the needs of the most vulnerable groups at risk. This should be done by identifying the most vulnerable group and then using methods that specifically address this group. An example would be using TV cartoons in the instruction of children. At the same time, training should be intensified in special climate situation such as the area in which El Niño struck, where it is predictable that hydrological events occur with higher frequency and intensity (Brito Junior et al. 2014).

The role of the media also seems to play an essential part in risk communication and preparedness on a population-wide level. Therefore the authors suggest that journalists take part in

Preparedness Trainings to improve their accurate report capacity and furthermore to take "survivor success" stories as examples to report on that might then encourage people to emulate these survivors' behaviors in the future (Brito Junior et al. 2014).

Disaster-specific Preparedness Trainings and drills seem to have a positive effect, but mainly for higher educated (secondary school) respondents. A study by Muttarak and Pothisiri (2013) explains that the capacity for information absorption and high learning skills necessary for a more successful application of such trainings are something that can often be gained through higher education (Muttarak & Pothisiri 2013).

Isayama and Shaw (2014) found in their study about sediment disasters in Japan that hazard maps and evacuation drills have an effective outcome in emergency situations. The data was based on detailed questionnaire surveys, field visits and hearing surveys in locations were landslides and floods had occurred in the past. However, the literature does not provide an exact explanation of how the level of preparedness has been measured. The results show that people who participate in regular community activities such as neighborhood watching, or take part in the disaster prevention mapping processes have a higher level of preparedness awareness (Isayama & Shaw 2014).

Furthermore, CBPT have been found to be more effective if a variety of stakeholders are engaged. As Chen, et al. (2006) show in their study, it is beneficial if there are not only the minimum required stakeholders but a broad variety, which can contribute expert knowledge, money and other resources. Chen's article outlines a participatory approach of CBPT in which the community is involved at all stages, from mobilizations, to data and experience collection, vulnerability assessments, problem evaluation and solution finding, establishing of local networks to, finally, the presentation of all these to the rest of the stakeholders. His example of a Taiwanese community shows one potential structural setup of such trainings. He also presented some of the shortcomings in the implementation process, such as a lack of participation, limited resources and missing support from the governmental sector (Chen et al. 2006; Izumi & Shaw 2012).

Asharoses et. al.'s (2015) study of effects of CBPT in Indian communities has shown that there is an increase in preparedness within communities when a CBPT has been conducted. In their study,

they conducted surveys before and after a CBPT and found that the difference in many preparedness topics is quite significant. For example, the study shows that people's knowledge of natural warning signs for tsunamis increased to quite an impressive extent, as did their knowledge about flood insurance. Also, the participants self-perception can change toward a view of themselves as being, to an extent, in control and able to make a change regarding their own disaster vulnerability. This example shows that CBPT can have positive effects, even if this does not always have to be the case (Asharose et al. 2015).

Karanci's et al.´s (2005) study of CBPT shows that other concerns such as economic hardship, health and financial matters are often more pressing concerns for the community members than preparedness for and mitigation of the risks of a natural disaster. Therefore the circumstances people live in and the coping resources people have has an impact on adaptive behavior (Karanci et al. 2005).

To ensure a long-lasting effect and to work against the slow decrease of preparedness knowledge, a sustainable awareness program has to be continued within communities. A continuous implementation of DRR in school curricula as well as monthly Disaster Group meetings or follow-up trainings before a critical seasons, like, for example, just before the rain seasons starts, are essential (Asharose et al. 2015; Shaw 2012c; Chen et al. 2006).

To sum up, some of the articles found investigate the effects of training and try to measure these, whereas other articles mainly investigated factors or conditions that have influence the training effects. Such factors include, among others, age, education level and economic status.

5 RESULTS OF THE INTERVIEW STUDY

5.1 Results from the Expert Interviews in Badulla District

This section provides the essential parts of the expert interviews that will help to answer the research question detailed above. Two interviews with experts from the field of DRR within the Badulla district have been conducted. The first interview partner was Mr E.M.L. Udaya, the assistant director of the Badulla District Disaster Management Centre (DMC) Coordination Unit,

who has been working in this position for some years (Expert 1). The second interview partner was Nipuna Weerasekara, a geologist at the National Building Research Organization (NBRO) (Expert 2). Mr. Udaya and Mr. Weerasekara are both actively involved in the CBPT workshops in the district of Badula and trained one of the communities later interviewed. The interview partners both briefly explained the structure and concepts of the trainings. The following section is a summary of the most important, and for this paper most relevant, input from these interviews. Furthermore, a table has been created based on the information from the expert interviews and expert training presentations to: identify general factors of landslides, man-made factors of landslides, signs for future landslides and reduction measure for landslides. This list was used to cross check the right answers for the following community interviews. Details regarding the methodology can be found in Section 2.3 and 2.4.

Table 1: List of landslide indicators and mitigation measures

General landslide factors	**Man-made factors for landslides**	**Signs of future landslides**	**Reduction measures**
Intense rainfall	Irresponsible slope cutting	Tension cracks	Improving drainage
Earth vibration due to earthquakes	Pour drainage	Broken waterlines	Retaining structures
Volcanic eruptions	Poor land use at upper level	Offset fence lines	Reinforcing slopes internally
Rapid snow melt	Houses too close to unstable cut	Leaning telephone poles, trees, retaining walls or fences	Modifying slopes
Rapid change of water level	Unplanned intensive cultivation	Tilting or cracking of concrete floors/walls and foundation	Keeping a safe distance to cuttings
Storm waves or rapid erosion	Obstruction of natural waterways	Soil moving away from foundation	Implementing retaining measures with tires, bamboo, sand bags, soil bags or rubble packs
Changes caused by human activities	Deregulated excavations	Ancillary structures at the house are moving	Avoiding unstable hills, valleys and dispositional areas
	Deforestation	Springs seeps/saturated ground in areas that have been dry before	Conducting constructions with minimum slope disturbance
	Construction in valleys blocking waterways	Stuck doors and windows, either jammed or showing a crack between the jamb and the frame	Relocating
		Sudden decrease in creek water level, when rain is still falling	
		Sunken or dropped-down road beds	
		Mud water	
		Change in animal behavior	

5.1.1 Risk Awareness

The experts pointed out that the people in the communities in landslide risk zones have to constantly live with the risk they face and therefore a high level of awareness and preparedness is essential. The layouts of the trainings might be adjusted to the pre-existing knowledge of communities, but this is not necessarily the case; Expert 1 mentioned that all communities receive a standardised training. The training consists of a risk awareness part with field training, followed by the establishment of a community response plan and ending with a drill exercise. The training takes about one whole day. Apart from the community itself, multiple stakeholders such as local authorities, DMC, NBRO and the estate manager take part in the training. The monitoring process after the training is not part of the standard CBPT structure, as there are limited resources for such refreshment trainings. Therefore, some communities receive follow-up trainings while others do not.

As tools for the risk awareness part of the training, different media such as Power Point presentations, short videos and community-based training methods are used. The experts themselves voiced positive feeling regarding the effectiveness of this method mix. Furthermore, they identified a trend of an overall higher awareness of landslide risks within communities and authorities. This they based on the intense media coverage of past landslide incidences with high casualty numbers. The experts pointed out that awareness of the geographical layout of the risk zones is essential, as the community can avoid erecting constructions or even being physically present in those areas during times of increased risk like, for example, the rain season. In connection to this, the experts talked about the awareness risk maps that are created in an interactive process during the CBPT, in which experts also contribute their knowledge. These maps also help to identify safe evacuation routes for the community.

5.1.2 Mitigation and Technical Knowledge

According to the experts, indicators and signs for future landslides are explained in the training so that the community has a certain autonomy when it comes to risk detection. A more detailed list of those signs is presented below (Table 1). Among other mitigation measures, the importance of improving drainage systems and the creation of retaining walls are highlighted. However,

Expert 2 is critical of the effectiveness of community-owned mitigation measures based on a lack of knowledge monitoring he sees within the CBPT process.

5.1.3 EWS and Response

Regarding EWS, the Experts mentioned natural early warning signs and technical EWS. In terms of natural early warning, the training should encourage community members to regularly check their surroundings for indicators of future landslides as experts on these matters cannot be present at all times. Such signs would be cracks in the ground or bent trees, growing crookedly because the ground underneath them has shifted (Table 1). The technical EWS that have been installed are also community-based. Examples of these would be the rain gauges that are introduced within the training. With those the community can monitor the rainfall and sound a siren if critical thresholds are reached. The responsibility for sounding this alarm and the passing on of relevant information along a pre-established information chain lies with a selected community member. In case of such an alarm, the pre-established evacuation plan should be followed. The necessary stand-down message after an evacuation will be given by the DMC. Expert 1 pointed out that this concept has already proven itself and a number of self-evacuations have successfully taken place in the past, within the district of Badulla.

5.1.4 Relocation

According to Expert 2, many participants would prefer structural measures or even relocation over a CBPT. He indicated that many of those who wish to be relocated expect the state or some other stakeholder to cover the costs for the relocation. He also pointed out that he sees the estate partly responsible for the costs, at least in the cases where the risk situation follows negligent land use or it was irresponsible slope cutting that led to slope failure (so called ‘cutting-failures’). Expert 1 analysed the general situation differently and mentioned that people are reluctant to change their behaviour and rather want to stay in their original location than be moved.

In closing, the experts mentioned the language barrier between them and the Tamil community and the economically poor situation of some communities as the major challenges in their work.

The two experts also shared their knowledge regarding the factors that lead to landslides, the signs people can pay attention to and the measures they can take. This information is summed up in Table 1, supplemented by information extracted from a presentation put together by Dr. Gamini Jayathissa, who is a landslide researcher in the Risk Management Division of the NBRO in Colombo. This presentation was given at a community leader landslide training I attended as part of the data collection (Jayathissa 2016). Most of the factors are mentioned in CBPT, even if small adaptations in response to local conditions are usually made.

5.2 Results from the Community Interviews in Badulla

This section presents the data collected in the interviews in the Diagalla Community, which had received CBPT (24.11.2016) and the interviews in the Malangamuva Commuity, which had never taken part in such a training (29.11.2016). Throughout this section, the terms 'trained' and 'untrained' community will be used. These terms are to be understood with regards to the government-organised CBPT; that knowledge, skills and information regarding landslides has reached both communities, has been developed by them to an extent and has been passed on within the respective community is assumed as a given and is not considered as 'trainedness' in the context of this study. Table 2 presents the results of the independent-samples t-test that was conducted to compare the statistical significance of training effects in the trained and untrained community.

Table 2: Statistical Significance

Question	Training Status	Mean Value	Standard Deviation	DF	T-Statistic	Critical T-Value double sided	Double sided P value	Statistical Significance
11	Trained Untrained	2,25 1	1,0552 0,8528	22	3,1914	2,0738	0,0042	Yes
12	Trained Untrained	1,0833 1,25	1,4433 0,866	22	-0,3429	2,0738	0,7348	No
14	Trained Untrained	1,75 1,25	1,7122 1,0552	22	0,8611	2,0738	0,3984	No
16	Trained Untrained	0,5833 0,5833	0,7929 0,6685	22	0	2,0738	1	No
18	Trained Untrained	1,6666 1,1666	0,7784 0,8348	22	1,5173	2,0738	0,1434	No
20	Trained Untrained	2,75 1	1,4222 0,7385	17	3,7828	2,1098	0,0014	Yes
21	Trained Untrained	1,6666 1	0,9847 0,4472	16	2,1189	2,1199	0,05	Yes
22	Trained Untrained	0,5454 1,1818	0,6875 0,603	20	-2,3078	2,0859	0,03	Yes

5.2.1 Risk Awareness and Exposure

To the question “if people think they know what landslides are”. There is no predominant trend between the communities regarding their own Landslide knowledge assessment. The largest number of participants in both groups indicated that they “have a good idea” what Landslides are (Figure 1).

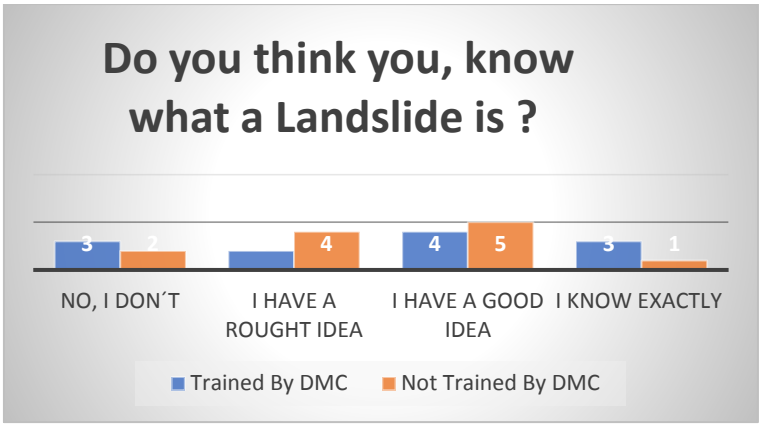

Figure 2: Community landslide knowledge

All interviews were conducted in active high risk landslide areas. Therefore, all individuals interviewed were exposed to landslide risks. Eleven out of twelve people questioned in the untrained community were absolutely sure that they lived in a landslide area, whereas in the community, where people had received CBPT, only five people were absolutely sure of this fact (Figure 2). This question was followed up by the question “if they can explain and point out the risk area within their community”. In answer to this question, the same eleven interviewees in the untrained community were able to correctly point out the landslide risk area within their community. In the trained community, nine out of twelve could point out the affected area. Interestingly, that means that in the trained community four individuals were able to point out the correct risk area while at the same time they had indicated that they did not consider their own home at risk when asked before. The untrained community interviewees had a higher correct response number to this question.

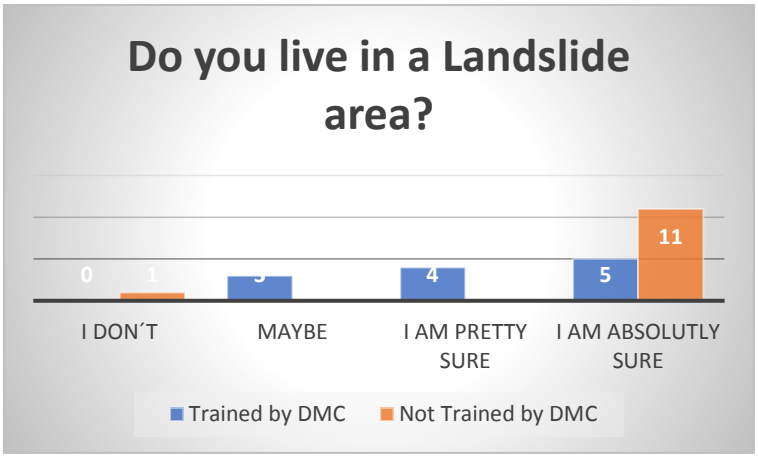

Figure 3: Community personal exposure

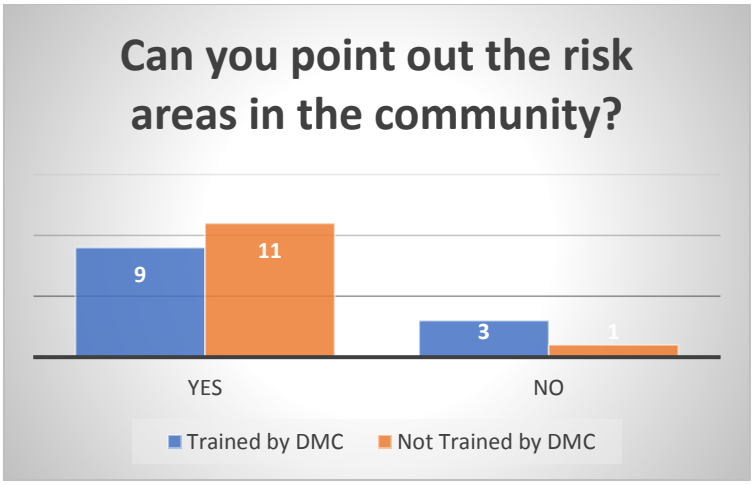

Figure 4: Community exposure

5.2.2 Knowledge of landslide and mitigation measures (including technical knowledge)

While the previous subsection dealt with the more general notion of awareness, this subsection looks at the interviewees' knowledge regarding trigger factors, warning signs, reduction measures and actors within the field of local DRR that might play a role in the mitigation measure implementation process.

To the question if the participants “can name general factors that lead to landslides” the trained community had a (125%) higher mean value knowledge than the untrained community (Figure 4). An independent-samples t-test was conducted to compare the number of positive indicators that could be named in the communities regarding general factors that can lead to landslides. There was a significant difference in the score of the trained community (M=2,25, SD= 1,05) and the untrained community (M=1, SD= 0,85) conditions; t (22) = 3,19, p=0,004 (Table 2). This result suggests that there is a statistically significant difference given between the compared communities. The trained community named a number of hydrological reasons such as heavy rain (83% of the respondents), high water pressure or rising water levels. In the untrained community, 25% of the participants could not name a single factor and only 41% of the interviewees could name additional factors besides rain, whereas in the trained community 66% were able to do so.

The trained community had a 14% lower knowledge in mean values, compared to the untrained community on man-made factors that can lead to landslides (Figure 4). A similar t-test was conducted for this question. There was no significant difference in the score of the trained community (M=1,08, SD= 1,44) and the untrained community (M=1,25, SD= 0,86) conditions; t (22) = -0,34, p=0,734 (Table 2). This result suggests that there is no statistically significant difference between the compared communities. In community, where participants had been trained, cultivation and deforestation were the most often mentioned man-made factors whereas in the untrained community bad drainage and cutting failures were mentioned most.

The awareness of signs of future landslides – so-called natural early warning signs – had a 14% higher mean value in the trained community (Figure 4). Again, a t-test was conducted. It showed that there was no significant difference in the score of the trained community (M=1,75, SD= 1,71) and the untrained community (M=1,25, SD= 1,05) conditions; t (22) = 0,86, p=0,398 (Table 2). In the trained community, falling trees and cracks in the ground were described most often. In the untrained group, only the cracks were mentioned by a large number of people.

To the question “what measures can the family or community take to reduce landslides?” the communities’ answers had the same mean value. The independent-samples t-test for this question showed no significant difference in the score of the trained community (M=0,58, SD=

0,79) and the untrained community (M=0,58, SD= 0,66) conditions; t (22) = 0, p=1 (Table 2). In the trained community "moving to safe location" was the most-often suggested measurement but "evacuation plans", "improving drainage" and "planting of trees" was mentioned as well. In the untrained community, 70% mentioned improving of drainage system. "Moving" and the "covering of cutting failures" was mentioned once.

The knowledge on supporting actors or responsible stakeholders has also been assessed. In this question, the trained community was able to show a higher level of knowledge, the difference of the mean value amounting to 30% (Figure 4). The t-test conducted on the results of this question showed that there was no significant difference in the score of the trained community (M=1,66, SD= 0,77) and the untrained community (M=1,16, SD= 0,83) conditions; t (22) = 1,15 p=0,143 (Table 2).

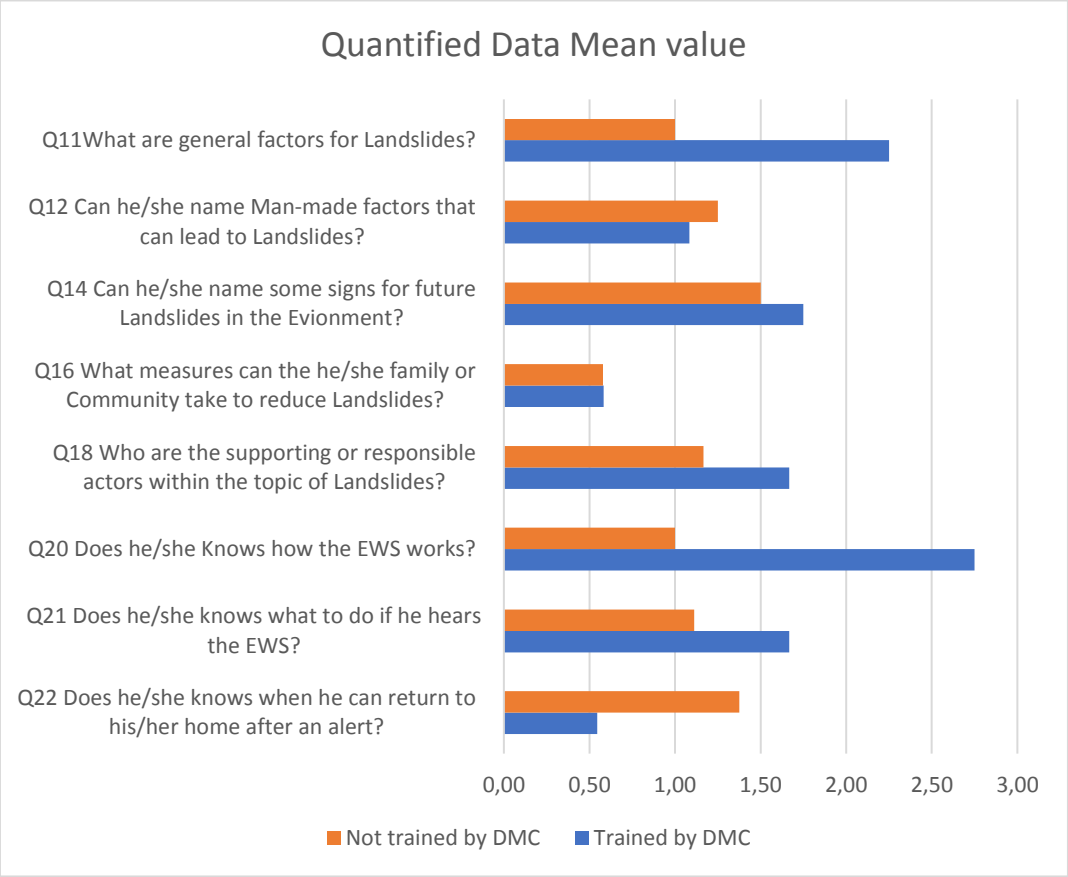

Figure 5: Quantified community interviews

5.2.3 EWS and Response

In this section, the data related to EWS is presented. Both communities have a kind of EWS. Trained community has a new manual rain-gauge system in place, while the untrained community has a less technical system that relies less on direct measurements and more on metrology departments and local authorities. Nevertheless, the untrained community has already gone through a self-evacuation initiated by community members and the local authorities. To the first question in this category "if the participants know how the EWS in their community works" the mean values of the trained communities' EWS knowledge were 175% higher than those of the untrained community (Figure 4). Again, an independent-samples t-test was conducted to compare the number of positive indicators that could be named in the communities for the question on how the EWS in his/her community works. There was a significant difference between the scores of the trained community (M=2,75, SD= 1,44) and the untrained community (M=1, SD= 0,73) conditions; t (17) = 3,78, p=0,001 (Table 2). The trained community members seemed to have a good idea about who is responsible for the EWS (75% of the interview partners) and also showed a fair amount of knowledge regarding the technical background information on their EWS. Nearly all members mentioned the rain measurement tool and many also knew the exact threshold levels at which the situation becomes critical. The Siren was also mentioned by half of the participants; 25%, however, believed that the old information system including using the telephone or shouting the message was still in place. In the untrained community, the percentage of respondents who were able to say which authority is responsible for the warnings was also 75%, but only 16% of the participants named the way the information is then spread. When asked follow-up questions on how the local authority gets the information regarding the need for evacuation, only one participant could provide an answer.

To the question if the interviewees "know what to do when they receive the EWS message or hear the siren" the trained community's responses' mean value was 34% higher than that of the untrained community (Figure 4). A similar t-test was conducted for this question. There was a significant difference in the score of the trained community (M=1,66, SD= 0,98) and the untrained community (M=1, SD= 0,44) conditions; t (16) = 2,11, p=0,05 (Table 2). In this trained community,

all members interviewed knew that they have to evacuate in case of an alert. Also, the collection of important items (grab bag) and the support of other family members was mentioned by 25% of the interview partners. In the untrained community, 16% did not mention the evacuation at all. Apart from the mentioning of the safe community location by two participants, no other actions were brought up by the participants in the untrained community.

To the question "how the participants know when they can return to their houses after an alert" the untrained community had a mean score that was 140% than that of the trained community (Figure 4). The independent-samples t-test for this question showed that there was a significant difference between the score of the trained community (M=0,54, SD= 0,68) and the untrained community (M=1,18, SD= 0,6) conditions; t (20) = -2,30, p=0,03 (Table 2). This result suggests that there is a statistically significant difference between the compared communities. In the untrained community, 50% of the interview partners knew by which authorities they need to be informed about being able to return to their houses. 20% wrongly thought they could just return when the rain stops. In the trained community, only 33% of the people could name the right authority for the information and 30% thought they could return when the rain stopped.

To the question "if the interviewed community members would trust the EWS" all members who had knowledge about the EWS in their community trusted it. This applies to both the groups interviewed, even if in the untrained community fewer people knew about the general existence of an EWS. When trained members were asked why they trust it, 33% said "they have to trust it" for various reasons such as "because they were told so", or" because the people in charge are trustworthy". Two respondents said they tend to trust it, but do not do so fully. One participant mentioned that "he generally trusts the responsible person but he might not be always there, so the trust is limited".

5.2.4 Relocation

When asked "if the participants would like to move from their current risk zone", 100% of the trained community expressed their wish to move to a safe location. In the untrained community, 82% of the interviewed individuals would like to move. 18% of those were actually in the process

of moving at the time they were interviewed. The remaining 18% who would not like to move argued that “they have all the facilities here” and another participant mentioned that “he has business and family here”.

5.2.5 Training

With regard to the assessment of how many participants received training in each community and how many did not, the analysies shows that in the trained community, which had recently received training by the DMC/NBRO, 75% of the interviewed individuals had been present at the training. The remaining part received their information through relatives or other community members as they were not able to be present in person. In the second community were the DMC/NBRO had never conducted any CBPT, 100% of the respondents confirmed that they had not receive any kind of training.

As a last follow-up question, the participants in the trained community were asked “if the training was useful and what their biggest learning outcomes were”. All participants who had attended the meeting said it had proved useful to them. Some mentioned that they had learned about the heavy rain as a trigger factor, as well as where to move and evacuate in an emergency. The notion of having to “grab the bag with important items” was also mentioned by two participants. Another participant said he found the “danger zone map” useful and one lady mentioned that she had the feeling that the training improved the social structures in the community and that she thought people are more likely to help one another now in a case of emergency.

6 DISCUSSION

The following section provides an analysis and comparison between the findings of the different result sections above. Some of the most important components that can be identified in all three sections are disuses in detail. Furthermore, surprising and controversial findings are addressed.

6.1 Community-Based Preparedness Training Strategies and Challenges

Community-Based approaches are on the rise, especially in middle- and low-income countries. This political shift can be identified in international politics such as the Hyogo Framework but also

in the discourse within the scientific community (UNISDR 2005). This transformation also trickles down to the government institution level, as can be seen in the case of Sri Lanka, where the government started campaigns for CBPT in landslide risk areas. This ongoing trend for CBPT in Sri Lanka is reinforced by the high number of major landslides that have occurred there in the last years, which have been well covered by the national media.

It seems that rising death tolls and the reoccurrence of such events are to an extent connected to weak economic situations in these countries and communities. The experts interviewed as part of this study identified poverty as a leading challenge in the national disaster discourse. As the researchers Anderson and Holcombe (2014) has pointed out, countless community members live in danger zones because it is the cheapest place to life in (Anderson et al. 2014). Many community members in the communities studied have expressed the feeling that they would rather live at a safe location but that their financial situation does not allow it. Therefore, a general poverty reduction strategy would lead to higher preparedness and more importantly to a lower exposure to hazard risks. As this long-term goal of poverty reduction is far from being reached, governments in different countries seek medium- and short-term solutions such as Preparedness Trainings. So, did Sri Lanka, a country, which initiated a line of CBPT aptly named “Living with Landslide Risk”. A cooperation between different state institutions has been established to produce the content of such trainings and implement them in the field.

6.2 Risk Awareness

Risk Awareness is an essential part in starting any kind of Preparedness Training (Mwera 2013). People have to acquire a certain level of knowledge regarding the risk they are exposed to before CB steps towards preparedness can be taken. The results of the community interviews show that the total percentage of people who do not know or just have a rough idea what a landslide is nevertheless relatively high in both communities. This is unexpected, considering the fact that the trained community participated in a CBPT, which usually starts with the basic information of what landslides are.

The experts as well as the literature point out that geographical knowledge is an important part of risk awareness. Individuals have to know where disasters within their community are likely to strike. For this purpose, the creation of risk maps has shown itself to be a useful measure (Asharose et al. 2015; Maceda et al. 2009; UNISDR 2015). Indicators that such practices are useful, were found in the literature, as well as in the interviews with experts in the field and with community members (Maceda et al. 2009). In a participatory activity, maps of the community are created. These are then used to together identify the risk zones in that particular community. This information can be based on previous experience of the community or on expert knowledge, as is mostly the case in Sri Lanka.

Both communities that took part in the study had good knowledge of where the risk areas in their communities are located. Nevertheless, even if the general area was known, a large part of the trained community did not identify their own houses as being at risk. This might be explained by the personal "invulnerability feeling" that Enander mentions (Enander 2010). The untrained community, however, had a better idea of risk exposure than the trained community. A likely explanation for this is the fact that the untrained community had gone through a self-evacuation in 2014 that had lasted three weeks. It can be assumed that based on this experience people who had evacuated themselves with the support of local authorities had a very good idea of the risk exposure areas, even if in the end no landslide had occurred at that time. This difference between the two communities, the fact that one has already experienced an evacuation and one has not, is, was an unplanned circumstance (Section 1.3).

What this new component brings to the discussion, is actually the effect of previous experience and the discourse on it. There are a number of authors who argue that previous experience can lead to higher risk awareness and preparedness (Sattler et al. 2000; Karanci et al. 2005). The data collected corroborates this notion in so far as the experience of this untrained community had apparently led to a higher degree of knowledge regarding the risk exposure zones in the area.

On a larger scale, the experts mentioned that the overall risk awareness in the country has improved. They reasoned that this might be the case because of the major landslide events that have happened there in the recent past and have led to high numbers of casualties. These events

were also mentioned by some of the community members and community leaders. Therefore, a disaster expertise does not even have to have been experienced by the people themselves to have an effect on a community. As Enander (2010) points out, the mere knowledge of past events has effects on risk awareness (Enander 2010). In spreading such knowledge and thus raising awareness, the media can be an important and useful partner, and are thus discussed in trainings, like Briton et. al, suggested (Briton Junior et al. 2014).

In addition to the inclusion of the media, a general multiple stakeholder approach in CBPT seems to be beneficial, as different stakeholders can contribute different resources and sets of knowledge (Chen et al. 2006). This wide-sweeping inclusion of stakeholders appears to be part of Sri Lanka's CBPT. However, there is a noticeable shortage of NGO inclusion. Globally, NGOs are often present in the implementation of CBPT and support communities in their DRR measures (Izumi & Shaw 2012). This does not appear to often be the case in Sri Lanka. There is a certain mistrust of the government towards NGOs. The roots for this can be found in the recent armed conflict of the country. Furthermore, the tea-estates are often critical of NGOs as some of these organisations have occasionally tried to expose the poor working and living conditions in the tea-estate communities.

Aiming at an ownership-driven kind of preparedness, the DMC follows a participatory approach in which different kinds of media are used (Chen et al. 2006; Asharose et al. 2015). According to the expert interviews and the literature study, this mix of videos and Power Point presentations as well as social media seems to be a successful instrument in structuring the trainings in an interesting and appealing way (Chen et al. 2006; Asharose et al. 2015).

Including and respecting the local or indigenous knowledge in place has been emphasised by a number of influential researchers in the field (Asharose et al. 2015; Walia 2008; Shaw 2012b; UNISDR 2015). The communities in question usually have been living in dangerous zones for long times and therefore, many have found strategies on how to deal with those risk and dangers. They also have the best knowledge about historical events and often know from experience, which areas are most likely to be affected. Therefore, an adaptation of trainings to this already existing set of knowledge can be encouraged (Asharose et al. 2015; Walia 2008; Shaw 2012b). In

the case of Sri Lanka, there are local knowledge capacities in some communities that can be built upon. So far, this seems to be largely disregarded and a standardized training not adapted to the knowledge base of the community seems to be conducted. This might be an economical and practical approach that does not require much assessment or training adaptation. The interviews showed, that members in untrained community might already be responding to many indicators of future landslides in their local context and can highlight activities or dangers that seem to them most present in their community. Accordingly, a non-standardized approach, which takes the local context into consideration, would seem to be beneficial in most settings.

To reach all members of a community, it is important to find appropriate communication and training methods for different target groups (Asharose et al. 2015; UNISDR 2015). Posters and meetings might be preferable for elderly participants, but in reaching a large group of younger participants an addition of social media activities could be a powerful tool. TV cartoons for children or radio programs for the women staying home during the day, who often listen to the radio while doing their chores, can be effective media outlets. Generally speaking, a larger mix of information sharing channels would be beneficial in order to reach the diverse set of people of various ages and levels of society in a community.

Interestingly, a difference was found between the literature findings on age group preparedness levels and the research conducted in this case study. The literature implies that younger members of a community have the lowest level of preparedness (Sattler et al. 2000; Enander 2010). The interviews conducted showed the younger group of participants (18-30) had a considerably higher knowledge on many topics related to landslide risks. The group with the lowest level of knowledge was the older interview group (>50). They personally seemed to care more for their younger family members than for themselves and showed a certain level of disregard when it came to preparedness knowledge and activities that were targeted at enabling them to save their own lives. This is certainly connected to the situation that elder and disabled people are often not encouraged to take part in trainings if they have physical difficulties to attend. Another important and significant group are children and teenagers who are excluded from such trainings in Sri Lanka. A strategy to also reach and include those groups, which represent the maybe most

vulnerable members of a community, would seem to be an important step to take (Brito Junior et al. 2014). Such a change might need additional resources and alternative strategies to be fruitful, but can lead to a significant improvement of community preparedness on an average level.

To have a significant and also sustainable impact, trainings have to be refreshed (Asharose et al. 2015; Shaw 2012c; Chen et al. 2006). There is a strong need for monitoring and for constant practice strategies that follow the CBPT. If that is not the case, the training effect can easily fade after a while. A regular refreshment before risk prone months such as the rainy season starts could be beneficial in keeping awareness on a high level in dangerous times. The monitoring sessions are also a chance to receive feedback on whether the training structure that has been set up is actually functioning or if adaptations have to be made. As the experts indicated, such monitoring and refreshment trainings are unfortunately not standard in Sri Lankan CBPT, due to financial and staff restrains. What impact CBPT can have without such refreshment sessions in the long run is actually rather questionable.

While the immediate response to landslides is in the hands of the community affected by it, the approach the government takes to preparedness does not reflect this on all levels. The CBPT currently conducted do follow a participatory approach and try to include the Sri Lankans communities in most training activities. However, a real owner-driven concept in which the local needs are addressed and solutions are built on the existing foundation of local capacity and knowledge cannot be identified in this current version of a CBPT (Asharose et al. 2015; UNISDR 2015). Additionally, the option of legislative powers being given to the communities to strengthen their preparedness has not been addressed in Sri Lanka. There seems to be no empowerment, such as Community-Based policy making or a certain budget being allocated to communities so that they have means to take responsibility for their own preparedness, all of which the literature suggests as potentially beneficial (Coppola 2011b; UNISDR 2015). So far, the tools are mainly limited to EWS, expert advice and knowledge building.

The components of CBPT that have been discuss here for Sri Lanka are of importance in most other CBPT, and should be taken into consideration in the establishment of such a program.

6.3 Knowledge of Landslides and Mitigation Measure (including Technical Knowledge)

To be aware of risks is a good foundation for preparedness, but to see indicators for the events and to know which measures one can take to reduce the risks is the next essential step.

The CBPT in the present case study seemed to have had a relevant effect on the knowledge of factors that can lead to landslides, especially when one considers not the individual's knowledge but the shared knowledge base of the community. The participants' replies were significantly more divers in the trained community than in the comparison group. The knowledge on so-called natural early warning signs is also greater in the trained community. Those signs are another important monitoring strategy, according to the scientific literature as well as the experts (Asharose et al. 2015). Experts and authorities see these as indispensable, as they themselves cannot always be present in person to analyse current risk developments. The local knowledge and physical presents play a critical role here, as dwellers recognise changes in the environment easiest. Training can strengthen their knowledge and encourage them to actively identify signs that indicate imminent danger to their safety and should be reported to the authorities, or signs that signal a need for immediate action (Asharose et al. 2015). This leaves the community with a certain degree of autonomy with regards to danger detection. While this contributes to the sense of responsibility that can lead to effective actions, it might also put a certain amount of pressure on the community itself. At the same time, it is part of the owner-driven concept that empowers the community to take the driver seat, so to speak. These seemingly opposing forces of empowerment and potential overwhelmedness raise the question if any only partly owner-driven concept such as the one implemented in Sri Lanka is a successful strategy. Does it only put some of the burdensome responsibilities on the community without giving them a real long-term and sustainable solution that gives them the autonomy to actually take charge of their own safety?

Beside natural landslides there are also those landslides that are to extent set off humans (Brito Junior et al. 2014). Examples of man-made factors then lead to an increase in landslide risks are discussed in the training. Despite this, the untrained community had a moderately better response rate when it came to naming these factors then the trained one, even if the trained

responses of the trained group were more diverse. This larger knowledge could once more be explained by the past experience the untrained community had had (Maidl & Buchecker 2015). There have been a number of small cutting failures in the community, which had also led to casualties. Cutting failures were therefore well known and accordingly often mention by the members of the untrained community. The trained community had had no such experiences of any kind.

It furthermore seems that there were a number of respondents in the trained community who claimed that in fact there are no man-made influences on landslides. These interviewees tended to hold job position close to the estate management. It seems that two conflicting agendas are in place here. On the one hand, there is the information that has been developed in the training, but on the other hand there is the information provided by the ever-so-present estate management. Generally, preparedness for disasters is in the interest of the management as well. When it comes to the topic of man-made factors for landslides, however, the estate holders might have an interest in their employees not being too well-informed, as they then might be more hesitant to execute certain orders. Of special importance, in this context is the Union Leader in the trained community. While taking up a number of responsibilities regarding EWS and alerts, he clearly indicated that he followed the estate agenda on the non-existence of man-made causes for landslides. This brings up the discourse on how influential or powerful stakeholders can be in following their alternative agenda to pursue their own interests over the safety of communities (Allen 2006). This seemed to be the case for many communities who live in tea-estates in Sri Lanka, but can also be seen internationally in different kind of businesses, where profit is prioritised over safety. With respect to man-made factors in Sri Lanka, a considerable number of incidences can be connected to causes such as deforestation, poor drainage, wrong land use or cutting failures. To create a consciousness that such actions and habits can lead to increasing landslide risk seems to be a critical element of CBPT.

Waila (2008) points out that local knowledge should also be utilised when it comes to mitigation strategies. Communities at risk have been dealing with those hazards in the past and have often found solutions themselves (Walia 2008). In the case of Sri Lankan communities, this might not

be fully applicable, as the knowledge level regarding risk reduction measures in both of the communities were relatively low. Some community members in the trained community picked up knowledge on mitigation in the training. At the same time, in the untrained community active steps such as the improvement of the drainage system and the filling in of land cracks have already taken. Overall, it has to be stated that knowledge on mitigation measures does not seem to be a key priority in the trainings or if so, is poorly communicated.

In general, the part on mitigation strategies and technical knowledge in the CBPT conducted appears to purely have been focused on the acquisition of explicit knowledge. A lack of active community strategy development could be identified. In participatory activities, plans for actual measures that the community can take by itself could have been initiated. The literature research brought up that the creation of disaster groups or disaster committees, who are in charge of certain DRR tasks, can lead to a higher level of preparedness (Asharose et al. 2015). Even if such constantly active groups still cannot replace necessary refreshment trainings, they would increase the sustainability of CBPT, as they try to keep the awareness at a high level (Asharose et al. 2015; Shaw 2012c; Chen et al. 2006). Such committees have been established in communities at risk in different parts of the world and have been linked to positive outcomes. They could potentially do a lot of good if they were adapted in Sri Lankan landslide risk communities.

6.4 EWS and Response

In addition to the knowledge about the natural early warning signs, which have been discussed above, many CBPT also introduce a technical EWS. Such systems have to be targeted to the needs, capacities and resources of the community it serves (Basher 2006; Ishiwatari 2012). In the Sri Lankan CBPT, rain-gauges are most commonly introduced as monitoring devices. Those gauges and their functioning is well known by the trained community. It is a simple and easily maintained system that can effectively measure when critical threshold levels of rain are reached and an evacuation is necessary (Karnawati et al. 2011; Ishiwatari 2012). Taking the effects of climate change into account, the relatively primitive system might, however, increasingly sound an alarm, even when no hazard is imminent. A certain number of wrong alerts of course could then lead to a tiredness of evacuation and result in a lower awareness level over time. An extensometer or

other more accurate and reliable systems might therefore be a suitable alternative (Karnawati et al. 2011).

Nevertheless, it has to be pointed out that the training seemed to have a successful impact regarding the community's knowledge on the functioning of the EWS as well as the necessary actions that follow an alert. One can argue that this technical background knowledge might be irrelevant to preparedness, but on the other hand it might be said that such knowledge encourages trust in the EWS (Fakhruddin et al. 2015; Walia 2008). It seems that both communities have a high trust in the system if they are aware of its existence. Nearly all participants in the trained community mentioned the rain measurement tool with a certain excitement. Whether this tool is worthy of the amount of trust some seem to put into it, is questionable. It also puts a large amount of trust in and responsibility on the one person in the community who is in charge of it. At the same time it follows the recommendation of self-monitoring of the community given in the literature and by the experts (Basher 2006; UNISDR 2005).

The trainings in Sri Lanka furthermore include strategies such as field trips and the establishment of community evacuation plans, which can also be found in the literature. A key component here is the establishment of safe evacuation routes and routines that communities can follow in emergency cases (Asharose et al. 2015; UNISDR 2015). The community members highlighted their knowledge on and the importance of such routes and safe house in a number of interviews.

When it came to actions that are to be taken when an alert is sounded, the trained community showed a higher level of knowledge. Interestingly, 25% of the respondents said that they have to support others who are more vulnerable in cases of emergencies. This awareness of their ability and responsibility to help those in need, which was also brought up in literature, was not mentioned in the untrained community (Jayathissa 2016). In the final comments on learning outcomes, one of the trained participants pointed out that she since the training perceives the community as more social and closer to each other. She also indicated that the CBPT has improved people's awareness of evacuation support they can receive and give, and that this was one of the essential outcomes to her. Therefore, it indicates that the CBPT also benefitted some of the social structures and bonds in the community.

In general it seems that the training the community had received, covered many of the key components of EWS addressed in the literature (Basher 2006; Karnawati et al. 2011). At this point, the importance of drills must also be acknowledged. The literature research, the expert interviews and the community interviews all underline their necessity (Isayama & Shaw 2014; Coppola 2011b; UNISDR 2015). Through them, the theoretical plan for an evacuation receives an practical component from which much can be leaned (Basher 2006). To once actually pack the important items, and physically walk the evacuation route can have great learning outcomes. The experience of the drill and the actions taken in it were named as beneficial by the trained community members a number of times.

The necessary knowledge on when evacuated people can return to their houses seems to not have been covert properly in the training. The trained community mainly put forth guesses on how they would receive the 'stand down' message. The untrained community who had already experienced this kind of communication with authorities towards the end of an evacuation had more knowledge on this topic. This important knowledge on when it is safe to return to one's house is an essential detail of such trainings, as the danger of landslides does not immediately end after the rain stops, like some community members indicated (Coppola 2011b), and could therefore be given more importance in trainings.

6.5 Relocation

One common alternative to life in risk areas is to relocate to safe zones. This is often a hard and difficult procedure, as it is cost intensive and people often rather prefer to stay in the place they are living in and are familiar with. The literature and the experts often identify a wish of communities to solve the situation with engineering solutions (Bukvic & Owen 2016). However, the data suggested that all of the questioned people in the trained community would rather move than stay. This might be due to the fact that engineering solutions are not a real option at Sri Lankan communities, due to short budgets. Either people move from the dangerous location or they live with the risk and entrust their safety to the new EWS and the training they receive. It seems that the training created a higher level of threat perception in the trained community, as all of them wanted to move (Karanci et al. 2005). Whether or not this fear is justified depends on

the development of future climate conditions and is something for the experts to judge. In the untrained community, all members have been offered new lands and a small loan from the state to move to a safer location. Despite this support and incentive, only 2/3 of the people are willing to move. It might be that there is a lower level of fear within this community, as they have not received the training. Another possibility is that the experienced precipitous evacuation in the past lets some community members mistrust the actual assessment of the danger situation.

Everyone in the trained community wanted to move, but such a move was not supported by authorities or other stakeholders with land or financial resources. This is a rather troubling situation, especially for people working in CBPT, as the training clearly strengthens their wish to move. Therefore, in a way, the training puts the community into a situation in which they know what their safest choice would be, but lacking the means to implement this choice they then stay anyway. It also shows that the line between risk awareness and fear is a fine one.

The general trend actually is for communities at risk to indeed be forced to move, as this is the only viable longer-term solution to problems such as droughts repeatedly destroying people's harvest, and reoccurring floods and hurricanes intensifying in their destruction of property (Bukvic et al. 2015). These changing weather patterns are indicators that climate changes plays a major role in the issue of community safety, and will, along with other factors, ultimately lead to higher numbers of communities at risk that will have to be relocated (Bukvic et al. 2015; Bukvic & Owen 2016).

6.6 Effects of Training

It seems that if a CBPT program is well-tailored to the needs of the target group and has working communication channels, then the training can lead to a number of positive effects (Brito Junior et al. 2014) Nevertheless the literature research shows a dispute if higher awareness leads to higher preparedness and if mitigation measures lead to relevant outcomes (Mwera 2013; Lin et al. 2007; Scolobig et al. 2012; Maidl & Buchecker 2015; Sattler et al. 2000).

Experts in the DMC and NBRO in Sri Lanka have the personal feeling that the trainings they have conducted had a positive impact on the communities, a feeling which they base on a number of

successful self-evacuations in the past. The community members themselves likewise expressed feelings of positive outcomes of the training. For many, the knowledge they gained on rain as a trigger event and the establishment of the evacuation routes was most present in their minds.

There are certainly some valid arguments for the statement that people in many communities, while having taken part in trainings, are more occupied with the tasks of their daily lives and the economic hardships they face due to the poor socio-economic situation they live in than with preparedness for possible disaster events (Karanci et al. 2005). This makes it hard to compare high-income with low-income communities, as many of the surrounding factors seem to have a sizable influence on the long-term effects of CBPT.

Another aspect that is relevant but country-specific is the political situation (Allen 2006; Anderson et al. 2014). In the case of Sri Lanka, political agendas might play a role in the decision which DRR a community receives. Some communities in Sri Lanka receive land and state support, while other communities at similar or higher risk levels do not. This might be due to underlying political conflicts. The trained community, which had not been offered alternative lands, consists of Tamil people, the minority, which had fought a long civil war with the Signalises, who make up the majority of people in the country. Not many Tamil work in state institutions such as the DMC within this region, so they wield little influence when it comes to the allocation of resources. Biased resource allocation, as well as communication problems between the Tamils and those who might lend support to them, be they trainers in CBPT or general donors or beneficiaries, with whom they do not share a common language, might well add to the difficult situation of the people living in the trained Diagalla Community.

7 CONCLUSIONS AND RECOMMENDATIONS

There is a consistent need for CBPT in communities all over the world, especially considering the present changes of climate patterns in low-income countries, where less money is invested in DRR. The present research project set out to analyze important components and strategies for CBPT in risk zones. Furthermore, the learning effects from CBPT in Sri Lanka were investigated. The present thesis made use of a combination of different methods. These included a structured

literature study, expert interviews and interviews with community members. The results of the study indicate that the most important concepts that should be considered when organizing a CBPT that aims at strengthening the local preparedness capacities in risk communities, are:

- Participatory and group-targeted training strategy that take as their starting point the local knowledge, involve multiple stakeholders and are generally adapted to the local context
- Risk awareness raising in connection with an increased awareness of natural early warning signs and the establishment of risk maps with suitable evacuation routes
- Implementation of a working EWS, with self-monitoring options
- Drills to test equipment and practice emergency cases
- Initiation of community-led risk mitigation processes
- Ensuring the training' sustainability through an owner-driven approach and regular refresh trainings

These key points represent a selection of the many important factors that came up repeatedly in the literature and the interviews and can be considered when conducting CBPT. The case study conducted in Sri Lanka showed that some of the concepts have been implemented there already, such as EWS, risk awareness and risk mapping, while others such as mitigation techniques, local ownership and sustainability could still receive more focus. Furthermore, it seems that the experience of a previous evacuation has a strong learning effect. In communities thus effected, these experiences could potentially be drawn upon to great effect in a CBPT conducted after such an event to facilitate more successful responses to landslides in the future.

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APPENDIX

Appendix A, List of Literature Search

(The process of exclusion and inclusion of literature and terms is presented in Section 2.1) After the first exclusion round an additional exclusion round was done with in LUB search provided subjects to further reduce the number of hits.

Date in 2017	Search Terms	Restrictions	Search Medium	Hits	Second Restrictions	Second Number of Hits	Citation
27.02.	Community Practices for Disaster Risk Reduction	Only: Journals, Magazines, Book, e-books, Thesis	LUB Search	484	Subjects: Excluding: Emergency management, communities Health, Medical	6	Ishiwatari, M. (2012). Government Roles in Community-Based Disaster Risk Reduction. In R. Shaw (Ed.), *Community , Environment and Disaster Risk Management* (First, Vol. 10, pp. 19–33). Bingley: Emerald Group Publishing Ltd. http://doi.org/10.1108/S2040-7262(2012)0000010008
							Izumi, T., & Shaw, R. (2012). Role of NGOs in Community-Based Disaster Risk Reduction. In R. Shaw (Ed.), *Community-Based Disaster Risk Reduction* (First, Vol. 10, pp. 35–54). Bingley: Emerald Group Publishing Ltd. http://doi.org/10.1108/S2040-7262(2012)0000010009
27.02.	Community Disaster Risk Reduction practice	Only: Journals, Magazines, Book, e-books, Thesis	LUB Search	484	Subject: Emergency management, risk reduction, community Development, community; excluding: Medial, health	53	Shaw, R. (2008). Chapter 20 Future Perspectives of Community-Based Disaster Risk Reduction. In R. Shaw (Ed.), *Community, Environment and Disaster Risk Management* (First, Vol. 10, pp. 3–17). Bingley: Emerald Group Publishing Ltd. http://doi.org/10.1108/S2040-7262(2012)0000010007

							Shaw, R. (2012). Chapter 1 Overview of Community-Based Disaster Risk Reduction. Community, Environment and Disaster Risk Management (Vol. 10). Emerald Group Publishing Ltd. http://doi.org/10.1108/S2040-7262(2012)0000010007
27.02.	Community Practices for Disaster Risk Reduction	Only: Journals, Magazines, Book, e-books, Thesis	LUB Search	394	Subject: emergency management, community, natural hazards; Excluding: health, medical	78	Isayama, K., & Shaw, R. (2014). *Community Practices for Disaster Risk Reduction in Japan*. (R. Shaw, Ed.). Kyoto: Springer. http://doi.org/10.1007/978-4-431-54246-9
27.02.	Community-based disaster preparedness	Only: Journals, Magazines, Book, e-books, Thesis	LUB Search	511	Subject: Community organization, Community based societal services; Excluding: health, medical	10	Allen, K. M. (2006). Community-based disaster preparedness and climate adaptation: local capacity building in the Philippines. *Disasters*, *30*(1), 81–101.
03.03.	Community Based awareness for Disasters	Only: Journals, Magazines, Book, e-books, Thesis	LUB Search	737	Subject: Emergency management, communities, community, community involvement, community organization;	89	Amini Hosseini, K., Hosseini, M., Izadkhah, Y. O., Mansouri, B., & Shaw, T. (2014). Main challenges on community-based approaches in earthquake risk reduction: Case study of Tehran, Iran. International Journal of Disaster Risk Reduction, 8, 114–124. http://doi.org/10.1016/j.ijdrr.2014.03.001

					Excluding Health, medical		
03.03.	Landslide risk perception	Only: Journals, Magazines, Book, e-books, Thesis	LUB Search	113	Subject: Landslides, Risk Perception, Emergency Management, perception, landslide hazard analysis, risk perception research, risk perceptions	42	Hernández-Moreno, G., & Alcántara-Ayala, I. (2016). Landslide risk perception in Mexico: a research gate into public awareness and knowledge. *Landslides*, (July 2015), 1–21. http://doi.org/10.1007/s10346-016-0683-9
03.03.	Community awareness Disasters	Only: Journals, Magazines, Book, e-books, Thesis	LUB Search	1674	Subject: Emergency management, risk perception, preparedness, awareness, community, communities, Excluding: health, medical	288	Karanci, A. N., Aksit, B., & Dirik, G. (2005). Impact of a Community Disaster Awareness Training Program in Turkey: Does It Influence Hazard-Related Cognitions and Preparedness Behaviors. Social Behavior and Personality, 33(3), 243–258. http://doi.org/10.2224/sbp.2005.33.3.243

							Henly-Shepard, S., Gray, S. A., & Cox, L. J. (2015). The use of participatory modeling to promote social learning and facilitate community disaster planning. Environmental Science and Policy, 45, 109–122. http://doi.org/10.1016/j.envsci.2014.10.004
03.03.	community awareness disaster risk reduction	Only: Journals, Magazines, Book, e-books, Thesis	LUB Search	333	Excluding: health, medical	204	Asharose, Saizen, I., & Sasi, P. K. C. (2015). Awareness workshop as an effective tool and approach for education in disaster risk reduction: A case study from Tamil Nadu, India. *Sustainability (Switzerland)*, *7*(7), 8965–8984. http://doi.org/10.3390/su7078965
							MWERA, T. S. (2013). *COMMUNITY AWARENESS AND PARTICIPATION IN DISASTER RISK MANAGAMENT: THE CASE OF KHAYELITSHA TR-SECTION*. University of the Western Cape
03.03.	Community Practices for Disaster Risk Reduction		My own Mendeley Library				Walia, A. (2008). Community based disaster preparedness: Need for a standardized training module. *The Australian Journal of Emergency Management*, *23*(2), 68–73.

08.03.	Effects of preparedness trainings disasters	Only: Journals, Magazines, Book, e-books, Thesis Excluding terms: nurse, medical	LUB Search	148	Brito Junior, I. de, Rosis, C. H. V. de, Carneiro, P. V., Leiras, A., & Yoshizaki, H. T. Y. (2014). Proposta de um programa de treinamento de desastres naturais considerando o perfil das vítimas. Ambiente & Sociedade, 17(4), 153–176. http://doi.org/10.1590/1809-4422ASOC1092V1742014
					Muttarak, R., & Pothisiri, W. (2013). The role of education on disaster preparedness: Case study of 2012 Indian Ocean earthquakes on Thailand's Andaman coast. *Ecology and Society*, *18*(4). http://doi.org/10.5751/ES-06101-180451
					Perry, R. W., & Lindell, M. K. (2003). Preparedness for Emergency Response : Guide-lines for the Emergency Planning Process. Disasters, 27(4), 336–350. http://doi.org/10.1111/j.0361-3666.2003.00237.x

10.03.	Snowballing from Muttarak and Pothisiri (2013)						Sattler, D. N., Kaiser, C. F. F., & Hittner, J. B. B. (2000). Disaster preparedness: Relationships among prior experience, personal characteristics, and distress. Journal of Applied Social Psychology, 30(7), 1396–1420. http://doi.org/10.1111/j.1559-1816.2000.tb02527.x
13.03.	Response Exercises		My own Mendeley Library				Lee, Y.-I., Trim, P., Upton, J., & Upton, D. (2009). Large Emergency-Response Exercises: Qualitative Characteristics - A Survey. *Simulation & Gaming*, *40*(6), 726–751. http://doi.org/10.1177/1046878109334006
13.03	Community-Based Disaster Management Program	Only: Journals, Magazines, Book, e-books, Thesis; Excluding: Medical, health, nurse	LUB Search	185	Subject: emergency management, community development, community-based programs	101	Chen, L. C., Liu, Y. C., & Chan, K. C. (2006). Integrated Community-Based Disaster Management Program in Taiwan: A case study of Shang-An Village. Natural Hazards, 37(1–2), 209–223. http://doi.org/10.1007/s11069-005-4669-5
14.03.	Community based hazards mapping	Only: Journals, Magazines, Book, e-books, Thesis	LUB Search	340	Subject: hazard mitigation, emergency management, landslides, landslide hazard analysis,	37	Maceda, E. a, Gaillard, J., Stasiak, E., Masson, V. L. E., & Le Berre, I. (2009). Dimensional models in island community-based disaster risk management. *The International Journal of Research into Island Cultures*, *3*(1), 72–84.

			mapping, maps; Excluding: health, medical	
16.03.	Risk awareness	My own Mendel ey Library		Maidl, E., & Buchecker, M. (2015). Raising risk preparedness by flood risk communication. *Natural Hazards and Earth System Science*, *15*(7), 1577–1595. http://doi.org/10.5194/nhess-15-1577-2015
16.03.	Snowballed from Maidl (2015)	LUB Search		Lin, S., Shaw, D., & Ho, M. C. (2008). Why are flood and landslide victims less willing to take mitigation measures than the public? Natural Hazards, 44(2), 305–314. http://doi.org/10.1007/s11069-007-9136-z
		LUB Search		Scolobig, A., De Marchi, B., & Borga, M. (2012). The missing link between flood risk awareness and preparedness: Findings from case studies in an Alpine Region. *Natural Hazards*, *63*(2), 499–520

17.03.	Community-based Risk Reduction landslides	LUB Search	22	Karnawati, D., Fathani, T. F., Ignatius, S., Andayani, B., Legono, D., & Burton, P. W. (2011). Landslide hazard and community-based risk reduction effort in Karanganyar and the surrounding area, central Java, Indonesia. *Journal of Mountain Science*, *8*(2), 149–153. http://doi.org/10.1007/s11629-011-2107-6
				Anderson, M., & Holcombe, E. (2014). What Are the Emerging Challenges for Community-Based Landslide Risk Reduction in Developing Countries? Natural Hazards, 15(2011), 128–139. http://doi.org/10.1061/(ASCE)NH.1527-6996.0000125.
				Isayama, K., & Shaw, R. (2014). Community Practices for Disaster Risk Reduction in Japan. (R. Shaw, Ed.). Kyoto: Springer. http://doi.org/10.1007/978-4-431-54246-9
17.03.	Early warning systems landslides	My own Mendeley Library		Basher, R. (2006). Global early warning systems for natural hazards: systematic and people-centred. Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences, 364(1845), 2167–2182. http://doi.org/10.1098/rsta.2006.1819

17.03.	Terminology UNISDR	Google			UNISDR. (2007). UNISDR Terminology. Retrieved March 17, 2017, from https://www.unisdr.org/we/inform/terminology
20.03.	Snowballing from Basher	LUB Search			ISDR. (2005). Hyogo Framework for Action 2005-2015. Strategy. Hyogo. Retrieved from http://www.undp.org/bcpr/whats_new/rdr_english.pdf
20.03.	Community willingness to relocate	LUB Search	44		Bukvic, A., & Owen, G. (2016). Attitudes towards relocation following Hurricane Sandy: Should we stay or should we go? *Disasters*, *41*(1), 101–123. http://doi.org/10.1111/disa.12186
					Bukvic, A., Smith, A., & Zhang, A. (2015). Evaluating drivers of coastal relocation in Hurricane Sandy affected communities. *International Journal of Disaster Risk Reduction*, *13*, 215–228. http://doi.org/10.1016/j.ijdrr.2015.06.008

Appendix B, Community Interview Questionnaire

(The black questions were included in the thesis. The grey questions were excluded because of repeating confusion on those questions by Interview partners)

Questionnaire landslide awareness program + Interview Date:

Master Thesis Julian Erjautz, Lund University Location:

1. What is your Name?

2. Where are, you born?

3. What is your sex?
   - Female
   - Male

4. How old are you?

5. What is your highest obtained education?
   - No education
   - Primary School
   - Secondary School
   - Basic Degree
   - Advanced Degree
   - PhD

6. What is your occupation?

7. How many people life in your household?

No, I don´t rave idea	I have a good idea	I have a good idea	I know exactly

8. Do you know what a Landslide is?	o	o	o	o

	I don´t	Maybe	I am pretty sure	I am absolutely sure
9. Do you leave in a Landslide area?	o	o	o	o

10. Can he/she show us the risk area in your Community?
11. What are general factors for Landslides?
12. Can he/she name Man-made factors that can lead to Landslides?
13. What are the most present one in his/her Community?
14. Can he/she name some signs for future Landslides in the Environment?
15. What measures can you, your Family or the Community take to detect Landslides?
16. What measures can the he/she family or Community take to reduce Landslides?
17. Did he/she or the Community take any active measures?
18. Who are the supporting or responsible actors within the topic of Landslides?
19. Would he/she like to move because He/she lives in a Landslide risk Zone?
20. Does he/she Knows how the EWS works?
21. Does he/she knows what to do if he hears the EWS?
22. Does he/she knows when he can return to his/her home after an alert?

23. Does he/she trust the alerts?

24. Did he/she receive any training on Land Slides?

25. If when was this training?

26. What was the biggest outcome for you from this training?

27. Was the training use full?

Appendix C, Expert Interview Questionnaire

Experts/Trainers:

Familiarise with the interviewee

- Age
- Gender
- Occupation
- What´s your educational Background?

Training Facilitation

- Are they adjusted to each different community or standardized?
- How do you reach out for the participants?
- How many in one training section?
- What Material do you use?
- How long is a training?
- What preparation are done before the Training?
- Who are the key actors?
- What are the major challenges in facilitating the training?
- Are participants easy to motivate?
- Is there any monitoring after the training?
- Can you explain the training structure, and topics?

Training Outcome

- What is the goal of this trainings?
- What do you feel you are building up with this training?
- How should it strengthen the risk awareness? (follow up on structure question)
- How should it strengthen the risk detection? (follow up on structure question)
- How should it strengthen the self-monitoring? (follow up on structure question)
- How should it strengthen the community to take their own measures? (follow up on structure question)
- How should it strengthen the awareness and functioning of the EWS? (follow up on structure question)
- What are other key messages?
- What are the advantages of Community Based Awareness Trainings?
- Do you feel the knowledge is integrated to the Community?
- Is there a monitoring process?
- What do you see as the most rewording outcome?
- What are the most effective measures that communities take?

- Which challenges remain?
- How is the knowledge passed on?
- Do you see improvements in the Communities?
- How would link the training to the term Capacity Development?

Appendix D, Preliminary Hazard Zone Map Badulla District