Climate Change Adaptation: Evaluation and Development of the Practices for Measuring Community Resilience to Natural Hazards

Author: Chris Urwin

Report No.: 1, Rev. 3
Document No.: 1G3RD39-1
Date: 2014-09-29
Report title: Climate Change Adaptation: Evaluation and Development of the Practices for Measuring Community Resilience to Natural Hazards

Date of issue: 2014-09-29

Project No.: PP108219

Organisation unit: Manchester Advisory Services

Report No.: 1, Rev. 3

Document No.: 1G3RD39-1

Prepared by: Chris Urwin
Associate Director,
DNV GL

Reviewed by: Jenny Pope
Fellow, University of Cambridge
Institute of Sustainability Leadership

Approved by: Bente Pretlove
Head of Climate Change,
DNV GL Research and Innovation

Keywords: Community Resilience, Disaster Risk Reduction, Climate Change Adaptation

Unrestricted distribution (internal and external)

Reference to part of this report which may lead to misinterpretation is not permissible.

Rev. No. Date Reason for Issue Prepared by Verified by Approved by
1 12 Aug 2014 First issue
2 10 Sept 2014 Second issue
3 29 Sept 2014 Third issue reviewed and approved by
Bente Pretlove

Cover Photo: Schoolboys in Wailea Community, Fiji (taken by Chris Urwin, March 2014)
Summary

Every year approximately 270 million people are adversely impacted by natural disasters around the world. These disasters are increasing in severity and frequency in some regions due to climate change. Poor communities are typically the most vulnerable to disaster loss, despite contributing the least to climate change. Many of these communities are becoming more vulnerable due to global trends like population growth and urbanisation in coastal areas. There is an urgent need to increase the resilience of vulnerable communities to ensure the continued prosperity of their people. Community resilience concerns the ability of communities to cope with and recover from natural disasters like floods, droughts or hurricanes as well as stresses like lack of food, water or sanitation. A challenge is that resilience is difficult to measure and therefore manage.

The questions addressed in this dissertation were: 1) what are characteristics of resilient communities, and 2) how can the resilience of communities be evaluated? Literature was studied in the domains of resilience, vulnerability, disaster risk reduction, risk management and the various approaches used to measure resilience. Using an action research methodology, the author worked with the Red Cross to develop a community resilience evaluation tool and methodology. This drew on the author’s experience of safety management in high hazard industries. A community resilience evaluation was conducted in Fiji together with the Fiji Red Cross to pilot the approach. An important finding of the research is that the existing community resilience assessment approaches focus on loss recovery rather than loss prevention. The research then proposes a new assessment approach informed by loss prevention approaches applied in the major hazard industries. It is hoped that this assessment approach offers a fresh and practical perspective to help vulnerable communities cope better with natural hazards they face and the effects of climate change.
**Acknowledgements**

Many people have assisted me in the development of this dissertation. I would firstly like to thank the personnel of the Fiji Red Cross, Norwegian Red Cross and International Federation of the Red Cross who have assisted me in this project. I would particularly like to thank Chris Ho of Fiji Red Cross for seeing the value in this research and for personally committing himself and his operations team to undertake the project. I would also like to thank all the community members and government representatives in Fiji who generously gave their time to be interviewed.

I would like to thank Dr Jenny Pope from the University of Cambridge Institute for Sustainability Leadership for her assistance throughout this project. Jenny’s clear thinking has been key to the design, execution and write up of this project.

I would like to thank my colleagues in DNV GL Research and Innovation for their assistance in completing this project within the context of our company’s climate change adaptation research programme.
Research Context

Before introducing the topic of this research, I think it may be helpful for the reader if I describe the context within this research was conducted and its various motivations. There have been a number of drivers that have influenced this research project: 1) I am an Associate Director with DNV GL where am responsible for a global safety and sustainability management system consulting service. I have 16 years experience providing safety management consulting services to the major hazard industries and was the author of the 7th and 8th Editions of the International Safety Rating System (ISRS) (DNV GL, 2009). DNV GL is a risk management consulting company based in Norway with 16000 employees in 100 countries worldwide. Our vision is “global impact for a safe and sustainable future”. It was therefore a requirement that this research be aligned with DNV GL’s strategic plans, and if possible to help advance the commercial interests of the company. 2) DNV GL have a Research and Innovation group of about 50 employees in Oslo working on long term research projects supporting the company vision and goals. In 2013, I was invited by this group to work on a project within their Climate Change Adaptation programme, specifically looking at the impact of climate change on vulnerable communities around the world and if our organisation could develop services or partnerships to help address this issue. 3) Since 2004, DNV GL have had a partnership agreement with the Norwegian Red Cross which involves direct funding of their activities as well as pro bono consulting to help them on agreed risk management issues. In 2013 DNV GL were invited by the Norwegian Red Cross and the International Federation of the Red Cross to participate in a project to help the international Red Cross community develop a new framework and tools for improving Community Resilience. I was asked to work on this project.

All of these drivers have had a bearing on the design of this project however the main driver have been the need to be as helpful as possible to the Red Cross in developing their framework and tools for improving Community Resilience.
## Table of Contents

Summary ...................................................................................................................................... 1  
Acknowledgements .................................................................................................................... 2  
Research Context ....................................................................................................................... 3  
1 Introduction ......................................................................................................................... 6  
2 Research Design ..................................................................................................................... 10  
3 Action Research Cycle 1 – The Characteristics of Resilient Communities ...................... 14  
  3.1 Introduction....................................................................................................................... 14  
  3.2 Literature Review ............................................................................................................. 15  
    3.2.1 The Concept of Resilience ................................................................................. 15  
    3.2.2 Disaster Risk Reduction ................................................................................. 17  
    3.2.3 Community Resilience ............................................................................... 18  
    3.2.4 The Characteristics of Resilient Communities ............................................ 20  
    3.2.5 The Concept of Vulnerability .................................................................... 21  
    3.2.6 Vulnerability and Resilience .................................................................... 24  
    3.2.7 Risk Management: Barrier Based Approach ............................................. 24  
    3.2.8 Risk Management: Loss Prevention ......................................................... 25  
  3.3 Data Collection and Analysis ........................................................................................... 26  
    3.3.1 Developing the Resilience Framework ....................................................... 26  
    3.3.2 Bow Tie Barrier Analysis ........................................................................... 29  
  3.4 Conclusions ....................................................................................................................... 33  
4 Action Research Cycle 2 – Evaluating Community Resilience ............................................. 35  
  4.1 Introduction....................................................................................................................... 35  
  4.2 Literature Review ............................................................................................................. 36  
    4.2.1 Vulnerability and Capability Analysis ....................................................... 36  
    4.2.2 Measuring the Characteristics of Resilient Communities ....................... 37  
    4.2.3 Resilience Principles, Frameworks and Indicators ..................................... 38  
    4.2.4 Systems Thinking ....................................................................................... 38  
  4.3 Data Collection and Analysis ........................................................................................... 40  
    4.3.1 Introduction to Field Work .......................................................................... 40  
    4.3.2 Community Resilience Alpha Assessment ............................................. 40  
    4.3.3 Physical Barriers Assessment .................................................................. 42  
    4.3.4 Review and Reporting .............................................................................. 44  
  4.4 Conclusions ....................................................................................................................... 45  
5 Conclusions and Recommendations ...................................................................................... 47
List of Figures

Figure 1 - The cyclical process of action research
Figure 2 - Resilience at different levels of society
Figure 3 - Pressure and Release Model - The Progression of Vulnerability
Figure 4 - Resilience at different levels of society
Figure 5 - Pressure and Release Model: The Progression of Vulnerability
Figure 6 – Layers of Protection for a Resilient Community
Figure 7 – Layers of Protection for a Vulnerable Community
Figure 8 – Loss Causation Model
Figure 9 - Red Cross Community Resilience Workshop
Figure 10 - Bow Tie Barrier Representation of a Red Cross Vulnerability and Capability Analysis for a Caribbean Flooding Event
Figure 11 – Community Resilience Alpha Assessment – The Characteristics of Resilient Communities
Figure 12 - Communities visited in Fiji
Figure 13 - Physical Barriers Assessment Record Sheet
Figure 14 - Wailea community a few days after a flood
Figure 15 - Community Resilience Assessment for Lautoka, Fiji
Figure 16 - Physical Barriers Assessment for Lautoka, Fiji

List of Tables

Table 1 - Extreme weather and climate events: Global-scale assessment of recent observed changes
Table 2 - Definitions of resilience in the field of field of ecology
Table 3 - Definitions of resilience in the field of field of disasters and hazards
Table 4 - Framework for the characteristics of disaster resilient communities
1 Introduction

Community resilience concerns the ability of a community to cope with and recover from natural disasters like floods, droughts or hurricanes as well as stresses like lack of access to food, water and sanitation. In this dissertation, I will explore the concept of community resilience, focussing in particular on the practices used to measure it.

Natural disasters cause widespread human suffering. During the period 2002 to 2011, there were on average 394 disasters per year which killed 31,331 people per year and adversely impacted 267.9 million people per year (Guha-Sapir, 2013). In addition to the hundreds of smaller disasters each year, there are periodically major disasters, for example the Haiti earthquake in 2010 killing 297,598 people and the cyclone in Myanmar in 2008 killing 241,698 people, and the Indian Ocean tsunami in 2004 killing 235,293 people in 14 countries (Guha-Sapir, 2013).

In addition to terrible human loss, disasters also result in huge economic costs. Between 2001 and 2010 the average economic cost of disasters globally was US$ 143 billion per year and this figure is on a rising upward trend (Guha-Sapir, 2013). Sadly disasters create the greatest losses for vulnerable countries who are already struggling to overcome poverty. Disasters have the effect of setting back years of development gains improving access to education, healthcare and creating sustainable livelihoods. It can often take countries decades to recover from the effects of a major disaster (UNDP, 2013).

Although it is impossible to attribute a particular natural disaster to climate change, there is evidence that the changing climate is changing the frequency, intensity, extent, duration and timing of extreme weather events (IPCC, 2012; Van Aalst, 2006). Changes in extreme weather and climate events have been observed since 1950 which are summarised in the table below taken from the International Panel for Climate Change’s Fifth Assessment Report (IPCC, 2013):

<table>
<thead>
<tr>
<th>Phenomenon and direction of trend</th>
<th>Assessment that changes occurred (typically since 1950 unless otherwise indicated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warmer and/or fewer cold days and nights over most land areas</td>
<td>Very likely</td>
</tr>
<tr>
<td>Warmer and/or more frequent hot days and nights over most land areas</td>
<td>Very likely</td>
</tr>
<tr>
<td>Warm spells/heat waves. Frequency and/or</td>
<td>Medium confidence on a global scale</td>
</tr>
</tbody>
</table>

1 A disaster is defined here as a natural event where more than 10 people were killed.
duration increases over most land areas | Likely in large parts of Europe, Asia and Australia
---|---
Heavy precipitation events. Increase in the frequency, intensity, and/or amount of heavy precipitation | Likely more land areas with increases than decreases
Increases in intensity and/or duration of drought | The frequency and intensity of drought has likely increased in the Mediterranean and West Africa, and likely decreased in central North America and north-west Australia.
Increases in intense tropical cyclone activity | Low confidence in long term (centennial) changes
Increased incidence and/or magnitude of extreme high sea level | Likely (since 1970)

**Table 1 Extreme weather and climate events: Global-scale assessment of recent observed changes**

Table 1 shows that the changing climate is affecting different regions very differently. In some regions, climate change may indeed be beneficial, for example as a warmer climate improves agriculture performance (IPCC, 2012). However, other regions are experiencing heavy precipitation events and an increased frequency or severity of flooding. Others are experiencing an increased frequency or severity of heat waves or tropical cyclones.

In addition to the increased incidence of natural disasters, the changing climate is causing other stresses on communities for example reduced access to water and food, and increased prevalence of disease (IPCC, 2012). In 2009, the respected medical journal The Lancet and University College London published a comprehensive review of the effects on global health due to climate change and commented “climate change is the biggest global health threat of the 21st century. The effects of climate change on health will affect most populations in the next decades and put the lives and wellbeing of billions of people at increased risk” (Costello et al, 2009). The report outlines the threats of climate change in six areas: 1) changing patterns of disease and mortality 2) food insecurity 3) access to water and sanitation, 4) inadequate shelter and human settlements, 5) extreme climatic events, and 6) population growth and migration. They highlight that the extreme climatic events are just one of many effects due to climate change and the indirect impacts on disease, food, water and sanitation may have a significantly greater impact on global health (Costello et al, 2009).

---

2 Explanation of probability terms used in table: Virtually certain (99–100% probability), Very likely (90–100% probability), Likely (66–100% probability), About as likely as not (33–66% probability), Unlikely (0–33% probability), Very unlikely (0–10% probability), Exceptionally unlikely (0–1% probability)
How can society cope with these increasing natural shocks and stresses? The term “resilience” has risen to prominence in recent years as a strategy for coping with these changes. The Indian Ocean Tsunami in 2004 mentioned above represented a turning point for the international community in terms of their response to natural disasters. Responding to disasters of this magnitude with humanitarian relief was no longer considered adequate. This event prompted the promotion of a different strategy known as Disaster Risk Reduction (DRR), to help countries and communities prevent, mitigate and manage their disaster risks. 168 member states from the United Nations came together to agree on the Hyogo Framework for Action in 2005 committing the international community to invest in disaster risk reduction (UNDP, 2013). The Hyogo Framework for Action also adopted the term resilience which it defined as: “the capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which the social system is capable of organising itself to increase this capacity for learning from past disasters for better future protection and to improve risk reduction measures” (UNISDR, 2005). This is the definition of resilience I will use in this dissertation. There are various other definitions of resilience which are discussed in the literature review below.

Building resilience is a climate change adaptation strategy. An alternative strategy is climate change mitigation which includes seeking to reduce the effects of climate change by reducing greenhouse gas emissions. Scientists and policy makers have known about the risk of climate change and the mitigation actions required to prevent it for 40 years since the landmark publication Limits to Growth (Meadows et al, 1972). Policy makers have also known that it is an order of magnitude less costly to address climate change through mitigation than through adaptation (Stern, 2007). However securing meaningful global action on climate change mitigation has proved impossible to date, in large part because of the short term behaviour of society and its leaders at all levels supported by climate change sceptics who dispute that climate change has an anthropogenic influence (Randers, 2012). Sadly this means that climate change is now with us and is likely to increase in the years to come. Interestingly, individuals do not need to have a long term perspective or believe in anthropogenic influenced climate change to agree to the need to build resilience to cope with the natural hazards they experience around them. For this reason, some commentators believe that “resilience” will overtake “sustainability” as the defining agenda for society and its leaders in the years to come (Silva, 2012).
For the reasons outlined above, there is an urgent need to increase the resilience of vulnerable communities to help them avoid major loss events and ensure their continued prosperity. Many organisations are trying to better understand how resilience concept can be applied at the community level. A key challenge in improving and managing community resilience is that it is difficult to measure. As Drucker (1954) points out, one cannot manage what one cannot measure. Resilience is a complex topic addressing many social, environmental and economic systems which makes measurement difficult. This study will review literature on resilience, vulnerability and disaster risk reduction. I will focus in particular on literature exploring the “characteristics” of resilient communities e.g. Twigg (2009) and IFRC (2011). The resilience definition above characterises community resilience as a risk management problem so this study will explore community resilience from a risk management perspective. The definition above also characterises resilience as a system problem so this study will also explore community resilience from a systems perspective.

The first research question for this study is:

1. What are the characteristics of resilient communities?

This paper will draws on the literature review outlined above to propose a framework for the characteristics of resilient communities.

A second research question is:

2. How can community resilience be evaluated?

Based on the framework for the characteristics of resilient communities and primary research conducted with vulnerable communities in Fiji, this research proposes new assessment tool and methodology to evaluate community resilience.
2 Research Design

When beginning this study it was not clear to me how to design the research project. This was due to in part to the multidisciplinary nature of community resilience. It was also due to the potentially conflicting needs to be as helpful as possible to the Red Cross while simultaneously conducting a rigorous piece of research. I had decided to work closely with the Red Cross on this project, an approach which offered advantages and disadvantages. The advantages included the ability to work on a topic of real need and to have good access to knowledgeable people and vulnerable communities to conduct primary research. The disadvantages included the research had to focus on issues of specific interest to the Red Cross and my access to their organisation was sporadic based on attendance at meetings planned for other reasons for which I was wearing more than one hat. In the first instance my research approach was simply to follow the lead given by the Red Cross, be opportunistic and learn as much as possible about the issues from whatever source and to work with the Red Cross professionals to better understand and formulate the problem that the research was going to address.

Over time an “action research” methodology evolved. Action research was attractive because; 1) It offered a practical approach to address the social research questions identified as well as allow me to fulfil my responsibilities to the Red Cross, 2) It offered a structured way to approach research as a series of iterative cycles which seemed to match the way my research activities were unfolding, 3) Following an action research strategy would help me ensure the rigour of my research activities as well as position my work as a piece of academic research, 4) This approach would also allow me to introduce my own area of expertise into the research process, namely safety management in high hazard industries, and 5) By adopting the action research practices of self-reflection and documenting the research process this would help mitigate the concerns of research bias. The epistemological framework adopted for this research is therefore inductive employing a qualitative action research approach to help develop new theory.

Action research may be defined as a “democratic process concerned with developing practical knowledge in pursuit of worthwhile human purposes... It seeks to bring together action and reflection, theory and practice, in participation with others, in pursuit of practical issues of pressing concern to people” (Reason and Bradbury, 2001). Action research is not a single academic discipline or methodology but rather an approach to research that has emerged from a broad range of academic fields (Brydon-Miller, 2003). Kurt Lewin (1946) may have been the first person to coin the term “action research” as an alternative to traditional positivistic
approaches to social research which he thought were ineffective, famously commenting that “research that produces nothing but books will not suffice”. This frustration is echoed by others. Susman and Evered (1978) suggest there is crisis in organisational science commenting “by limiting its methods to what it claims is value-free, logical, and empirical, the positivist model of science when applied to organizations produces a knowledge that may only inadvertently serve and sometimes undermine the values of organizational members”. In the emerging interdisciplinary field of sustainability science, Berkes et al (2003) comment, “By structure, method and content, sustainability science must differ fundamentally from most science as we know it. Familiar approaches to developing and testing hypotheses are inadequate because of nonlinearity, complexity, and long time lags between actions and consequences”. In the field of management science, the well respected management thinker Edgar Schein (2001) criticises positivistic research within organisations as “imperialistic, yet all too often has shown itself to be an emperor with no clothes”.

Action research has four defining characteristics (Denscombe, 2003): 1) Action research is concerned with practical issues of real concern to people. The motivation and purpose of action research is closely linked with the needs of the research subject and the research may even be initiated by them. Typically action research relates to a particular professional practice. 2) Action research is not just concerned with knowledge generation as an end in itself, but with applying new knowledge to create change as part of the research process itself. 3) In action research, the development of findings and their application are part of repeated cycles of research, action and reflection as represented in Figure 1 below, and 4) the researcher is an active participant in the research process rather than a passive observer. The action researcher must engage in structured and systematic self-reflection and analysis in order to remain as detached and impartial as possible. Reflection is also necessary to identify new problems worthy of investigation and to evaluate the changes just implemented (Denscombe, 2003).
It is interesting to reflect that improvement cycles like the one described above are widespread throughout business. For example the Plan-Do- Check-Act (PDCA) continuous improvement cycle advocated by Edward Deming is the basis of the ISO quality management system certification approach which has been adopted by more than 1.1 million of organisations worldwide (ISO, 2012). Deming’s work on quality circles is suggested as one of the ancestors of action research (Noffke, 1994). The “Six Sigma” quality programme was developed in 1987 as improvement on PDCA and is widely implemented in business. This is based on a continuous improvement cycle with five steps; Define, Measure, Analyse, Improve and Control (DMAIC). These five stages bear comparison to the 5 stages of action research described above.

Within the action research design principles outlined above, there no constraints on the research methodologies that can be applied. Reason and Bradbury (2001) document multiple action research approaches in their “Handbook of Action Research”. One such is “process consulting” which concerns generating knowledge as part of a process designed help the subject of the research (Schein, 2001). Schein suggests process consulting to be is the most effective form of action research because it is initiated by and has high involvement with the subject of the research. Schein (2001) suggests “not only should data gathering based on helping be considered legitimate research, but such data are often deeper and more valid than data gathered in the researcher initiated models.”
A key feature of process consulting is that the “researcher” and the “subject” engage in a process of joint research recognising that neither party knows enough to solve the problem on their own (Schein, 1999). Often the subject of the research knows that something is wrong but may not be clear at the outset exactly what the problem is. In turn, the researcher is willing to work with the subject without the problem being clearly defined in advance. In this way the researcher and the subject work together in cycles of research refining the nature of the problem, planning and implementing actions, evaluating the changes made and repeating the cycle. In process consulting the research process and resulting outputs are jointly owned by the researcher and the subject of the research. An advantage of process consulting is the researcher has excellent access to data because the subject initiated the research and enters into the process voluntarily. The disadvantages of action research and process consulting include; 1) the scope of the research is limited to the topics defined by the subject, 2) the research is typically limited to small scale projects, 3) integrating research and practice together limits the controls needed for rigorous research, and 4) it may be difficult for the researcher to be detached and impartial in his or her approach to the research and as such may not meet the requirements of traditional positivistic research (Denscombe, 2003).

Schein (1999) proposes ten principles for process consulting of which the first four are; 1) Always try to be helpful - this principle may on occasion lead the researcher to different decisions compared to researcher initiated research 2) Always stay in touch with the current situation - continually check your understanding of your own and the subject’s situation, 3) Access your ignorance - actively search out your areas of ignorance concerning the subject’s situation recognising how limited your knowledge will ever be about the subject and their social system, 4) Everything you do is an intervention – apply the precautionary principle in your research activities recognising that every comment you make is an intervention in the social system of the subject.

Where possible this research employs the principles of action research and process consulting outlined above. Two action research cycles are described in the sections below addressing the respective research questions. Each section tries to address the process steps of the action research cycle in Figure 1.
3  Action Research Cycle 1 – The Characteristics of Resilient Communities

3.1  Introduction

This section describes the research activities I undertook in order to answer the research question “what are the characteristics of resilient communities?”

In April 2013, I attended a one day workshop on community resilience at International Federation of the Red Cross (IFRC) offices in Geneva. The workshop involved a presentation on a project conducted by Arup commissioned by the Red Cross on the characteristics of safe and resilient communities (IFRC, 2011). The purpose of the Arup project was to identify new knowledge to help the IFRC improve their policies and practices for addressing community resilience. The workshop was attended by approximately 60 people drawn from Red Cross societies around the world plus other stakeholders like the World Bank, NGOs, private sector collaborators and donors. I attended with another colleague from DNV GL and our role was to represent our organization and explore areas of collaboration. The presentation was followed by discussion in small groups to review and critique the results of the project. This was my first exposure to the Red Cross and to their work on community resilience. It was a valuable opportunity to learn about the topic, the Red Cross’ current practices, new research, the different perspectives of key stakeholders and the challenges the Red Cross faced in developing this further.

My reflections on the workshop in Geneva were that it had been a very rich and slightly overwhelming experience for me as my first experience of the complex topic of community resilience and the world of the Red Cross. However, it occurred to me that there were parallels between community resilience and my own field of safety management. I could see there was potential for applying risk management and system thinking methodologies in the domain of community resilience.

Following the workshop I began to study the work on the Red Cross and other literature on community resilience starting with work done by Arup. I began to see themes emerging in the way different organisations were approaching community resilience as outlined. One of these themes was the “Characteristics of Community Resilience”. This has been the approach adopted in the Arup study as well as in another study by John Twigg (2009) of University College London. This approach seemed to resonate with several of the Red Cross personnel. It also resonated with me as being a similar approach to safety management tools I was
familiar with. I began to consider that it might be helpful to make a framework for assessing community resilience similar to the mature safety management tools I was familiar with.

### 3.2 Literature Review

#### 3.2.1 The Concept of Resilience

The resilience concept is applied in many disciplines including ecology, disaster risk reduction, psychology, sociology, geography, psychiatry and public health (Manyena, 2006). It has been defined in a variety of ways, and has different connotations depending on the discipline. Although it is still contested, many researchers argue that the concept of resilience originated in the field of ecology (Manyena, 2006).

Resilience is derived from the Latin word resilio, meaning to jump back (Klein Nicholls, and Thomalla, 2003). It typically relates to the ability of systems to respond and adapt effectively to changing circumstances. “Community resilience” is an emerging field which to some extent has grown out of the Disaster Risk Reduction (DRR) agenda (Mayunga, 2009).

The two tables below give an overview of definitions for resilience from the ecology and DRR domains respectively.

<table>
<thead>
<tr>
<th>Author</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holling (1973)</td>
<td>Resilience of an ecosystem is the measure of the ability of an ecosystem to absorb changes and still persist.</td>
</tr>
<tr>
<td>Pimm (1984)</td>
<td>Resilience is the speed with which a system returns to its original state following a perturbation.</td>
</tr>
<tr>
<td>Holling et al. (1995)</td>
<td>Resilience is a buffer capacity or ability of a system to absorb perturbation, or the magnitude of the disturbance that can be absorbed before a system changes its structure by changing the variables and processes that control behavior.</td>
</tr>
<tr>
<td>Lebel (2001)</td>
<td>Resilience is the potential of a particular configuration of a system to maintain its structure/function in the face of disturbance, and the ability of the system to reorganize following disturbance-driven change and measured by size of stability domain</td>
</tr>
<tr>
<td>Walkers et al. (2002)</td>
<td>Resilience is a potential of a system to remain in a particular configuration and to maintain its feedbacks and functions, and involves the ability of the system to reorganize following the disturbance driven change.</td>
</tr>
<tr>
<td>Folke et al. (2002)</td>
<td>Resilience for social-ecological systems is related to three different characteristics: (a) the magnitude of shock that the system can absorb and remain in within a given state; (b) the degree to which the system is capable of self-organization, and (c) the degree to which the system can build capacity for learning and adaptation.</td>
</tr>
<tr>
<td>Walker &amp; Salt (2006)</td>
<td>Resilience is the capacity of a system to absorb disturbances, to undergo changes, and still retain essentially the same function, structure, and feedbacks.</td>
</tr>
<tr>
<td>Resilience Alliance (2007)</td>
<td>Ecosystem resilience is the capacity of an ecosystem to tolerate disturbance without collapsing into a qualitatively different state that is controlled by different set of processes. Thus, a resilient ecosystem can withstand shocks and rebuild itself when necessary. Resilience in social systems has the added capacity of humans to anticipate and plan for the future.</td>
</tr>
<tr>
<td>Millennium Ecosystem Assessment (2007)</td>
<td>Resilience refers to the amount of disturbance or stress that a system can absorb and still remain capable of returning to its pre-disturbance state</td>
</tr>
</tbody>
</table>
Table 2 - Definitions of resilience in the field of ecology

<table>
<thead>
<tr>
<th>Author</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timmerman (1981)</td>
<td>Resilience is the measure of a system’s or part of the system’s capacity to absorb and recover from occurrence of a hazardous event.</td>
</tr>
<tr>
<td>Wildavsky (1991)</td>
<td>Resilience is the capacity to cope with unanticipated dangers after they have become manifest, learning to bounce back.</td>
</tr>
<tr>
<td>Buckle (1998)</td>
<td>Resilience is the capacity that people or groups may possess to withstand or recover from the emergencies and which can stand as a counterbalance to vulnerability.</td>
</tr>
<tr>
<td>EMA (1998)</td>
<td>Resilience is a measure of how quickly a system recovers from failures.</td>
</tr>
<tr>
<td>Mileti (1999)</td>
<td>Local resiliency with regard to disasters means that a locale is able to withstand an extreme natural event without suffering devastating losses, damage, diminished productivity, or quality of life without a large amount of assistance from outside the community.</td>
</tr>
<tr>
<td>Comfort et al. (1999)</td>
<td>The capacity to adapt existing resources and skills to new systems and operating conditions.</td>
</tr>
<tr>
<td>Adger (2000)</td>
<td>Social resilience is the ability of groups or communities to cope with external stresses and disturbances as a result of social, political, and environmental change.</td>
</tr>
<tr>
<td>Paton et al. (2000)</td>
<td>Resilience describes an active process of self-righting, learned resourcefulness and growth — the ability to function psychologically at a level far greater than expected given the individual’s capabilities and previous experiences.</td>
</tr>
<tr>
<td>Buckle et al. (2000)</td>
<td>Resilience is the quality of people, communities, agencies, and infrastructure that reduce vulnerability. Not just the absence of vulnerability rather the capacity to prevent or mitigate loss and then secondly, if damage does occur to maintain normal condition as far as possible, and thirdly to manage recovery from the impact.</td>
</tr>
<tr>
<td>Pelling (2003)</td>
<td>Resilience is the ability of an actor to cope with or adapt to hazard stress.</td>
</tr>
<tr>
<td>IFRC (2004)</td>
<td>Resilience is the capacity to survive, adapt and recover from a natural disaster. Resilience relies on understanding the nature of possible natural disasters and taking steps to reduce risk before an event as well as providing for quick recovery when a natural disaster occurs. These activities necessitate institutionalized planning and response networks to minimize diminished productivity, devastating losses and decreased quality of life in the event of a disaster.</td>
</tr>
<tr>
<td>UNISDR (2005)</td>
<td>Resilience is the capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which the social system is capable of organizing itself to increase this capacity for learning from past disasters for better future protection and to improve risk reduction measures.</td>
</tr>
<tr>
<td>Paton &amp; Johnston (2006)</td>
<td>Resilience is a measure of how well people and societies can adapt to a changed reality and capitalize on the new possibilities offered.</td>
</tr>
<tr>
<td>Maguire &amp; Hagan (2007)</td>
<td>Social resilience is the capacity of social entity e.g. group or community to bounce back or respond positively to adversity. Social resilience has three major properties, resistance, recovery, and creativity.</td>
</tr>
<tr>
<td>Twigg (2007)</td>
<td>System or community resilience can be understood as the capacity to: 1) anticipate, minimize and absorb potential stresses or destructive forces through adaptation or resistance 2) manage or maintain certain basic functions and structures during disastrous events 3) recover or ‘bounce back’ after an event</td>
</tr>
</tbody>
</table>

Table 3 - Definitions of resilience in the field of field of disasters and hazards

As mentioned in Section 1, this dissertation adopts the definition of resilience proposed in in the Hyogo Framework for Action (UNISDR, 2005). This definition is adopted for the following reasons:

- It has been accepted and adopted by 168 members of the United Nations (UNDP, 2013).
• It is universal definition encompassing “systems, community or society”
• It is risk based definition referring to “hazards” and “risk reduction” which aligns with the concept of resilience as a risk management problem adopted by this paper.
• It specifically refers to the “social system” as being the focus for attention which aligns with the concept of resilience as a social systems problem adopted by this paper.

3.2.2 Disaster Risk Reduction

DRR concerns disaster prevention, mitigation, preparedness and relief and the need to integrate control measures into development policies and plans at local, national and international levels (UNISDR, 2014).

As mentioned in Section 1, the Hyogo Framework for Action (UNISDR, 2005) popularised the term “resilience” in a DRR context in response to the terrible losses associated with the Indian Ocean Tsunami in 2004. This development is part of an evolution of the DRR concept over a period of decades prompted by multiple disasters and the human suffering they created. The United Nations Office for DRR (2014) describe the following as landmarks in the development of international policy for DRR:

• Creation of the United Nations Disaster Relief Office in 1971
• Designation of the 1990s as the “International Decade for Natural Disaster Reduction”
• Adoption by the United Nations of the “Yokohama Strategy and Plan of Action for a Safer World: Guidelines for Natural Disaster Prevention, Preparedness and Mitigation” in 1994 (UN, 1994)
• Creation of the “International Strategy for Disaster Reduction” in 2000

The Yokohama Strategy states; “Disaster prevention, mitigation, preparedness and relief are four elements which contribute to and gain from the implementation of sustainable development policies...Disaster response alone is not sufficient, as it yields only temporary results at a very high cost. We have followed this limited approach for too long” (UN, 1994). In this way, Yokohama Strategy broadens the scope of disaster management significantly from “response” to “prevention, mitigation, preparedness and relief”.

Building on the Yokohama Strategy, the “Hyogo Framework for Action : Building the Resilience of Nations and Communities to Disasters” promotes the importance of disaster risk
reduction efforts at the level of the community. In this way Hyogo Framework of Action further broadens the disaster risk reduction agenda. The five pillars of the Hyogo Framework for Action are: (1) Governance: organizational, legal and policy frameworks, (2) Risk identification, assessment, monitoring and early warning (3) Knowledge management and education; (4) Reducing underlying risk factors; and 5) Preparedness for effective response and recovery (UNISDR, 2005).

As indicated by the Hyogo agreement, the international community aspires to disaster prevention, mitigation, preparedness as well as humanitarian relief. However there remains a gap between intentions and practice as measured by the funding that disaster risk reduction receives in contrast to humanitarian relief. This is illustrated by the funding provided by the European Commission Humanitarian Office (ECHO), the world's biggest donor of humanitarian aid who provide more than 50% of humanitarian aid worldwide. The ECHO budget for humanitarian aid in 2012 was EUR 977 million. Of that budget 96% was spent in humanitarian relief with only 4% invested in DRR. This is despite ECHO’s own recognition that DRR is a more cost effective way to reduce disaster losses (ECHO, 2012).

Funding limitations also limit the work of the Non-Governmental Organisations (NGOs) on DRR activities. DRR can be characterised as both a developmental and emergency type activity and as such can be funded from both emergency budgets and developmental budgets. However the respective funding bodies often see DRR as the funding responsibility of the other party and as a result DRR funding has been marginalised (Benson, 2001). In addition, NGOs disaster appeals often focus on narrowly defined post disaster humanitarian needs. This makes such funds inflexible for other applications like DRR (Benson, 2001).

3.2.3 Community Resilience

Resilience can be addressed at different levels from the individual level to the level of global society as depicted in the Figure 4 below.
Sanderson (2010) and O’Rourke (2007) consider that the most useful unit of resilience is typically the community. In 2004, the International Federation of the Red Cross demonstrated their interest in this domain publishing; “World Disaster Report: Focus on Community Resilience” (IFRC, 2004).

Community based disaster prevention is an increasingly important element of disaster management and a move away from top down interventionist approaches (Allen, 2006). Allen (2006) suggests, “Potentially, community-based approaches are a fundamental form of participant empowerment and a compelling mechanism for enforcing the transmission of ideas and claims from the bottom up. In addition to the ethics underpinning community-based approaches, their growth is also attributable to their relative cost-effectiveness and the preference of many donors to fund initiatives with a community-based component.”

Masing (1999) identifies a number of advantages of community based approaches: 1) they are intended to strengthen coping and adaptive capacities at the level where the hazards are experienced, 2) they build on the existing local knowledge, resources, coping and adaptive capabilities, 3) local capacities and institutions already in place provide a foundation for improvement 4) local people are empowered to become more self-reliant.

The primary weakness of community-based approaches rests in the relative lack of resources and decision-making, legislative and regulatory powers available at the local-level (Allen, 2006). Community based projects should therefore be viewed as part of a broader change process and should not in isolation from the social, economic, cultural and political context within which they are embedded (Eade, 1997).
3.2.4 The Characteristics of Resilient Communities

A recent development in research on community resilience has been the work by Twigg (2007) and IFRC (2011) on the characteristics of resilient communities. This research has been done by conducting interviews with a large number of community workers and community members in the field. Twigg describes 167 characteristics within the framework in Table 4 below. The IFRC (2011) study conducted by Arup International Development identified 68 summary characteristics.

<table>
<thead>
<tr>
<th>Thematic Areas</th>
<th>Components of Community Resilience</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Governance</td>
<td>• Policy, planning, priorities and political commitment</td>
</tr>
<tr>
<td></td>
<td>• Legal and regulatory systems</td>
</tr>
<tr>
<td></td>
<td>• Integration with development policies and planning</td>
</tr>
<tr>
<td></td>
<td>• Integration with emergency response and recovery</td>
</tr>
<tr>
<td></td>
<td>• Institutional mechanisms, capacities and structures; allocation of responsibilities</td>
</tr>
<tr>
<td></td>
<td>• Partnerships</td>
</tr>
<tr>
<td></td>
<td>• Accountability and community participation</td>
</tr>
<tr>
<td>2. Risk Assessment</td>
<td>• Hazards/risk data and assessment</td>
</tr>
<tr>
<td></td>
<td>• Vulnerability/capacity and impact data and assessment</td>
</tr>
<tr>
<td></td>
<td>• Scientific and technical capacities and innovation</td>
</tr>
<tr>
<td>3. Knowledge and Education</td>
<td>• Public awareness, knowledge and skills</td>
</tr>
<tr>
<td></td>
<td>• Information management and sharing</td>
</tr>
<tr>
<td></td>
<td>• Education and training</td>
</tr>
<tr>
<td></td>
<td>• Cultures, attitudes, motivation</td>
</tr>
<tr>
<td></td>
<td>• Learning and research</td>
</tr>
<tr>
<td>4. Risk Management and Vulnerability Reduction</td>
<td>• Environmental and natural resource management</td>
</tr>
<tr>
<td></td>
<td>• Health and well being</td>
</tr>
<tr>
<td></td>
<td>• Sustainable livelihoods</td>
</tr>
<tr>
<td></td>
<td>• Social protection</td>
</tr>
<tr>
<td></td>
<td>• Financial instruments</td>
</tr>
<tr>
<td></td>
<td>• Physical protection; structural and technical measures</td>
</tr>
<tr>
<td></td>
<td>• Planning régimes</td>
</tr>
<tr>
<td>5. Disaster Preparedness and Response</td>
<td>• Organizational capacities and coordination</td>
</tr>
<tr>
<td></td>
<td>• Early warning systems</td>
</tr>
<tr>
<td></td>
<td>• Preparedness and contingency planning</td>
</tr>
<tr>
<td></td>
<td>• Emergency resources and infrastructure</td>
</tr>
<tr>
<td></td>
<td>• Emergency response and recovery</td>
</tr>
<tr>
<td></td>
<td>• Participation, voluntarism, accountability</td>
</tr>
</tbody>
</table>

Table 4 – Framework for the characteristics of disaster resilient communities (Twigg, 2007)

The Red Cross has taken a leading role in the development of this research on characteristics and was a contributor to the Twigg (2007) characteristics and sponsor of the IFRC (2011) characteristics. Both these sets of characteristics are described in full in the cross reference in Appendix 7.2.

Mayunga (2009) comments: “Twigg (2007) has taken the concept of disaster resilience to a new level by proposing the guidelines for identifying basic characteristics of a disaster resilient community; however, the work is still in progress.”
3.2.5 The Concept of Vulnerability

As I researched the concept of resilience I discovered that the concept of vulnerability was a closely related and more established construct, on which there was a large body of research. This section reviews some of the important aspects of the vulnerability concept which is important to inform the concept of resilience.

The Pressure and Release (PAR) model suggests that disaster risk is a function of two opposing forces: 1) the processes generating vulnerability, and 2) physical exposure to the natural hazard (Blaikie, 1994). Stated simplistically:

\[
\text{Disaster Risk} = \text{Hazard} + \text{Vulnerability} \quad \text{(or R = H + V)}
\]

The name of the PAR model refers to the “pressure” created by the hazard the “release” of pressure through efforts to reduce vulnerability. The model suggests that the degree of loss associated with a natural disaster is a function of the severity of the hazard, the exposure to the hazard and how vulnerable the community is. The severity of a natural hazard cannot be controlled and established communities have limited options in reducing their exposure to natural hazards for example if they are located in an area where flooding is prevalent. It is therefore essential to understand the nature of vulnerability and what causes it in order to reduce vulnerability. As far as possible, improvement actions should be taken to address the root causes of vulnerability to reduce disaster losses.

Vulnerability may be defined as “the characteristics of person or group in terms of their capacity to anticipate, cope with, resist and recover from the impact of a natural hazard” (Blaikie, 1994). The sources of vulnerability are based in social processes and other underlying causes as outlined in Figure 5. On the left of the figure are the “root causes” of vulnerability. These are concerned with how power is distributed within a society. Communities who are economically marginal tend to have marginal importance to those with economic and political power (Blaikie and Brookfield, 1987). The next stage in the model is “dynamic pressures” which refers to the process or activities which translate roots causes into unsafe actions. These include reduced access to resources and global pressures like population growth, urbanization, war, epidemic disease and climate change. (Blaikie, 1994). For example, the prevalence of disease will reduce people’s basic health and nutrition which makes them more vulnerable to hazards. Dynamic pressures also include social processes like local institutions, training, and local investments. If these are inadequate then this will also result in unsafe conditions. The third block in the model is “unsafe conditions” which refers to the specific conditions that make communities more exposed to natural hazards. This may
include living in locations where flooding is prevalent or engaging in insecure livelihoods. These unsafe conditions interact with the natural hazards to determine the level of disaster risk and loss than a community is subject to (Blaikie, 1994).

Figure 5 - Pressure and Release Model: The Progression of Vulnerability (Blaikie, 1994)

It is relatively easy to identify unsafe conditions because they are apparent in the communities themselves. It is however difficult to track the causation of unsafe conditions to particular dynamic pressures and root causes. This is partly because of the complexities of the social, environmental and economic systems involved. However Blaikie (1994) suggests it is also partly because policy makers are not asking the right questions. Failure to properly understand the causation of vulnerability will mean that improvement actions are addressed at the symptoms of vulnerability rather than its causes. Until the causes are addressed vulnerability will persist. From the perspective of building community based resilience, the PAR model suggests it is necessary to work as far as possible to the left of the model. In practice this will mean trying to ensure adequate social processes (dynamic pressures) which will in turn reduce unsafe conditions and therefore disaster losses.

An alternative model for vulnerability is the “access model”, which describes how variation in the access to resources and rights between different groups has a significant impact on the relative losses they suffer from natural hazards and the time it takes them to recover. The
access model can be illustrated by the following narrative taken from the work by Winchester (1992).

Two families live in a low lying area of Andhra Pradesh, Southern India which is periodically struck by cyclones. The first family is relatively wealthy and has a brick house, 6 cattle and 3 acres of paddy fields. The family runs a small grain business, has some savings and their own truck. The second family is relatively poor. They have thatch and pole house, one oxen, one calf and half an acre of poor unirrigated land. The cyclone strikes. The first family has a radio and hear the cyclone warning. They are able to pack their valuables and their family into the truck and leave to a safe area. The storm partly destroys their house and takes off the roof. Three cattle are drowned, their fields are flooded and the crops destroyed. The second family receive no warning and do not evacuate. The youngest child in their family is drowned. They lose their house completely. Both their animals are drowned and their crops ruined.

The first family returns and uses their savings to rebuild their house within one week. They replace their cattle and are able to plough their land when the water recedes. The second family have lost less in monetary terms. However they have no savings to replace their house. They are forced to borrow money from a money lender at exorbitant rates. They eventually replace the calf. They have to hire bullocks to plough their field which they do late in the season because many others are in the same position and draught animals are in short supply. As a result the family suffers a hungry period for 8 months after the cyclone.

This anecdote illustrates how access to information, cash, rights, the means of production, tools and equipment, and the social networks to access resources from outside the household contribute to vulnerability. Access to resources is often related to social and economic demographics concerning gender, ethnicity, class, status and age. This means that access to resources is not equally distributed between all people (Winchester, 1992). The access model highlights how income inequality in particular has a major influence on the relative vulnerability of different groups.

There is a concern that many communities around the world are becoming increasing vulnerable because of the dynamic pressures mentioned above working in combination. For example urbanisation in coastal areas not only puts communities at greater risk of flooding which is exacerbated by sea level rise. In addition the activities of the communities often result in weakening existing defence systems e.g. cutting down mangroves or deforestation (Mayunga, 2009). There is evidence that although the number of natural disasters is not
increasing significantly, there is a continuing rise in the economic cost of accidents and this may be due to the increase vulnerability (Guha-Sapir, 2013).

Climate change experts suggests that the frequency and intensity of natural hazards is increasing in some regions as described above. In many of those same regions vulnerability is increasing. If disaster risk is a function of hazard and vulnerability (Blaikie, 2004) this suggests disaster losses may be increasing at a faster rate than one might expect based on climate change effects alone. The increase vulnerability and disaster losses has led to a significant shift in hazard research from the emphasis on vulnerability to an emphasis on understanding how to make communities more resilient to disasters (Mayunga, 2009).

### 3.2.6 Vulnerability and Resilience

The terms “vulnerability” and “resilience” are very similar concepts with different origins and slightly different focusses (Miller, 2010). The term “resilience” has positive connotations and emphasizes learning, transformation and improvement. In contrast, “vulnerability” has negative connotations, emphasises the limitations of individual agency and is able to identify the socio-political dimensions that prevent progressive changes from occurring (Miller, 2010). It is suggested that research on resilience and vulnerability should converge to strengthen society’s ability to solve real world problems and there is an urgent need to translate complex conceptual insights into practical operational methodologies and integrated vulnerability and resilience assessments tools (Miller, 2010). It is hoped that this research will contribute to the development of practical operational methodology for improving community resilience.

### 3.2.7 Risk Management: Barrier Based Approach

In reviewing the literature on resilience and vulnerability above, I found many parallels with my own field of risk management but I was surprised to see that well established risk management concepts that seemed relevant, were not mentioned. This was therefore an opportunity for me to add the body of knowledge on resilience by linking it to risk management concepts I know well. Below I have therefore summarised two foundations of safety risk management literature which I believe apply to community resilience domain.

The barrier based risk management concept suggests that what prevents a hazard propagating to become a loss, are a series of barriers (Reason, 1997). These barriers can be considered to be like slices of Swiss cheese, containing lots of holes. The holes represent the fact that no barrier is entirely reliable. If a system has multiple barriers it is less likely that all the holes will line up and the hazard will propagate to become a loss.
These barriers may be considered to be in a range between “hard barriers” for example physical barriers like walls or alarm systems and “soft barriers” or “people barriers” like safe practices or safe behaviour. In between these extremes are various other types of control which depend on to a greater or lesser extent on technical and human systems respectively. Barrier based safety management has become the standard way to model and manage risks in the major hazard industries.

If we were to apply the barrier concept to the domain of community resilience, I suggest a resilient community would have multiple barriers or layers of protection as depicted in Figure 6.

![Figure 6 – Layers of Protection for a Resilient Community](image)

A vulnerable community would have fewer barriers against hazards as depicted in Figure 7.

![Figure 7 – Layers of Protection for a Vulnerable Community](image)

### 3.2.8 Risk Management: Loss Prevention

In the 1960s, Frank Bird a pioneer in the field of safety management undertook an accident causation study of 2 million accidents. He used the resulting learnings to develop the Loss Causation Model shown in Figure 8 (Bird et al, 1985). This describes a systematic approach to understand how losses occur and how to make the required improvements to reduce such
losses.

Figure 8 – Loss Causation Model (Bird et al, 1985)

Read from right to left, this model is a powerful incident investigation tool for the organization to analyse and learn from loss events, tracing the causation down to the basic causes and systems failure. Reading from left to right, the model becomes a powerful loss prevention model showing that by replacing inadequate systems with adequate systems one can eliminate the basic and immediate causes of potential accidents and reduce loss events.

The loss causation model can be applied to individual barriers in the barrier management model to determine the systems failing for each barrier. Improvement actions can then be taken to improve the underlying systems to change a failed barrier into a healthy barrier capable of preventing a loss event.

An important outcome of this model is that to reduce loss events, one must work as far as possible to the left hand side of the model and try to address the system failure. It is interesting to compare the Loss Causation Model with the PAR model described above which also requires one to work as far as possible to the left hand side of the model to reduce the vulnerability of communities. This similarity supports the idea that loss prevention and barrier management principles are applicable in the domain of community resilience.

3.3 Data Collection and Analysis

3.3.1 Developing the Resilience Framework

In August 2013 I was invited by the IFRC to attend a 2 day workshop for Asia Pacific Red Cross in Kuala Lumpur. The IFRC were conducting 5 such regional workshops to engage with Red Cross National Committee representatives on an update to their “Framework for Community Resilience” and “Road to Resilience” policy documents. They were inviting me to provide an independent risk management perspective. At the same time IFRC were allowing me to use this as an opportunity to advance my own research in the hope this would
also benefit them. This offered me a good opportunity to learn more about the Red Cross issues with respect to community resilience as well as hopefully give them some helpful input to their process. It also offered me two days to mix with Red Cross personnel, many of whom had deep first-hand knowledge about building resilience in vulnerable communities and test out my emerging ideas.

I decided to try to draw together the various literature I had reviewed to make my own high level framework of the characteristics resilient communities. The resulting framework was based on the 5 element structure used in the Hyogo Framework for Action (2005) and by Twigg (2007). I prepared a semi-structured questionnaire to test this new framework which is shown in Appendix 7.1

In September 2013 I joined the workshop in Kuala Lumpur which was attended by 20 senior managers from the Red Cross drawn from Australia, China, Indonesia, Japan, Mongolia, Nepal, Solomon Islands, Fiji, Thailand, Vietnam, France, Norway, Finland, America, Switzerland and UK. I participated in the two day programme which consisted of presentations followed by small group work and feedback sessions to review draft documents already prepared. I was the only non Red Cross person attending. I was an active participant in the process and was pleased to find that my risk management background and my reading and exposure on the community resilience over the previous months, allowed me to be a credible participant. The photo below shows me feeding back our group’s work after one exercise.

Figure 9 - Red Cross Community Resilience Workshop

In addition to my participation in the formal workshop, I was successful in arranging one interview after the workshop with the delegate from the Norwegian Red Cross. This consisted
of an in depth interview lasting 2 hours. The interview was recorded and later transcribed. I also had a number of informal meetings with other delegates with whom I was able to share some of my ideas about applying risk management principles to community resilience. Several of these delegates expressed an interest in these ideas and offered to participate in my ongoing research activity. In particular the delegate from the Fiji Red Cross offered to pilot a new approach for assessing community resilience.

My conclusions from the meeting were that the Red Cross had the following community resilience tool and methodology development needs:

- Supplement existing Red Cross methodologies by developing a holistic assessment for community resilience providing Red Cross field personnel with a sound basis for programming their activities and the activities of other development partners. This assessment should be sophisticated enough to penetrate the complexity of the topic and yet simple enough to be delivered potentially by Red Cross volunteers with limited training and resources. The assessment should be useable as a monitoring and evaluation tool to assess the extent to which resilience had changed following development projects.
- Given the broad nature of community resilience and the limited time and resources available, Red Cross personnel had difficulty in knowing what issues were important and should be measured. There was a need therefore to clarify what resilience issues to measure and try to influence in order to create maximum benefit for communities.
- Provide clarity on the role of the Red Cross relative to other stakeholders
- Develop simple tools using straightforward language which can be easily communicated and translated
- Include the “characteristics of resilience” approach within Red Cross policy documents and tools.

Back in the UK, I worked to update my framework and approach based on these learnings. I employed the principles of constant comparison to identify concepts, group these concepts into categories, and refine these categories into findings (Bryman and Bell, 2011). This process was repeated as I read new literature, analysed my interactions with Red Cross colleagues and reflected on my activities. In this way my framework of the characteristics of community resilience evolved in an iterative fashion.

On several occasions, a single comment from a knowledgeable person would change my perspective on a key issue or add a new issue for consideration. For example, in my interview with the Norwegian Red Cross professional in Kuala Lumpur, she described her humanitarian
relief work in a refugee camp in Honduras for 1.5 years in 1998 following the destruction from Hurricane Mitch. She commented;

“We started the process of impressing on them the need to organise themselves. This project was called ‘Strengthening the Community’ and was all about getting them organised. When we arrived, there was nothing there. When we left there was a water and sanitation committee, there was a health committee, there was an education committee, there was an economic activities committee and all of these committees were taking care of the community based health and sanitation issues...There is governance in a way because having these committees provides governance.”

I knew from the literature that good governance was an important community resilience issue. This aligned with my own experience of the importance of good leadership in effective safety management. From experience in assessing safety management, I knew that governance structures were not only important for their own sake, they were also necessary in order to find the correct people to interview in an assessment. Interestingly I had found practically no references in the resilience literature or Red Cross materials about need to set up committees. From this interview, I had the idea that community governance may be done as a series of community led committees. I was then able to explore this idea further in subsequent research.

Another important insight from this interview was that certain issues may be considered important as resilience development issues in general but because the context or maturity of the community, they may not be relevant at that time. For example setting health improvement goals might be a good idea in general but if community members spend their time searching for their next meal in order to survive, then such considerations are irrelevant to them. This is reflected in the Norwegian Red Cross professional’s comment; “For these people who are in a very vulnerable and unstable situation, the time perspective does not exist. To introduce the idea of work for the future is very difficult.” This highlighted the need for any community resilience assessment to be sensitive to the context, needs and wishes of the community itself.

### 3.3.2 Bow Tie Barrier Analysis

As a parallel activity I commissioned one of my risk analyst colleagues in DNV GL to undertake a “Bow Tie Barrier Analysis” using a Red Cross vulnerability study of a flood in the Caribbean. Bow Tie Barrier Analysis is a risk analysis technique used in the major hazard industries based on the barrier management concept outlined in the literature section above. The result is shown in Figure 10. This analysis shows the barriers needed to prevent the flood
from happening on left hand side of the bow tie. On the right hand side, are the barriers to reduce the consequences of the flood if it happens. Typical safety management practice in major hazard industries is to maximise one’s efforts in prevention i.e. on the left hand side of the bow tie. It is important to note that not all “events” become “loss events”. A “loss event” only occurs when an exchange of energy exceeds the threshold of the relevant structure (Bird et al, 1985). This is important in a natural disaster context because it is not possible to prevent natural hazards like a high precipitation event from happening. It is however possible to stop this “event” from becoming a “loss event” for example by ensuring key buildings and crops are not in flood zones, and river embankments and drainage systems are maintained in good condition. Preventing the loss event in the first place is clearly preferable in terms of reducing human suffering, environmental and property damage. It is also generally more cost effective in the long term. This analysis indicated however that the Red Cross mainly identify barriers on the right hand side of the bow tie designed to reduce the consequences of a flood rather than preventing it from happening. I and my colleagues were surprised to see this bow tie weighted heavily on the right hand side because it represented the inverse of typical industrial safety bow tie which is weighted heavily on the left hand side. This dramatic difference I considered highlighted a considerable gap in loss prevention thinking within the Red Cross’s current practices.
My experiences described above had given me confidence that my decision to focus on the “characteristics of community resilience” had been worthwhile. I had tested the high level community resilience framework I had made and although there were many improvement areas identified, the basic concept had been successful. I now decided to try to make a more detailed framework drawing together the various literatures I had identified while being mindful of the complexities I had uncovered and the need for any assessment to be sensitively applied.
It was my goal not only to describe the characteristics of resilience communities but also to use this information to make an assessment tool. I knew from my own experience designing safety management assessment tools that much care had to go into the design of each question or statement to make it simple, practical and effective in application. In particular I wanted to express the characteristics as a set of “good practices” that could be simply understood by Red Cross professionals and community members so they could be simply adopted if helpful, rather than as a desirable set of outcomes which did not explain what activities were needed to secure these outcomes. This intention was born out of my experience writing safety management assessment tools and informed by research on the use of process and outcome indicators (Mant, 2001). The main advantage of using process indicators (practices) in an assessment tool is that if the score for that indicator is zero, it is immediately clear what is to be done in order to gain credit in the future. This is not the case if using outcome indicators. The main difficulty in using process indicators in an assessment tool is that there should be evidence that the presence of that practice will positively influence the desired outcome indicators (Mant, 2001). A criticism of the Twigg (2007) and IFRC (2011) characteristics is that they are mixture of process indicators, outcome indicators and other issues related to community resilience which make them a valuable form of guidance but inappropriate for direct use as an assessment tool.

To help me in pulling this diverse information together I drew on structure and content from ISRS (DNVGL, 2009). I selected ISRS as a framework because it is a comprehensive and mature risk management framework with which I was very familiar. Using this approach I developed two documents. The first document was my interpretation of the characteristics of community resilience. This was expressed as a set of practices or process indicators in a matrix which could be printed on one double sided A3 page, which I called the Community Resilience Alpha Assessment (CRAA). My intention was that this would be a simple and practical guidance or assessment tool that Red Cross workers could use with communities in the field. The second document was a cross reference between the CRAA and the Twigg (2007) and IFRC (2011) characteristics which was intended as further guidance for practitioners to support the assessment or implementation of the practices in CRAA. The hoped for advantage of structuring the information in this way was that a manageable set of relatively simple and understandable practices in a “one page” assessment tool were supported by more comprehensive guidance informing the assessor or community member the intent behind the practice and as well as guidance on how the practices could be implemented.
3.4 Conclusions

The purpose of the first action research cycle had been to answer the research question “what are the characteristics of resilient communities?” The proposed answer to this question is described in several parts.

The principal conclusion is the characteristics of resilient communities framework shown in Figure 11. The 125 statements in the framework are intended as a set of “good practices” or process indicators for community resilience. Designed for use as an assessment tool, this CRAA framework is structured using 9 elements organised in a continual improvement loop starting with “Leadership” and concluding with “Review and Improve”. In this way the application of the framework within a community incorporates action research principles. As mentioned in the literature review for action research, continual improvement approaches like PDCA and Six Sigma are internationally adopted for the risk management domains of safety management, environmental management and quality management. I propose that the vulnerable communities should draw on this experience and aspire to each develop a “Community Resilience Management System” (CRMS) to manage the hazards to which it is subject. The CRAA tool may be used to assess the extent of the CRMS.

A second conclusion is that previous research on the characteristics of resilient communities by Twigg (2007) and IFRC (2011) are mixture of process indicators, outcome indicators and other issues related to community resilience. This makes them valuable as a form of guidance, but inappropriate for direct use as an assessment tool.

The third conclusion is the cross reference between CRAA and the other characteristics frameworks shown in Appendix 7.2. This document gives a comprehensive picture of the research on characteristics of resilience communities to date showing both “good practices” (process indicators) and their desired outcomes. This cross reference is intended as guidance to support the application of the CRAA.

A fourth conclusion is that existing NGO approaches to measure community resilience are weak in loss prevention thinking. The application of risk management approaches like barrier thinking and loss causation which are the foundation of modern safety management practice will result in more holistic and effective assessments of community resilience.

A fifth conclusion was that community committees are the principal means of providing community led governance which is an essential characteristic of resilient communities, and yet the Red Cross’ VCA methodology currently does not focus on this issue beyond setting up “disaster committees”.
Figure 11 – Community Resilience Alpha Assessment – The Characteristics of Resilient Communities

See the following two pages.
<table>
<thead>
<tr>
<th>1 Leadership</th>
<th>2 Communication</th>
<th>3 Legislation</th>
<th>4 Health</th>
<th>5 Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 VISION AND GOALS</td>
<td>2.1 COMMUNICATION SYSTEM</td>
<td>3.1 LEGISLATION</td>
<td>4.1 HEALTH COMMITTEE</td>
<td>5.1 EARLY CHILDHOOD EDUCATION</td>
</tr>
<tr>
<td>1.1.1 The community has a defined vision addressing long term risk reduction</td>
<td>2.1.1 Community uses appropriate channels to communicate with external stakeholders e.g. meetings, personal visits, newsletters, mobile phone.</td>
<td>3.1.1 A system is in place to identify applicable legislation e.g. health and safety, environmental, employment, trade, building</td>
<td>4.1.1 The community has a health committee managing the community’s health and safety programmes</td>
<td>5.1.1 A system is in place to provide early childhood education to all community members aged 0 to 8 years</td>
</tr>
<tr>
<td>1.1.2 The community has defined goals for risk reduction</td>
<td></td>
<td>3.1.2 Relevant information on legislation is communicated to community members</td>
<td>4.1.2 A member of the health committee has been appointed with overall responsibility for the health of the community</td>
<td>5.1.2 Early childhood education curriculum is comprehensive (and in line with UNESCO guidance)</td>
</tr>
<tr>
<td>1.1.3 Community goals are specific and measurable</td>
<td></td>
<td></td>
<td>4.1.3 The health committee meets regularly</td>
<td>5.1.3 Adequate facilities and resources are available for early childhood education</td>
</tr>
<tr>
<td>1.1.4 The vision and goals have been effectively communicated within the community</td>
<td></td>
<td></td>
<td>4.1.4 The health committee meetings are open to all members of the community to attend</td>
<td></td>
</tr>
<tr>
<td>1.1.5 The vision and goals have been effectively communicated to external stakeholders</td>
<td></td>
<td></td>
<td>4.1.5 The health committee is considered effective by community members</td>
<td></td>
</tr>
<tr>
<td>1.2 COMMUNITY COMMITTEES</td>
<td>2.2 COMMUNITY MEETINGS</td>
<td>3.2 LEGAL RIGHTS</td>
<td>4.2 HEALTH HAZARD IDENTIFICATION AND EVALUATION</td>
<td>5.2 PRIMARY EDUCATION</td>
</tr>
<tr>
<td>1.2.1 The community has a central committee to manage the overall activities of the community</td>
<td>2.2.1 Most community members attend community meetings</td>
<td>3.2.1 Information on their legal rights is communicated to community members</td>
<td>4.2.1 The activities or conditions which may affect the health of community members have been identified</td>
<td>5.2.1 A system is in place to provide primary education to all community members aged 5 to 15 years</td>
</tr>
<tr>
<td>1.2.2 The chairperson of the central committee has been appointed with overall responsibility for the well-being of the community</td>
<td>2.2.2 Community leaders participate in community meetings</td>
<td>3.2.2 Risk reduction efforts are discussed in community meetings</td>
<td>4.2.2 All health hazards have been identified</td>
<td>5.2.2 Primary curriculum is comprehensive (and in line with UNESCO guidance)</td>
</tr>
<tr>
<td>1.2.3 The central committee has representatives from all groups within the community</td>
<td>2.2.3 Risk reduction efforts are discussed in community meetings</td>
<td>3.2.3 Risk reduction partnerships are effective</td>
<td>4.2.3 The potential losses associated with each health hazard have been identified</td>
<td>5.2.3 Adequate facilities and resources are available for primary education</td>
</tr>
<tr>
<td>1.2.4 Central committee meetings are open to all members of the community to attend</td>
<td>2.2.4 Records of community meetings are kept documenting when they were held, who attended and what was discussed</td>
<td></td>
<td>4.2.4 The likelihood of the loss occurring has been evaluated</td>
<td></td>
</tr>
<tr>
<td>1.2.5 The central committee meets regularly</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2.6 The central committee coordinates the activities of all other committees e.g. health, disaster, education, crime prevention, youth development, fire</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2.7 The central committee is considered effective by community members</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.3 STAKEHOLDER ENGAGEMENT</td>
<td>2.3 AWARENESS CAMPAIGNS</td>
<td>3.3 HEALTH CARE</td>
<td>4.3 HEALTH CARE</td>
<td>5.3 POST PRIMARY EDUCATION</td>
</tr>
<tr>
<td>1.3.1 The community has identified its key stakeholders e.g. government, business, Red Cross, NGOs</td>
<td>2.3.1 A system is in place for conducting awareness campaigns</td>
<td>3.3.1 The community has a health care system</td>
<td>4.3.1 The community has a health care system</td>
<td>5.3.1 A system is in place to provide post primary education to all community members aged 10 to 19 years</td>
</tr>
<tr>
<td>1.3.2 The community has regular consultation with key stakeholders</td>
<td>2.3.2 Awareness campaigns address risk reduction issues</td>
<td>3.3.2 Healthcare programmes are available for the health hazards identified in sub process 4.2</td>
<td>4.3.2 Healthcare programmes are available for the health hazards identified in sub process 4.2</td>
<td>5.3.2 Post primary curriculum is comprehensive (and in line with UNESCO guidance)</td>
</tr>
<tr>
<td>1.3.3 Community Leaders ensure stakeholders understand the expectations of the community</td>
<td>2.3.3 Awareness campaigns are planned and conducted on a regular basis</td>
<td>3.3.3 A community nurse has been appointed</td>
<td>4.3.3 A community nurse has been appointed</td>
<td>5.3.3 Adequate facilities and resources are available for post primary education</td>
</tr>
<tr>
<td>1.3.4 The community aligns its activities with the expectations of its stakeholders</td>
<td></td>
<td>3.3.4 The community nurse has adequate training</td>
<td>4.3.4 The community nurse has adequate training</td>
<td></td>
</tr>
<tr>
<td>1.3.5 Risk reduction partnerships are effective</td>
<td></td>
<td>3.3.5 Information on health hazards and controls is available to community members</td>
<td>4.3.5 Information on health hazards and controls is available to community members</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.3.6 Health care system has adequately resources</td>
<td>4.3.6 Health care system has adequately resources</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.3.7 Health records protected from damage or loss</td>
<td>4.3.7 Health records protected from damage or loss</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.3.8 The community has access to a health centre</td>
<td>4.3.8 The community has access to a health centre</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.3.9 Medical surveillance is in place to monitor the health of community members for the hazards identified</td>
<td>4.3.9 Medical surveillance is in place to monitor the health of community members for the hazards identified</td>
<td></td>
</tr>
<tr>
<td>1.4 COMMUNITY RISKS</td>
<td>1.5 COMMUNITY PLAN</td>
<td>1.6 LEADERSHIP COMMITMENT</td>
<td>1.6.1 Community leaders regularly visit the homes and community spaces of individual community members and discuss risk reduction issues</td>
<td>1.6.1 Community leaders regularly visit the homes and community spaces of individual community members and discuss risk reduction issues</td>
</tr>
<tr>
<td>1.4.1 The community has identified the major risks to its well-being e.g. access to safe water, food, sanitation, health services and secure livelihoods</td>
<td>1.5.1 A community planning process is in place</td>
<td>1.6.2 Community leaders discuss and plan risk reduction activities in community meetings</td>
<td>1.6.2 Community leaders discuss and plan risk reduction activities in community meetings</td>
<td></td>
</tr>
<tr>
<td>1.4.2 Community members participate in risk assessment.</td>
<td>1.5.2 The community plan is consistent with goals and includes risk reduction activities</td>
<td>1.6.3 Community leaders are trained in risk reduction topics</td>
<td>1.6.3 Community leaders are trained in risk reduction topics</td>
<td></td>
</tr>
<tr>
<td>1.4.3 The potential losses (people, property, economic, environment) associated with each risk has been identified</td>
<td>1.5.3 The plan is adequately resourced</td>
<td>1.6.4 Community leaders track improvement actions to completion</td>
<td>1.6.4 Community leaders track improvement actions to completion</td>
<td></td>
</tr>
<tr>
<td>1.4.4 The likelihood of the loss occurring has been evaluated</td>
<td>1.5.4 The community has a system to safeguard key documents.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.4.5 Risks are communicated to necessary internal and external stakeholders</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5 COMMUNITY PLAN</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6 Management of Physical Assets

6.1 BUILD
6.1.1 Physical assets/barriers (e.g. buildings, water provision, sanitation, communication embankments, roads, food storage, water storage) have been built to address the risks identified in sub process 1.4.
6.1.2 Physical assets/barriers are built in accordance with building codes/good practice.

6.2 MAINTAIN
6.2.1 The community has a system to maintain the condition and function of its physical assets/barriers.
6.2.2 The community has a list of its physical assets/barriers.
6.2.3 Individuals are assigned responsibility for maintaining each physical asset/barrier.
6.2.4 Physical assets/barriers are inspected on a regular basis to ensure they are in good condition.
6.2.5 Inspection is performed by competent people.
6.2.6 A maintenance programme is developed for key assets/barriers.
6.2.7 Maintenance is performed by competent people.
6.2.8 The maintenance programme has adequate resources.

7 Disaster Preparedness

7.1 DISASTER COMMITTEE
7.1.1 The community has a disaster committee managing the community’s disaster risk reduction programme.
7.1.2 A member of the disaster committee has been appointed with overall responsibility for disaster risk reduction.
7.1.3 The disaster committee meets regularly.
7.1.4 The disaster committee meetings are open to all members of the community to attend.
7.1.5 The disaster committee is considered effective by community members.

7.2 DISASTER NEEDS ASSESSMENT
7.2.1 A comprehensive list of possible disaster scenarios has been developed.
7.2.2 The community has identified its emergency needs based on a risk assessment of potential disasters.
7.2.3 The community has assessed its energy needs based on a risk assessment of potential disasters.

7.3 EMERGENCY PLAN
7.3.1 The community has an emergency plan.
7.3.2 The emergency plan has been communicated to relevant stakeholders.
7.3.3 The emergency plan is regularly reviewed and updated.
7.3.4 Adequate resources are available to implement the emergency plan.

7.4 EARLY WARNING SYSTEM
7.4.1 A system is in place for warning community members of imminent emergencies.

7.5 EMERGENCY COMMUNICATIONS
7.5.1 The community has identified all relevant individuals and groups that need to be contacted in an emergency.
7.5.2 Systems are in place to ensure relevant information is communicated to necessary people in an emergency.
7.5.3 Alternative communication systems are available e.g. backup power source for mobile phones.

7.6 EMERGENCY RESOURCES
7.6.1 Adequate resources are available for emergency preparedness.

7.7 EMERGENCY TEAM
7.7.1 An emergency team is in place to respond to emergency situations.

7.8 DRILLS AND EXERCISES
7.8.1 Drills and exercises of the emergency plan are conducted periodically.

7.9 FIRST AID
7.9.1 The community has appointed and trained sufficient first aiders.

7.10 ORGANISED OUTSIDE HELP
7.10.1 There are partnership agreements with local communities and other organisations to provide people and equipment in the event of an emergency.

8 Risk Management

8.1 SUSTAINABLE LIVELIHOODS
8.1.1 The community has an assessment of the income generation (ways to make money) created by community members.
8.1.2 The community has evaluated opportunities to create new or different ways to generate income to ensure a sustainable income generation.
8.1.3 Improvement actions are implemented to create new or different income generation.

8.2 YOUTH DEVELOPMENT
8.2.1 The community has a youth committee managing the community’s youth development programme.
8.2.2 A member of the youth committee has been appointed with overall responsibility for youth development.
8.2.3 The youth committee meets regularly.
8.2.4 The youth committee meetings are open to all members of the community to attend.
8.2.5 The youth committee is considered effective by community members.

8.3 NATURAL RESOURCE MANAGEMENT
8.3.1 The community has identified the natural resources that are important for the long term well being of the community e.g. water sources, soil, forests.
8.3.2 The community has identified which may impact local natural resources and/or the wider environment.
8.3.3 The environmental impacts associated with each activity has been identified e.g. contamination of water, soil degradation, deforestation, damage to animals and plants.
8.3.4 Good environmental management practices are in place to ensure the preservation of key natural resources.

8.4 FOOD SECURITY
8.4.1 The community has reserve stocks of staple foods for emergency use.
8.4.2 The community has access to a safe water supply in the event of an emergency.

8.5 FINANCIAL SERVICES
8.5.1 Community members have access to financial services e.g. saving accounts, money transfers.

8.6 SOCIAL PROTECTION
8.6.1 The community has a system of social welfare.

8.7 VIOLENCE PREVENTION
8.7.1 The community has implemented a community policing or violence prevention programme.

9 Review and Improve

9.1 LESSONS LEARNED
9.1.1 The community has a learning from events system to learn from unintended events.
9.1.2 The community has identified the types of events to be reported and investigated e.g. fatalities, accidents, near misses, ill health, failure of assets/barriers, property damage, environmental events, substandard conditions.
9.1.3 Reports identify the basic causes of loss and necessary improvement actions.
9.1.4 Investigation reports are communicated within the community and externally.
9.2 REVIEW
9.2.1 The community measures its performance against its goals (sub process 1.1).
9.2.2 Reports of results are communicated to relevant stakeholders.
9.2.3 Actions are identified to improve risk reduction.
9.3 REPORTING TO STAKEHOLDERS
9.3.1 The community reports its performance to its stakeholders (identified in sub process 1.3).
4 Action Research Cycle 2 – Evaluating Community Resilience

4.1 Introduction

The purpose of action research cycle 2 was to pilot the CRAA developed in action research cycle 1 and answer the second research question “how can community resilience be evaluated?”

Following our meeting in Kuala Lumpur, my discussions with the representative of the Fiji Red Cross continued. Eventually it was agreed to undertake a pilot assessment of the new community resilience tool and methodology together with colleagues from Fiji Red Cross. The project would be to test the new approach as well as refine it. My request to Fiji Red Cross was to focus our week’s activity in one or possibly two communities which we could study in detail conducting interviews with multiple members of the same community. Fiji Red Cross proposed instead that we spend 7 days visiting 6 vulnerable communities in urban and rural locations, with various ethnicities, on the two largest islands in Fiji. An advantage of this approach would be to pilot the assessment approach on many different types of community context. A disadvantage would be that we would not spend long in any community so it we would have limited time to collect evidence for the assessment. The result would therefore be a “desktop assessment” or an indicative assessment based on limited verification of evidence.

Fiji was chosen as the location for the pilot assessment because 1) The Chief Operating Office of Fiji Red Cross saw the potential value of the approach and was enthusiastic to learn more about it and help develop it, 2) there are many vulnerable communities in Fiji subject to regular losses due to flooding and cyclones, 3) Fiji is an island nation recognised by the international community as being one of the worst effected by climate change in terms of rising sea level, increased frequency and severity of cyclones and changing patterns of disease, 4) During the Red Cross meeting in Kuala Lumpur it was suggested that Fiji as a nation was more resilient than many because it was so isolated from the rest of the world. This meant that in the event of disasters, the country had to rely on its own resources rather than resources from the international community. From my experience in piloting safety management assessment tools I hoped to test the CRAA framework on a “best practice” resilient community if possible since this would provide the best test of the practices it described, 5) English was one of the official languages spoken in Fiji which would make the communication easier and the data collection more efficient.
In advance of visiting Fiji I conducted a review of literature concerned with the evaluation of community resilience, focussing in particular on the practices of the Red Cross. This work is outlined in the section below. Included in this review is an introduction to some concepts on systems thinking which I had proposed to the Red Cross were relevant to community resilience assessment.

4.2 Literature Review

4.2.1 Vulnerability and Capability Analysis

Vulnerability and Capability Analysis (VCA) is “a participatory investigative process designed to assess the risks that people face in their locality, their vulnerability to those risks, and the capacities they possess to cope with a hazard and recover from it when it strikes” (IFRC, 2007). VCA is the collective name for multiple techniques used by NGOs internationally to assess community vulnerability and resilience. The Red Cross describe their VCA approach as an “action-research framework” consisting of four stages; 1) research: identify/understand problem, 2) develop solutions, 3) implement projects, 4) evaluate and modify solutions. The VCA process is used to 1) create baseline assessments of the various aspects of community resilience, 2) help communities better understand their hazards and the capabilities needed cope with those hazards, and 3) form the basis for Red Cross project planning (IFRC, 2007).

The Red Cross VCA toolbox is set of simplified research processes that Red Cross staff and volunteers can use in the field, describing for example how to collect data from different sources, sort and analyse data and evaluate the outcome of projects. They include research methodologies describing how to:

- review of secondary sources of data
- conduct semi-structured interviews and focus groups
- perform behaviour observations
- undertake hazard mapping
- perform community tours
- organise meetings
- conduct brainstorming
- develop flow diagrams
- prioritise issues.
The Livelihood Analysis tool identifies the primary and secondary livelihoods for each household, the assets and capabilities they possess and what hazards put these livelihoods and assets at risk.

The Community Baseline Assessment tool assesses 139 issues in a checklist under 17 main headings including: location, demographics, local authorities, food, health, housing, water, sanitation, infrastructure, and emergency response.

These diverse tools are provided in the form of templates that VCA team members can copy and use in the field. The simplicity of these templates is a significant advantage of the VCA approach. Another strength is that the VCA is highly flexible in use and most tools can be applied to explore any focus issue e.g. safe water provision, sanitation, health or disaster risk reduction.

However the process orientation of the majority of the VCA tools means that how they are applied is highly dependent on the competence of the assessor and as a result there may be significant variation in the quality of such assessments between individuals. In addition the assessments may miss important issues and have low repeatability. The Red Cross themselves identify these disadvantages as issues and provide guidance on ways to increase the reliability and validity of measurement.

Practical Action, another NGO, has developed a VCA approach specifically focussed on resilience issues entitled “From Vulnerability to Resilience” (Pasteur, 2011). A detailed review of this approach was not made for this study

4.2.2 Measuring the Characteristics of Resilient Communities

Tearfund is a Christian humanitarian relief and development agency. They were one of 6 NGOs in the interagency group working to develop the “Characteristics of Disaster Resilient Communities” (Twigg, 2007). Tearfund are enthusiastic about the “Characteristics” approach to measuring resilience commenting: “Field staff usually look slightly overwhelmed by the document in the first moment. Once they get to it and understand its potential uses, a fairly common consequence is a sudden burst of motivation for further action” (Twigg, 2007).

Tearfund use the Twigg (2007) characteristics as a basis for their own methodology to measure community resilience. To make the measurement practical they reduce the 167 characteristics down to the “top 20 for fast onset hazards” (shocks) and “top 20 for slow onset hazards” (stresses). They suggest that depending on the community context further characteristics should be added as necessary. Group interviews with members of the
community and the characteristics are rated on a scale of 0 to 3, where zero means the characteristic is not in place and 3 means the characteristic is fully in place (Mutengu, 2011). Mutengu (2011) comments that the characteristics framework is generally easy to use, but is overly prescriptive on occasion. He suggests it is necessary to have local input to adapt it to fit particular community contexts.

4.2.3 Resilience Principles, Frameworks and Indicators

Various other literature aims to illuminate the complex issue of measuring resilience. For example the World Food Programme (2014) proposes ten “resilience measurement principles”. USAID (2013) propose a framework for community resilience based on evaluation of: the socio-economic context, shocks, stresses, and community assets within “five capitals”; human, financial, natural, physical, political (based on work by Schumacher (1973) and others). UNISDR (2008) propose a set of indicators for measuring disaster resilience.

These approaches may help to illuminate the concept of resilience, but they typically consider the issue in macro context or at a national or international level. Such models may be valuable for policy makers or academics but they are not suitable for use by practitioners working at community level.

4.2.4 Systems Thinking

Communities are complex systems composed of multiple interdependent social and environmental systems and their behaviour can never fully be predicted or controlled. However system thinking provides us with some principles and tools to help us address the complexity and make progress. (e.g. Gunderson and Holling (2002), Robèrt (2008))

In her book, Dancing with Systems, Donella Meadows (2004) comments; "Self-organizing, nonlinear feedback systems are inherently unpredictable. They are not controllable. They are understandable only in the most general way… We can't impose our will upon a system. We can listen to what the system tells us, and discover how its properties and our values can work together to bring forth something much better than could ever be produced by our will alone. We can't control systems or figure them out. But we can dance with them!"

Meadows (2004) proposes 14 “system wisdoms” which she believes apply universally. 5 of these principles I suggest are particularly relevant for the assessment of community resilience:

1. Get The Beat. Before you disturb the community watch how it behaves and learn its history. Consider not only 'what's wrong?' but also to 'how did we get here?'
2. *Listen to the Wisdom of the System*. Aid the forces and structures that help the community run itself. Don't be an unthinking intervener and destroy the communities own self-maintenance capacities.

3. *Honour Information*. A decision-maker can't respond to information he or she doesn't have. Create new information streams about important aspects of the community’s activities.

4. *Locate Responsibility in the System*. Look for the ways the community creates its own behaviour. Avoid blaming or trying to control outside influences. Rather focus on the easier task of increasing responsibility and empowerment within the community.

5. *Go for the Good of the Whole*. Try to see the whole community system. Sometimes, especially in the short term, changes for the good of the whole community may be counter to the interests of a part of the community. Be prepared to cross disciplines to get a holistic perspective.

Principle 1 suggests that we should start any community resilience assessment with a stakeholder engagement activity to identify what issues are most material to the community.

Principle 2 suggests we should work hard to understand how the community system works and build up what works. We may offer the community a menu of good practices but the community should determine which good practices to implement and how to do so.

Principle 3 suggests that if we measure the right issues that will tend to put more focus on these issues. Mant (2001) suggests we focus on process indicators or practices rather than outcomes.

The resilience of communities is dependent on a number of actors including local government, business and NGOs and it is easy to blame others for community vulnerability e.g. lack of water or sanitation infrastructure, power or roads. While others have a role to play, Principle 4 suggests communities focus their activities on their own sphere of influence seeking to empower themselves to greater self-reliance.

Principle 5 reminds us that communities are complex systems and we must take a holistic approach to system improvement and avoid reductionism. This means that assessments should be done by cross disciplinary teams where possible and individuals should push themselves out of their comfort zones and work across domains e.g. community leadership, health, education, disaster risk reduction and management of physical assets.
4.3 Data Collection and Analysis

4.3.1 Introduction to Field Work

I arrived in Fiji in March 2014 just as a tropical cyclone was leaving the country. Major flooding had occurred in several of the communities I was planning to visit and there was a dengue fever outbreak across the country. The communities I visited are shown in Figure 12.

Figure 12 – Communities visited in Fiji

Chris Ho, the Chief Operating Officer of Fiji Red Cross joined me for the whole week and assisted me on every interview. He had planned all our visits in advance and engaged the help of his local Red Cross volunteers to host us in each community. The community leaders and government officials had been contacted in advance to request access to the communities and give up their time to be interviewed. I conducted 18 interviews during the course of the week. The interviews were with village heads (known as Turaganikoro in Fiji), village nurses, disaster committee members, government officials and Red Cross volunteers. Some of these interviews had been planned and others I conducted on an opportunistic basis. The main interviews with village heads and government officials I recorded on my mobile phone once I had received permission from the individuals concerned. I also took interview notes.

4.3.2 Community Resilience Alpha Assessment

The CRAA began with interviews of knowledgeable people within the community. Each interview would begin with the local Red Cross representative thanking the person for agreeing to be interviewed and explaining what the project was about. In every case the local
Red Cross representative had an excellent relationship with the community representative and it was clear to me that it was because of this relationship and their evident respect for the Red Cross, that they had agreed to be interviewed. The interviews with government officials and Red Cross personnel were conducted in English. All the interviews with village heads except one, were conducted in local Fijian dialect and my questions were translated by the local Red Cross volunteer. The interviews lasted between 30 minutes and 2 hours.

I would generally ask three questions to “warm up” the interviewee and to set the context. Firstly I would ask the interviewee to explain their role and responsibilities. I would then ask what the major hazards or problems were affecting their community and follow up questions to get them to elaborate on the nature of the hazards and their consequences e.g. what happened when it flooded, how high did the water come and how quickly, how long did it take to subside, how many times a year was flooding happening, what were the typical losses etc. My last warm-up question was what the community did to cope with these events. I then used the first draft of the CRAA as a semi structured questionnaire. To make the interview as conversational as possible, I would try to pick sections from the CRAA based on topics mentioned by the interviewee. Informed by their comments to my opening questions, I would try to ask my questions using language and context appropriate for the community and the interviewee. Generally speaking I would try to cover all the main elements of the CRAA with the village heads and government officials if time allowed. I would select statements from these topics that seemed appropriate. In the first draft of the CRAA there were a number of topics which I judged inappropriate to ask e.g. for example the initial draft referred to the community having a “documentation system” which I realised was meaningless in the context of a vulnerable community. Some topics I introduced hesitatingly because I was wary my question would be inappropriate, only to be surprised that the interviewee had a ready response. For example I was pleased with the full responses my questions on community committees elicited. More surprisingly when I asked about community leaders about their vision and goals, some village heads and government officials had ready and full responses. On occasion, I would ask a question on a topic I judged might be important and receive a blank look from the interviewee. Chris Ho would then typically come to my rescue rephrasing the question using more appropriate language and using examples to illustrate. For example my questions on “learning from events” were typically not well understood by interviewees but I persevered as I knew them to be important in safety management context. Chris Ho would then try again to explain what I was asking and why it was important giving examples of the Red Cross’s own lessoned learned practice. Mindful of Schein (1999) principle 4 - “Everything you do is an intervention”, I was aware that every question I asked
was an intervention in the mind of the interviewee and it was therefore important that they had a positive effect. When Chris Ho and I asked questions about learning from events, we were indicating that we felt these practices were important. In this respect our assessment process included an element of community resilience coaching. I noticed that on many occasions Chris Ho was triggered by the conversation to mention related issues to the village head. For example during a discussion about disaster preparedness, he took an opportunity to explain about the “Nomad” mobile water purification system that Fiji Red Cross can deploy to provide safe water provision during an emergency. In this way Chris Ho was using our meetings and interviews as a way to build relationships with community leaders and increase Red Cross and community awareness on important resilience issues.

4.3.3 Physical Barriers Assessment

In section 3.2.7, I outlined the barrier based risk management approach (Reason, 1997) which broadly categorises barriers as being “hard barriers” for example buildings and infrastructure and “soft barriers” which are human barriers like safe practices or safe behaviour. The CRAA framework is proposed as an assessment of “soft barriers” or the human practices that communities need to do to ensure their resilience. To complete a barrier based assessment it was necessary to also assess the “hard barriers”. This was done in the form of a Physical Barriers Assessment (PBA) which is a well-established ISRS methodology to assess the condition of physical barriers.

Working with the Fiji Red Cross in advance of and during my visit to Fiji I prepared a PBA template containing eight equipment categories: Shelter, Sanitation, Water Safety, Hand Washing, Rubbish Disposal, Food Storage, Power and Transport. Under each heading was a list of key equipment for managing community hazards, for example under sanitation the equipment types were; Sewage Systems, Septic Systems, Soakage Pits, Pit toilets. To complete the PBA, we would tour the community looking for examples the equipment and count how many met a good practice “standard” and how many were “sub-standard”. This information was then used to make a percentage score for each of the 8 categories. We also found that knowledgeable people were able to estimate the percentages for the equipment categories based on their experience. The PBA is a sampling activity so it was not necessary to identify all items and the tour was often combined with conversations with community members as we walked around the community. The PBA worksheet (updated following our field work experience) is shown in Figure 13.
<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>% EQUIPMENT</th>
<th>VALUE FACTOR</th>
<th>SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>STANDARD</td>
<td>SUBSTANDARD</td>
<td></td>
</tr>
<tr>
<td>1. SHELTERS</td>
<td>STD=</td>
<td>SUB=</td>
<td>STD x VF=</td>
</tr>
<tr>
<td></td>
<td>Shelters built to building codes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shelters can withstand disasters</td>
<td>VF= 15</td>
<td></td>
</tr>
<tr>
<td>2. SANITATION</td>
<td>STD=</td>
<td>SUB=</td>
<td>STD x VF=</td>
</tr>
<tr>
<td></td>
<td>Sewage System</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Septic Systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Soakage Pits</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pit toilets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 WATER SAFETY</td>
<td>STD=</td>
<td>SUB=</td>
<td>STD x VF =</td>
</tr>
<tr>
<td></td>
<td>Piped/reticulated water</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Safe water storage (not in drums or containers in toilets)</td>
<td>VF= 15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Alternative water sources (e.g. rainwater harvesting)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Purification systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 HAND WASHING</td>
<td>STD=</td>
<td>SUB=</td>
<td>STD x VF =</td>
</tr>
<tr>
<td></td>
<td>Hand washing facilities near toilets</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sinks and running water in kitchens</td>
<td>VF= 15</td>
<td></td>
</tr>
<tr>
<td>5 RUBBISH DISPOSAL</td>
<td>STD=</td>
<td>SUB=</td>
<td>STD x VF =</td>
</tr>
<tr>
<td></td>
<td>Effective rubbish disposal</td>
<td>VF= 10</td>
<td></td>
</tr>
<tr>
<td>6 FOOD STORAGE</td>
<td>STD=</td>
<td>SUB=</td>
<td>STD x VF =</td>
</tr>
<tr>
<td></td>
<td>Safe Food Storage (normal)</td>
<td>VF= 10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Safe Food Storage (disaster)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 POWER</td>
<td>STD=</td>
<td>SUB=</td>
<td>STD x VF =</td>
</tr>
<tr>
<td></td>
<td>Electricity supply (normal)</td>
<td>VF= 10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Electricity supply (disaster)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 TRANSPORT</td>
<td>STD=</td>
<td>SUB=</td>
<td>STD x VF =</td>
</tr>
<tr>
<td></td>
<td>Roads</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vehicles</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

VF= 15
The PBA methodology was well received by the Red Cross representatives. It was judged a simple tool which was quick to complete and on several occasions created new insights. The PBA was helpful in quantifying information about physical barriers or the lack of them for example in Wailea which had been flooded a few days before I took the picture shown in Figure 14.

![Wailea community a few days after a flood](image)

**Figure 14 – Wailea community a few days after a flood**

### 4.3.4 Review and Reporting

Following our week of community visits and interviews, Chris Ho and I spent our final day together reviewing the CRAA framework in detail, discussing our experience of using it and updated it based on our learnings. The version of the CRAA shown in Figure 11 includes the learnings from our pilot activity in Fiji.

Back in the UK I reviewed all my interview notes and recordings to identify the best data on which I could complete my CRAA assessment for one community. I chose the Lautoka community to be assessed for the following reasons; 1) I had interview recordings and notes with community members, a well informed government official and Red Cross representatives from Lautoka 2) Interviews revealed Lautoka had come top of a nationwide media poll in terms of its good governance which indicated it had relatively good practice in terms of community resilience, 3) Lautoka includes both urban and rural wards.
I transcribed my interview recording and notes for Lautoka and used them to score the CRAA. For each statement I recorded the evidence available and gave a score using a 3 point Likert scale as follows; 0 – not in place, 1 – partially in place and working, 2 - In place and working. The evidence and scores for the Lautoka CRAA are shown are shown in Appendix 7.3. In addition a PBA was undertaken for Lautoka based on interviews and tours.

### 4.4 Conclusions

The purpose of this second action research cycle was to answer the research question; “How can community resilience be evaluated?” There are several components to this answer.

The first conclusion was that NGOs are the organisations taking a lead on the evaluation of community resilience and “Vulnerability and Capability Assessment” is the main methodology used. This process based approach is practical and flexible but sensitive to the competence of different practitioners and therefore ensuring the reliability and validity of measurement is challenging.

The second conclusion was the successful pilot of a new methodology to evaluate community resilience developed in the previous action research cycle. A CRAA of the “soft barriers” or human systems was conducted for the Lautoka community on Vitu Levu, Fiji. The overall score of this assessment was 42% and the scores of the 9 elements of assessment are shown in Figure 15.

![Figure 15 - Community Resilience Assessment for Lautoka, Fiji](image)

This assessment highlighted that Lautoka’s community resilience programme has a number of strengths in particular it’s systems of community committees, stakeholder engagement and disaster preparedness. Areas for improvement include formalizing its risk reduction goals and plans, implementing a system of awareness campaigns on risk reduction measures, ensuring building codes are respected in rural areas and implementing programmes for developing sustainable livelihoods and natural resource management.
A third conclusion was the successful development and pilot of a new technique to assess the “hard barriers” or physical barriers for Lautoka community. The results of the PBA for Lautoka are shown in Figure 16.3

![Figure 16 - Physical Barriers Assessment for Lautoka, Fiji](image)

The PBA was for the whole of Lautoka including urban and rural areas. In general the standard of physical barriers for shelters, sanitation and water safety were significantly higher in urban areas compared to rural districts. It was suggested that building codes were often not enforced in rural districts because government officials knew people needed shelter and could not afford to build in accordance with building standards. In some cases, rural settlements were located illegally which was a disincentive for stakeholders to invest in proper physical barriers.

An important learning from the PBAs was the importance of distinguishing between barriers for normal conditions and for disaster conditions. In a flood, many barriers typically fail for example piped water, sanitation, electrical power, communication, and transport. It is therefore critical to ensure that barriers for disaster conditions are in place e.g. access to safe water from borehole or rainwater harvesting, or solar power facilities to charge mobile phones essential for communication. As a result of this learning we updated the PBA shown in Appendix 7.3 to include examples of such barriers.

---

3 The barriers for “Power” and “Transport” were not included in the scope of the PBA for Lautoka because we had not included them in the initial version of the tool.
5 Conclusions and Recommendations

The research questions addressed by this dissertation were; “What are the characteristics of resilient communities?” and “How can community resilience be evaluated?” Sections 3.4 and 4.4 have already described the conclusions for these respective questions. In this section I will make some summary conclusions and recommendations.

The principal outcome of this research was the development and pilot of the CRAA and PBA tools and methodologies. It is important to reflect on what, if anything, these frameworks have added to the domain of community resilience. My hope is that the CRAA and PBA create useful new tools within the existing VCA toolbox that Red Cross and other practitioners may use to improve the resilience of their communities. Measuring resilience more effectively is necessary to manage resilience more effectively. In this way it is hoped that this research will help protect vulnerable communities from natural hazards and the impacts of climate change. The VCA methodology is primarily a process orientated approach. Red Cross have already identified that they would like to add a “characteristics” approach to VCA. In my view this is because they wish to add “content” to their “process”. They also want to increase the validity and reliability of the VCA. My hope is that the CRAA and PBA more effectively operationalise the resilience characteristics approach drawing on mature risk management concepts like barrier management and loss prevention.

As indicated above, action research is intended to create change so it is important to reflect on whether any partners to this research have experienced change. The communities involved in the study have not been changed as a result of this research as yet, apart from the fact that community leaders interviewed may now have a wider concept of the activities they can undertake for risk reduction. The Director General of Fiji Red Cross has commented that this project had been beneficial to his organisation and as a result, I have been invited back to Fiji to continue to develop this work. I have presented this work to the Norwegian Red Cross who were enthusiastic and have indicated their interest in applying some of these learnings in an upcoming project with the Philippines Red Cross. I hope to present this work to the International Federation of the Red Cross in the next period. DNV GL have presented a summary of this research at internal and external events as an example of thought leadership on climate change adaptation. We are also looking for partners to develop and operationalise these approaches in the future.

There are many limitations for a research study of this type addressing many academic domains and multiple social, economic and environmental factors. The primary limitation of this project may be that it has been an action research approach based on a single case study
and the results may not be valid for other communities. Further work in other community contexts is required to test and develop the CRAA and PBA tools and methodologies.
6 Bibliography


Fiona Miller, H. O., Emily Boyd, Frank Thomalla, Sukaina Bharwani, Gina Ziervogel, Brian Walker, Jörn Birkmann, Sander van der Leeuw, Johan Rockström, Jochen Hinkel, Tom


IFRC 2007. VCA Toolbox. International Federation of Red Cross and Red Crescent Societies/ Provention Consortium.

IFRC 2009. Implementation guide for Community-based health and first aid in action (CBHFA). International Federation of Red Cross and Red Crescent Societies.

IFRC 2010. IFRC guidelines for livelihoods programming. International Federation of Red Cross and Red Crescent Societies.

'IFRC 2012. Of networks, norms, and trust: The role of social capital in reinforcing community resilience. Authors: Patrick Bolte, Dr. Dennis Eucker (Banyaneer).


7 Appendices

7.1 Characteristics of Resilient Communities – Initial Questionnaire

1. Please select a community that you are knowledgeable about.

2. Briefly describe the community (e.g. location, approximate population, economy, culture, history of loss events)

3. What are the major hazards this community faces?

4. Rate the following activities in terms of how important they would be in improving the resilience of this community:
   a) In your view
   b) In the view of community members (based on your judgement)?
   (KEY: 0 – not important, 1 – low importance, 2 – medium importance, 3 – high importance)

<table>
<thead>
<tr>
<th>Issue</th>
<th>Your view</th>
<th>Community view</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Governance</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree Shared Vision and Values</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Set Improvement Goals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Establish Risk Management Policy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major Risks Identification and Evaluation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compliance with Regulations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stakeholder Engagement and Partnerships</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accountability and community participation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Risk Assessment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hazard identification and evaluation:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Health hazards</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Safety hazards</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Security hazards</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Environmental hazards</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Financial hazards</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vulnerability Capacity Assessment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Knowledge and Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training Needs Analysis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delivery of Training</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication Systems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community Meetings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Promotion Campaigns</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Risk Management and Vulnerability Reduction</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Hazard Controls and Monitoring</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety Hazard Controls and Monitoring</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Security Hazard Controls and Monitoring</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Hazard Controls and Monitoring</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sustainable Livelihoods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access to Finance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Support Systems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management of Physical Assets:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Design of Assets</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Inspection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Maintenance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sustainable Land Use</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Disaster Preparedness and Response</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency Needs Assessment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency Plan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency Communications</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warning Systems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency Teams</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency Equipment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drills and Exercises</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First Aid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical Support</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organised Outside Help</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Review and Improve</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learning from Events</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Audit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Review meetings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improvement Teams</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. How may the changing climate effect the resilience of this community in the future?

6. What other issues are important in improving the resilience of this community?
7.2 Cross Reference between the Community Resilience Alpha Assessment and the Characteristics Frameworks developed by Twigg (2007) and IFRC (2011)

The Community Resilience Alpha Assessment (CRAA) characteristic statements are repeated below and for most statements further guidance is provided. This guidance is taken from “The Characteristics of a Disaster Resilient Community” (Twigg, 2007) or “The Characteristics of Safe and Resilient Communities” (IFRC, 2011) which are repeated in full and referenced. The Red Cross were involved in or responsible for the development of both of these documents and it is hoped that pulling them together in a single integrated framework will be beneficial to the Red Cross. This is done to 1) provide guidance and further clarification for each statement 2) provide a cross reference to these documents and 3) demonstrate the holistic design of the CRAA framework. Some additional guidance was been added which has been adapted from ISRS (DNVGL, 2009), or gained from field experience gained in Fiji.

1. Leadership

1.1 Vision and Goals

1.1.1 The community has a defined vision addressing long term risk reduction.

   The vision of the community should be clearly stated in a written format and be well known amongst community members.

   A prepared and resilient community has a shared vision. (Twigg 1.1.1 and 3.1.1)

   The vision should be informed by an understanding of the underlying causes of vulnerability. (Twigg 1.1.3)

   Community takes a long term view focussing on the outcomes and impacts of risk reduction. (Twigg 1.1.4)

1.1.2 The community has defined goals for risk reduction.

   Performance is measured by comparing actual results against goals. When a community chooses its goals, it establishes what is important and the priorities for change. Measuring the right things is therefore central to good management because it is a key opportunity to set the performance expectations for the community.

   Millennium Development Goals (UN, 2000)

   1. To eradicate extreme poverty and hunger
   2. To achieve universal primary education
   3. To promote gender equality and empowering women
   4. To reduce child mortality rates
5. To improve maternal health
6. To combat HIV/AIDS, malaria, and other diseases
7. To ensure environmental sustainability
8. To develop a global partnership for development

*Goals of a Safe and Resilient Community* (IFRC, 2011)

1. A resilient community is knowledgeable and healthy. It has the ability to assess, manage and monitor its risks. It can learn new skills and build on past experiences.
2. A resilient community is organised. It has the capacity to identify problems, establish priorities and act.
3. A resilient community is connected. It has relationships with external actors who provide a wider supportive environment, and supply goods and services when needed.
4. A resilient community has infrastructure and services. It has strong housing, transport, power, water and sanitation systems. It has the ability to maintain, repair and renovate them.
5. A resilient community has economic opportunities. It has a diverse range of employment opportunities, income and financial services. It is flexible, resourceful and has the capacity to accept uncertainty and respond (proactively) to change.
6. A resilient community can manage its natural assets. It recognises their value and has the ability to protect, enhance and maintain them.

1.1.3 Community goals are specific and measurable.

Goals may be long term and may include input (leading) or output (lagging) measures of performance. Goals should be SMART (Specific, Measurable, Achievable, Realistic and Time Bounded).

1.1.4 The vision and goals have been effectively communicated within the community.

Risk reduction plans developed through participatory processes. (Twigg 1.1.6)

1.1.5 The vision and goals have been effectively communicated to external stakeholders.

1.2 Community Committees

1.2.1 The community has a central committee to manage the overall activities of the community.

Effective organisation and governance is essential for community resilience. Community organisation and governance is undertaken by committees or other community led organisations. These may include a Central Committee with overall responsibility for the well-being of the community, Water and Sanitation Committee, Health Committee, Education Committee, Disaster Response Committee & Economic Activities Committee.
Selection of community members for each committee is achieved in a fair and equitable manner, free from discrimination, and is representative of stakeholder groups within the community.

Responsibilities for each committee are clearly defined.

Effective and transparent communication of committee activities are undertaken to build trust with community stakeholders and to ensure effective coordination between committees.

Representative community based organisations are in place dedicated to risk reduction. (Twigg 1.5.1 and 1.5.2)

There is a shared understanding among all local stakeholders regarding risk reduction responsibilities, authority and decision making. (Twigg 1.5.4)

The community structures and culture support self-confidence to recover from the consequences of disasters (trauma, PTSD). (Twigg 4.2.6)

1.2.2 The chairperson of the central committee has been appointed with overall responsibility for the well-being of the community.

1.2.3 The central committee has representatives from all groups within the community.

1.2.4 Central committee meetings are open to all members of the community to attend.

There is open debate resulting in agreements about problems, solutions, and priorities. (Twigg 3.1.5)

1.2.5 The central committee meets regularly.

1.2.6 The central committee coordinates the activities of all other committees e.g. health, disaster, education, crime prevention, youth development, fire, police.

Devolved risk reduction structures facilitate community participation. (Twigg 1.7.1)

1.2.7 The central committee is considered effective by community members.

1.3 Stakeholder Engagement

1.3.1 The community has identified its key stakeholders e.g. government, business, Red Cross, NGOs.

No community can be resilient without effective relationships and partnerships being in place with a wide group of stakeholders. Stakeholders are those individuals and groups that have an interest in the activities of the community. Key stakeholders for community resilience should be identified. Examples of stakeholders include: community members, community leaders, local government, local businesses, public service organisations, NGOs and the media.
Local stakeholders are committed to genuine partnerships with open and shared principles of collaboration and high levels of trust. (Twigg 1.6.1)

Clear, agreed and stable risk reduction partnerships between local stakeholder groups and organisations are in place. (Twigg 1.6.2)

There is local capacity and enthusiasm to promote risk reduction and scale up activities through community partnerships. (Twigg 1.6.4)

Local NGOs and communities of interest are capable of supporting disaster risk reduction and response. i.e. emergent, extending or expanding organisations. Expanding organisations are expected to take on additional functions at times of crisis, which they do by increasing their capacity or altering their organisational structures (e.g. a local Red Cross branch calling on trained volunteers to support its small core of professional staff). Extending organisations are not expected to respond to disasters but during disasters may perform non-regular tasks (e.g. a construction company clearing debris to assist rescue operations). Emergent organisations do not exist before a disaster event but form in response to it (e.g. spontaneous search and rescue groups). (Twigg 1.5.4)

A resilient community has support from external actors who provide equipment to prevent or recover from shocks and stresses (IFRC, 2011, 50)

A resilient community has access to technical advice and support from external agencies (IFRC, 2011, 51)

A resilient community organises community recreational activities (IFRC, 2011, 52)

A resilient community can communicate, internally and externally (IFRC, 2011, 53)

A resilient community exchanges information with the government and other actors (IFRC, 2011, 54)

A resilient community coordinates with external actors (IFRC, 2011, 55)

A resilient community coordinates with government agencies (IFRC, 2011, 56)

A resilient community has community organisations, internal support mechanisms and coordination mechanisms (IFRC, 2011, 57)

A resilient community coordinates with the Red Cross (IFRC, 2011, 58)

A resilient community can request assistance from a number of different actors when required (IFRC, 2011, 59)

1.3.2 The community has regular consultation with key stakeholders.

Good communication is necessary both to inform and motivate stakeholders. There are many alternative channels for an organisation to communicate with its internal and external stakeholders. The challenge for communities is to choose those channels that are most efficient and effective. Using a variety of communication channels is also important to keep the interest of the receiver and to match the importance and complexity of the message.
Communication channels for external stakeholders include meetings, visits, shared projects, formal reports and letters (ISRS 1.5.2)

There should be trust within the community and between community and external agencies. (Twigg 1.7.3)

1.3.3 Community leaders ensure stakeholders understand the expectations of the community.

A resilient community should have the capacity to challenge and lobby external agencies on risk reduction plans, priorities, actions that may have an impact on risk. (Twigg 1.7.4)

1.3.4 The community aligns its activities with the expectations of its stakeholders.

A resilient community should have access to information on local government plans and structures. (Twigg 1.7.22)

1.3.5 Risk reduction partnerships are effective.

Local groups/ organisations have capacity to recruit, train, support and motivate community volunteers for risk reduction and work together to do so. (Twigg 1.6.5)

There are high levels of volunteerism in risk reduction activities. (Twigg 1.7.7)

1.4 Community Risks

1.4.1 The community has identified the major risks to its well-being e.g. access to safe water, food, sanitation, health services and secure livelihoods.

Community risks are the major risks that can threaten the prosperity or survival of the community. Ideally a risk register should be developed summarising the activity, category of hazard, likely consequence, risk evaluation and appropriate control measure. This provides the community with a management overview of risk and allows them to answer questions like:

- What are our top ten risks?

- Are all our significant risks adequately controlled?

Community hazard/risk assessments carried out which provide comprehensive picture of all major hazards and risks facing community (and potential risks). (Twigg 2.1.1)

Community vulnerability and capacity assessments (VCAs) are carried out which provide comprehensive picture of vulnerabilities and capacities. (Twigg 2.2.1)

VCAs are used to create baselines at start of community risk reduction projects. (Twigg 2.2.4)

There is ongoing monitoring of vulnerability and updating of assessments (Twigg 2.2.6)

Skills and capacity to carry out community VCA maintained through support and training. (Twigg 2.2.7)
1.4.2 Community members participate in risk assessment.

Community has a consensus view of the risks faced, adopts a risk management approach, identifies specific actions to be taken and targets to be met. (Twigg 1.1.2)

Hazard/risk assessment is participatory process including representatives of all sections of community and sources of expertise. (Twigg 2.2.2)

Indigenous knowledge and local perceptions of risk will be used as well as other scientific knowledge, data and assessment methods. (Twigg 2.3.2)

Content and methods of communicating information developed with communities (i.e. ‘communication’ not ‘information dissemination’). (Twigg 3.2.4)

1.4.3 The potential losses (people, property, economic, environment) associated with each risk has been identified.

1.4.4 The likelihood of the loss occurring has been evaluated.

The probability/frequency of particular loss event happening may be classified as follows:

- Improbable: less than 1 in 100 years
- Unlikely: 1 in 50 years
- Likely: 1 in 10 years
- Very likely: 1 in 1 year
- Virtually certain: 1 in 1 month/day

1.4.5 Risks are communicated to necessary internal and external stakeholders.

Risk evaluation assessment findings shared, discussed, understood and agreed among all stakeholders, and feed into community disaster planning. (Twigg 2.1.3)

Assessment findings are shared, discussed, understood and agreed among all stakeholders and feed into community disaster planning. (Twigg 2.2.3)

Findings are made available to all interested parties (within and outside community) and feed into their disaster and development planning. (Twigg 2.2.5)

In a resilient community, information on risk, vulnerability and disaster management practices is shared among those at risk. (Twigg 3.2.1)

1.5 Community Plan

1.5.1 A community planning process is in place.

Details of the process should include an explanation of the steps in the community planning process, when it takes place and who is involved. The output of this process
will be an annual or longer term plan, which sets out the steps, responsibilities and timeline to achieve the chosen goals.

1.5.2 The community plan is consistent with the community goals.

The plan sets out who does what and when to implement the goals (see 1.2.1).

In a resilient community, decision making regarding land use and management, taking hazard risks and vulnerabilities into account. (Twigg 4.7.1)

1.5.3 The plan is adequately resourced.

1.5.4 The community has a system to safeguard key documents.

Key documents like health records and education certificates should be identified and stored or duplicated such that they are protected in the event of fire, flood or other loss events.

1.6 Leadership Commitment

1.6.1 Community leaders regularly visit the homes and community spaces of individual community members and discuss risk reduction issues.

Coverage of the community is comprehensive. Discussion content is relevant to community. Constructive feedback from the tours is made by both community leaders and community members.

Committed, effective and accountable community leadership are in place for risk reduction planning and implementation. (Twigg 1.1.5)

1.6.2 Community leaders discuss and plan risk reduction activities in community meetings.

1.6.3 Community leaders are trained in risk reduction topics.

Leaders training needs are identified and training delivered.

1.6.4 Community leaders track improvement actions to completion.

2. Communication

2.1 Communication System

2.1.1 Community uses appropriate channels to communicate with external stakeholders e.g. meetings, newsletters, personal visits, mobile phone.

Communication may be defined as “giving and getting understanding”. Good communication is necessary to inform and motivate community leaders and community members. There are many alternative channels for communities to
communicate with its internal and external stakeholders. The challenge for communities is to choose those channels that are convenient for stakeholders, efficient and effective. Using a variety of communication channels is also important to keep the interest of individuals and to match the importance and complexity of the message.

Communication channels have different characteristics in terms of the resource required, time and space. Meetings, for example, have high "bandwidth" in that they can communicate rich, complex information face to face, however, they are resource intensive and depend on everyone being physically at the meeting at the same time in the same space. Newsletters by contrast has relatively low bandwidth in that it is just written information but is cheap on resources and is interdependent of time (receiver can pick it up when convenient).

In a resilient community, there is maximum deployment of indigenous, traditional, informal communications channels. (Twigg 3.2.6)

2.2 Community Meetings

2.2.1 Most community members attend community meetings.

Meetings occur on a regular basis

2.2.2 Community leaders participate in community meetings.

Leaders’ active involvement in meetings is essential to demonstrate their commitment to risk reduction efforts.

2.2.3 Risk reduction efforts are discussed in community meetings.

2.2.4 Records of community meeting are kept documenting when they were held, who attended and what was discussed.

2.3 Awareness Campaigns

2.3.1 A system is in place for conducting awareness campaigns.

Awareness campaigns are valuable means of reinvigorating interest in important topics and supporting other behaviour change initiatives. Promotion campaigns should be engaging and varied in nature to ensure that the message is driven home in a persuasive manner. Promotions can be both internal and external.

All sections of community know about facilities/services/skills available before, during and post-emergency, and how to access these. (Twigg 3.2.3)

According to IFRC 2011, a safe and resilient community is knowledgeable:

2.3.2 Awareness campaigns address risk reduction issues.

Examples of awareness campaign topics include: hand washing, safe water, sanitation, rubbish disposal, disaster risk reduction.
2.3.3 Awareness campaigns are planned and conducted on a regular basis.

The effectiveness of campaigns is evaluated.

3. Legislation

3.1 Legislation

3.1.1 A system is in place to identify applicable legislation e.g. health and safety, environmental, employment, trade, building.

A complete list of all legislation which may apply should be compiled. Appropriate expertise should be used to identify applicable regulations. Individuals in the community are identified to be responsible for compliance with particular legislation.

A resilient community "understands relevant legislation, regulations and procedures, and their importance". Twigg, 2009, Characteristic 2.1

3.1.2 Relevant information on legislation is communicated to community members.

The applicability of legislation for groups/individuals should be identified. The specific requirements are effectively communicated to particular individuals/groups as appropriate and the awareness of legislative requirements should be regularly promoted.

3.2 Legal Rights

3.2.1 Information on their legal rights is communicated to community members e.g. constitutional rights, human rights, women’s rights, children’s rights, social welfare.

A resilient community "is aware of its rights and the legal obligations of government and other stakeholders to provide protection." Twigg, 2009, Characterisitic 2.2

4. Health

4.1 Health Committee

4.1.1 The community has a health committee managing the community’s health and safety programme.

Guidance on implementing a community based health system is available in the International Federation of the Red Cross and Red Crescent publication: "Implementation guide for Community-Based Health and First Aid in action (CBHFA), 2009."
The physical ability to labour and good health maintained in normal times through adequate food and nutrition, hygiene and health care. (Twigg 4.2.1)

4.1.2 A member of the health committee has been appointed with overall responsibility for the health of the community.

4.1.3 The health committee meets regularly.

4.1.4 The health committee meetings are open to all members of the community to attend.

4.1.5 The health committee is considered effective by community members.

4.2 Health Hazard Identification and Evaluation

4.2.1 The activities or conditions which may affect the health of community members have been identified.

At risk activities or conditions are identified through workshops, risk assessments or surveys considering normal, abnormal and emergency situations.

The Red Cross Vulnerability and Capability Assessment may be used to do this.

4.2.2 All health hazards have been identified.

A "hazard" is defined as a condition or practice with the potential for loss. The output of this activity should be a health hazard risk register listing the activities and conditions that may bring people into contact with health hazards and the appropriate controls. The health hazards register should be updated following lessons learned reviews after loss events.

A resilient community will have knowledge of hazards, vulnerability, risks and risk reduction actions sufficient for effective action by community (alone and in collaboration with other stakeholders). (Twigg 3.1.3)

According to the World Health Organisation, "A significant proportion of the overall environmental disease burden can be attributed to relatively few key areas of risk. These include: poor water quality, availability, and sanitation; vector-borne diseases; poor ambient and indoor air quality; toxic substances; and global environmental change. In many cases, simple preventive measures exist to reduce the burden of disease from such risks, although systematic incorporation of such measures into policy has been more of a challenge. Below are estimates of deaths globally from the most significant environmentally-related causes or conditions, and from certain diseases with a strong environmental component:

- Unsafe water, and poor sanitation and hygiene kill an estimated 1.7 million people annually, particularly as a result of diarrhoeal disease.
- Indoor smoke – primarily from the use of solid fuels in domestic cooking and heating – kills an estimated 1.6 million people annually due to respiratory diseases.
- Malaria kills over 1.2 million people annually, mostly African children under the age of five.

- Poorly designed irrigation and water systems, inadequate housing, poor waste disposal and water storage, deforestation and loss of biodiversity, all may be contributing factors to the most common vector-borne diseases, including malaria, dengue and leishmaniasis.

- Urban air pollution generated by vehicles, industries, and energy production kills approximately 800 000 people annually.

- Road traffic injuries are responsible for 1.2 million deaths annually; low- and middle-income countries bear 90% of the death and injury toll. Degradation of the built urban and rural environment, particularly for pedestrians and cyclists, has been cited as a key risk factor.

- Lead exposure kills more than 230,000 people per year and causes cognitive effects in one third of all children globally; more than 97% of those affected live in the developing world.

- Climate change impacts – including more extreme weather events, changed patterns of disease and effects on agricultural production – are estimated to cause over 150 000 deaths annually.

- Unintentional poisonings kill 355,000 people globally each year. In developing countries – where two-thirds of these deaths occur – such poisonings are associated strongly with excessive exposure to, and inappropriate use of, toxic chemicals and pesticides present in occupational and/or domestic environments."


4.2.3 The potential losses associated with each health hazard have been identified.

Risk evaluation is essential for prioritisation for planning and control purposes to ensure that all risks are effectively managed.

Ideally a comprehensive risk register should be developed in a table format summarising the activity, category of hazard, likely consequence, risk evaluation and appropriate control measure. This provides the community with an overview of risk and allows them to answer questions like:

- What are our top ten risks?
- Are all our significant risks adequately controlled?

4.2.4 The likelihood of the loss occurring has been evaluated.

The probability/frequency of particular loss event happening may be classified as follows:

<table>
<thead>
<tr>
<th>Improbable</th>
<th>less than 1 in 100 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unlikely</td>
<td>1 in 50 years</td>
</tr>
<tr>
<td>Likely</td>
<td>1 in 10 years</td>
</tr>
</tbody>
</table>
Very likely  1 in 1 year  
Virtually certain  1 in 1 month/day

4.3  Health Care

4.3.1 The community has a health care system.

Community health care facilities and health workers, equipped and trained to respond to physical and mental health consequences of disasters and lesser hazard events, and supported by access to emergency health services, medicines, etc. (Twigg 4.2.7)

A resilient community has access to medical treatment (IFRC, 2011, 12)

4.3.2 Healthcare programmes are available for the health hazards identified in sub process 4.2.

4.3.3 A community nurse has been appointed.

4.3.4 The community nurse has adequate training.

4.3.5 Information on health hazards and controls is available to community members.

Guidance information has been identified for each hazard and information is prepared in a suitable format.

4.3.6 Health care system has adequately resources.

4.3.7 Health records protected from damage or loss.

4.3.8 The community has access to a health centre.

4.3.9 Medical surveillance is in place to monitor the health of community members for the hazards identified.

In resilient communities, people know how to stay healthy (e.g. hygiene, sanitation, nutrition, water treatment) and of life protecting/saving measures, and possession of appropriate skills. (Twigg 4.2.5)

A resilient community practices good personal hygiene (IFRC, 2011, 61)
A resilient community has a high level of awareness about maintaining good hygiene and sanitation practices (IFRC, 2011, 65)
A resilient community has a high level of awareness about shocks and stresses (IFRC, 2011, 66)

5.  Education
5.1 Early Childhood Education

5.1.1 A system is in place to provide early childhood education to all community members aged 0 to 8 years.


Natural disasters and other emergencies can significantly disrupt a child's education. When children are displaced due to these circumstances, they often are excluded from school for years. However, a high quality education can provide physical and psychological protection in in emergency situations that can contribute significantly to the child's ability to cope, as well improving the resilience of their community. Education can provide children with critical survival skills and coping mechanisms through learning for example about hygiene, sanitation and disease prevention.

A child's education may be described as going through three stages: early childhood, primary and post primary. How these stages are described varies across countries and cultures however in general they can be defined as shown below. The age ranges overlap to accommodate the different ages children begin and end their time at school.

- Early Childhood - students 0 to 8 years old
- Primary - students 5 to 15 years old
- Post Primary - students 10 to 19 years old.

Following a comprehensive study and consultation, UNESCO proposes universal learning outcomes in the 7 domains below. All children in all countries should learn essential knowledge within these topics:

1. Physical well being
2. Emotional and social
3. Culture and arts
4. Literacy and communication
5. Learning approaches and cognition
6. Numeracy and mathematics
7. Science and technology

5.1.2 Early childhood education curriculum is comprehensive (and in line with UNESCO guidance).

The essential learning outcomes in an early childhood education are outlined as follows:

1. Physical well-being: physical health and nutrition, health knowledge and practice, safety knowledge and practice, motor skills and coordination.
2. Social and emotional: self-regulation, emotional awareness, self-concept and self-efficacy, empathy, social relationships and behaviours, conflict resolution, moral values.

3. Culture and the arts: creative arts, self and community identity, awareness of and respect for diversity.

4. Literacy and communication: receptive language, expressive language, vocabulary, prints awareness.

5. Learning approaches and cognition: curiosity and engagement, persistence and attention, autonomy and initiative, cooperation, creativity, reasoning and problem solving, early critical thinking skills, symbolic representation.

6. Numeracy and mathematics: number sense and operations, spatial sense and geometry, patterns and classification, measurement and comparison

7. Science and technology: inquiry skills, awareness of the natural and physical world, technology awareness

5.1.3 Adequate facilities and resources are available for early childhood education.

The necessary human resources to provide training should be identified. The necessary facility and equipment requirements should be identified. Community members should consider these resources are adequate to meet the needs for early childhood education

5.2 Primary Education

5.2.1 A system is in place to provide primary education to all community members aged 5 to 15 years.

See guidance for 5.1.1

5.2.2 Primary curriculum is comprehensive (and in line with UNESCO guidance).

The essential learning outcomes in primary education are outlined as follows:

1. Physical well-being: physical health and hygiene, food and nutrition, physical activity, sexual health.

2. Social and emotional: social and community values, civic values, mental health and well-being.

3. Culture and the arts: creative arts, cultural knowledge.

4. Literacy and communication: oral fluency, oral comprehension, reading fluency, reading comprehension, receptive vocabulary, expressive vocabulary, written expression composition.
5. Learning approaches and cognition: persistence and attention, cooperation, autonomy, knowledge, comprehension, application, critical thinking.

6. Numeracy and mathematics: number sense and operations, spatial sense and geometry, patterns and classification, measurement and comparison.

7. Science and technology: inquiry skills, awareness of the natural and physical world, technology awareness.

5.2.3 Adequate facilities and resources are available for primary education.

The necessary human resources to provide training should be identified. The necessary facility and equipment requirements should be identified. Community members should consider these resources are adequate to meet the needs for primary education

5.3 Post Primary Education

5.3.1 A system is in place to provide post primary education to all community members aged 10 to 19 years.

See guidance for 5.1.1

5.3.2 Post primary curriculum is comprehensive (and in line with UNESCO guidance).

The essential learning outcomes in post primary education are outlined as follows:

1. Physical well-being: health and hygiene, sexual and reproductive health, illness and disease prevention,
2. Social and emotional: social awareness, leadership, civic engagement, positive view of self and others, resilience/"grit", moral and ethical values, social sciences
3. Culture and the arts: creative arts, cultural studies,
4. Literacy and communication: speaking and listening, writing, reading,
5. Learning approaches and cognition: collaboration, self-direction, learning orientation, persistence, problem solving, critical decision making, flexibility, creativity
6. Numeracy and mathematics: numbers, algebra, geometry, everyday calculations, personal finance, informed consumer, data and statistics,
7. Science and Technology: biology, chemistry, physics, earth science, scientific approaches, environmental awareness, digital learning

Skills and capacity to carry out community hazard and risk assessments maintained through support and training. (Twigg 2.1.6)

Community members and organisations are trained in hazards, risk and VCA techniques and supported to carry out assessments. (Twigg 3.3.1)
Individuals possess appropriate technical and organisational knowledge and skills for risk reduction and response actions at local level (including indigenous technical knowledge, coping strategies, livelihood strategies). (Twigg 3.1.4)

A resilient community has access to education and vocational training (IFRC, 2011, 11)

A resilient community has had training on shocks and stresses (IFRC, 2011, 64)

5.3.3 Adequate facilities and resources are available for post primary education.

The necessary human resources to provide training should be identified. The necessary facility and equipment requirements should be identified. Community members should consider these resources are adequate to meet the needs for post primary education

5.4 Community Engagement in Education

5.4.1 The community encourages their students to reach high educational standards.

Support may include funding, coaching, logistics and recognition.

5.4.2 Community provides support their local schools with fund raising and organising sporting and social events.

6. Management of Physical Assets

6.1 Build

6.1.1 Physical assets/barriers (e.g. buildings, water provision, sanitation, communication embankments, roads, food storage, water storage) have been built to address the risks identified in sub process 1.4.

Physical assets/barriers are the first line of defence to safeguard the community from hazards. Physical assets/barriers should be designed and built to 1) eliminate the hazard if possible, 2) reduce the frequency or consequences of loss events 3) isolate the hazard as far as possible, 4) reduce individual exposure

Decisions and planning regarding built environment take potential natural hazard risks into account (including potential for increasing risks through interference with ecological, hydrological, geological systems) and vulnerabilities of different groups. (Twigg 4.6.1)

Community has security of land ownership/tenancy rights and a low/minimal level of homelessness and landlessness. (Twigg 4.6.2)
Safe locations: community members and facilities (homes, workplaces, public and social facilities) not exposed to hazards in high-risk areas within locality and/or relocated away from unsafe sites. (Twigg 4.6.3)

Structural mitigation measures (embankments, flood diversion channels, water harvesting tanks, etc.) are in place to protect against major hazard threats, built using local labour, skills, materials and appropriate technologies as far as possible. (Twigg 4.6.4)

There is a knowledge of and take-up of building codes/regulations throughout community. (Twigg 4.6.5)

Community has adopted hazard-resilient construction and maintenance practices for homes and community facilities using local labour, skills, materials and appropriate technologies as far as possible. (Twigg 4.6.6)

Community has capabilities and skills to build, retrofit and maintain structures (technical and organisational). (Twigg 4.6.7)

Communities have adopted physical measures to protect items of domestic property (e.g. raised internal platforms and storage as flood mitigation measure, portable stoves) and productive assets (e.g. livestock shelters). (Twigg 4.6.8)

Community has adopted short-term protective measures against impending events (e.g. emergency protection of doors and windows from cyclone winds). (Twigg 4.6.9)

According to IFRC 2011, a resilient community takes measures to mitigate their hazards:

A resilient community builds strong houses to mitigate against wind and rain. (IFRC, 2011, 26)

6.1.2 Physical assets/barriers are built in accordance with building codes/good practice.

There is knowledge of and take-up of building codes/regulations throughout community. (Twigg 4.6.5)

Community has adopted hazard-resilient construction and maintenance practices for homes and community facilities using local labour, skills, materials and appropriate technologies as far as possible. (Twigg 4.6.6)

Community has capabilities and skills to build, retrofit and maintain structures (technical and organisational). (Twigg 4.6.7)

6.2 Maintain

6.2.1 The community has a system to maintain the condition and function of its physical assets/barriers.

All physical barriers/assets must be maintained to ensure they continue to operate as intended and protect the community from its hazards. It is essential that the community has a system to identify, plan and perform maintenance on critical
physical barriers/assets. e.g. public buildings, water systems, sanitation systems, drainage systems.

The maintenance responsibility for some infrastructure is likely to be held by other parties e.g. local government or service companies may be responsible for maintaining the roads, power supply or communication systems. Nevertheless the community may need to engage with these parties to ensure such activities are planned and completed.

6.2.2 The community has a list of its physical assets/barriers.

The asset register should be a complete listing of all facilities and equipment to be maintained. The asset register is required in order to provide a start-point for identification of critical maintenance activities and to enable proper management of all maintenance activities.

A resilient community has clean water (system), typically from multiple sources outside the community (IFRC, 2011, 1)

A resilient community constructs, maintains and renovates infrastructure to a variety of reliable water sources e.g. canals, wells, reservoirs and rainwater collection (IFRC, 2011, 2)

A resilient community has a waste management system (IFRC, 2011, 3)
A resilient community has permanent shelter (IFRC, 2011, 5)
A resilient community has sanitation facilities (IFRC, 2011, 6)
A resilient community has access to medical transport e.g. ambulance (IFRC, 2011, 7)
A resilient community has a back-up source of lighting (IFRC, 2011, 8)
A resilient community has good footpaths and roads for transport (IFRC, 2011, 10)

6.2.3 Individuals are assigned responsibility for maintaining each physical asset/barrier.

6.2.4 Physical assets/barriers are inspected on a regular basis to ensure they are in good condition.

Inspections should be undertaken for: 1) all areas/assets requiring inspection and 2) specific issues to check in related to each area/asset.

6.2.5 Inspection is performed by competent people.

6.3.6 A maintenance programme is developed for key assets/barriers.

The maintenance programme describes the maintenance approach for each asset in the asset register. The maintenance programme should be developed based on: 1) A determination of how each asset is likely to fail, 2) the consequences of failure, 3) the condition and performance of the asset, 4) the cost of maintenance, 5) the availability of competence community members or other parties.

Maintenance and repair is also needed in the aftermath of a disaster.
A resilient community can undertake damage assessments (IFRC, 2011, 67)
A resilient community cleans its homes and environment as part of the recovery process (IFRC, 2011, 46)
A resilient community can repair damaged houses (IFRC, 2011, 47)
A resilient community can replant crops and plants if they are damaged (IFRC, 2011, 48)
A resilient community has external support to assess and repair the damage of and repair infrastructure e.g. roads and power connections (IFRC, 2011, 49)

6.3.7 Maintenance is performed by competent people.

6.3.8 The maintenance programme has adequate resources.

7. Disaster Preparedness

7.1 Disaster Committee

7.1.1 The community has a disaster committee managing the community’s disaster risk reduction programme.

7.1.2 A member of the disaster committee has been appointed with overall responsibility for disaster risk reduction.

7.1.3 The disaster committee meets regularly.

7.1.4 The disaster committee meetings are open to all members of the community to attend.

7.1.5 The disaster committee is considered effective by community members.

7.2 Disaster Needs Assessment

7.2.1 A comprehensive list of possible disaster scenarios has been developed.
   A team should be established to identify possible disaster scenarios.

   A resilient community receives early warning from external media sources (IFRC, 2011, 30)

7.2.2 The community has identified its emergency needs based on a risk assessment of potential disasters.
Risk assessments for disaster scenarios address potential safety, health, security, environmental and economic losses.

7.3 **Emergency Plan**

7.3.1 The community has an emergency plan.

The emergency plan should describe all steps to be followed in an emergency and should have the key actions summarised in a user-friendly, easy to follow format and put together into one document, clearly recognisable as the emergency plan. The emergency plan will describe who does what in the event of a disaster including arrangements for preparation, communication, evacuation and rescue teams. Essential emergency contact information should be prominently shown.

Responsibilities are defined in community disaster plans. (Twigg 1.5.3)

A resilient community has an established place to evacuate to (IFRC, 2011, 31)

A resilient community has a pre-prepared 'pack' of valuables and important documents (IFRC, 2011, 34)

A resilient community has a pre-prepared evacuation route. (IFRC, 2011, 35)

A resilient community can evacuate people and property (IFRC, 2011, 36)

A resilient community can take shelter in a safe place in houses (IFRC, 2011, 37)

A resilient community can assess how prepared it is (IFRC, 2011, 60)

7.3.2 The emergency plan has been communicated to relevant stakeholders.

In a resilient community, disaster plans are publicly available and widely understood. (Twigg 3.2.2)

7.3.3 The emergency plan is regularly reviewed and updated.

7.3.4 Adequate resources are available to implement the emergency plan.

7.4 **Early Warning System**

7.4.1 A system is in place for warning community members of imminent emergencies.

Early warning systems should be in place for all identified emergency scenarios. This may be through observing signs in nature (e.g. water level in rivers) or communication systems (e.g. radio weather forecasts, text message weather service on mobile phone).

A resilient community observes natural changes or environment to provide early warning (IFRC, 2011, 29)

A resilient community has an early warning communication system (IFRC, 2011, 32)
7.5 **Emergency Communications**

7.5.1 The community has identified all relevant individuals and groups that need to be contacted in an emergency.

7.5.2 Systems are in place to ensure relevant information is communicated to necessary people in an emergency.

7.5.3 Alternative communication systems are available e.g. backup power source for mobile phones.

7.6 **Emergency Resources**

7.6.1 Adequate resources are available for emergency preparedness

7.7 **Emergency Team**

7.7.1 An emergency team is in place to respond to emergency situations

A resilient community can undertake search and rescue activities (IFRC, 2011, 63)

7.8 **Drills and Exercises**

7.8.1 Drills and exercises of the emergency plan are conducted periodically

Potential emergencies should be reviewed to evaluate the need for drills and exercises. Drills and exercises should be planned and performed for all potential emergencies with the necessary community involvement.

A resilient community has experience and knowledge of evacuation procedures (IFRC, 2011, 33)

All sections of community know about facilities/services/skills available before, during and post-emergency, and how to access these. (Twigg 3.2.3)

7.9 **First Aid**

7.9.1 The community has appointed and trained sufficient first aiders.

7.10 **Organised Outside Help**

7.10.1 There are partnership agreements with local communities and other organisations to provide people and equipment in the event of an emergency.
8. **Risk Management**

8.1 **Sustainable Livelihoods**

8.1.1 The community has done an assessment of the income generation (ways to make money) created by community members.

Guidance on implementing a Livelihoods programme is available in International Federation of the Red Cross and Red Crescent publication: "IFRC Guidelines for Livelihoods Programming", 2010

There are high levels of local economic activity and employment (including among vulnerable groups); stability in economic activity and employment levels. (Twigg 4.3.1)

There is equitable distribution of wealth and livelihood assets in community. (Twigg 4.3.2)

There is livelihood diversification (household and community level), including on-farm and off-farm activities in rural areas. (Twigg 4.3.3)

Few people are engaged in unsafe livelihood activities (e.g. small scale mining) or hazard-vulnerable activities (e.g. rain-fed agriculture in drought prone locations). (Twigg 4.3.4)

A resilient community has access to veterinary assistance (IFRC, 2011, 45)

8.1.2 The community has evaluated opportunities to create new or different ways to generate a sustainable income.

There is an adoption of hazard-resistant agricultural practices (e.g. soil and water conservation methods, cropping patterns geared to low or variable rainfall, hazard-tolerant crops) for food security. (Twigg 4.3.5)

Small enterprises have business protection and continuity/recovery plans. (Twigg 4.3.6)

Local trade and transport links with markets for products, labour and services protected against hazards and other external shocks. (Twigg 4.3.7)

Members of resilient communities can take alternative employment (IFRC, 2011, 13)

Members of resilient communities are entrepreneurial (IFRC, 2011, 14)

Members of resilient communities work longer/harder hours and take greater risks (IFRC, 2011, 15)

Members of resilient communities have livelihood support from district or national government (IFRC, 2011, 16)

Members of resilient communities take a job with lower pay (IFRC, 2011, 17)
8.1.3 Improvement actions are implemented to create new or different income generation.

8.2 Youth Development

8.2.1 The community has a youth committee managing the community’s youth development programme.

8.2.2 A member of the youth committee has been appointed with overall responsibility for youth development.

8.2.3 The youth committee meets regularly.

8.2.4 The youth committee meetings are open to all members of the community to attend.

8.2.5 The youth committee is considered effective by community members.

8.3 Natural Resource Management

8.3.1 The community has identified the natural resources that are important for the long term well-being of the community e.g. water sources, soil, forests.

The purpose of this review is to take a snapshot of the environmental conditions at a moment in time to compare against future environmental changes.

The survey may consider the following environmental issues: soil and groundwater, surface waters, land use, man-made drainage structures, areas of special sensitivity, air quality, existence of critical habitats for wildlife, contaminated land.

In resilient communities community members understand the characteristics and functioning of local natural environment and ecosystems (e.g. drainage, watersheds, slope and soil characteristics) and the potential risks associated with these natural features and human interventions that affect them. (Twigg 4.1.1)

8.3.2 The community activities have been identified which may impact local natural resources and/or the wider environment.

8.3.3 The environmental impacts associated with each activity has been identified e.g. contamination of water, soil degradation, deforestation, damage to animals and plants.

8.3.4 Good environmental management practices are in place to ensure the preservation of key natural resources.
Sustainable environmental management practices may include soil and water conservation, sustainable forestry, wetland management to reduce flood risk, maintenance of water supply and drainage systems.

Adopt sustainable environmental management practices that reduce hazard risk. (Twigg 4.1.2)

Preserve biodiversity (e.g. through community-managed seed banks, with equitable distribution system). (Twigg 4.1.3)

Preserve and apply indigenous knowledge and appropriate technologies relevant to environmental management. (Twigg 4.1.4)

Understand the need to have access to community-managed common property resources that can support coping and livelihood strategies in normal times and during crises. (Twigg 4.1.5)

There is an adoption of hazard-resistant agricultural practices (e.g. soil and water conservation methods, cropping patterns geared to low or variable rainfall, hazard-tolerant crops) for food security. (Twigg 4.3.5)

Resilient communities can manage its forests to mitigate landslides, erosion and fires

Resilient communities use water efficiently (IFRC, 2011, 19)

Resilient communities clean their homes and environment to mitigate water and vector borne disease (IFRC, 2011, 20)

Resilient communities maintain rivers, drainage and irrigation systems (IFRC, 2011, 21)

Resilient communities undertake mitigation activities to address landslides (IFRC, 2011, 22)

Resilient communities undertakes mitigation activities to address soil erosion (IFRC, 2011, 23)

Resilient communities undertakes mitigation activities to address drought (IFRC, 2011, 24)

Resilient communities undertake mitigation activities to address vector borne disease (e.g. fogging, nets or repellent) (IFRC, 2011, 25)

Resilient communities plant mangroves and trees to mitigate against wind, rain and tsunamis (IFRC, 2011, 26)

8.4 Food Security

8.4.1 The community has reserve stocks of staple foods for emergency use.

A resilient community has food supplies and nutritional status secure (e.g. through reserve stocks of grain and other staple foods managed distribution system during food crises). (Twigg 4.2.3)

Resilient communities stockpile food and medical supplies (IFRC, 2011, 38)
Resilient communities can provide relief items (food, shelters, medical etc) to affected people (IFRC, 2011, 40)

Resilient communities can request assistance to provide water when required (IFRC, 2011, 41)

Resilient communities have access to food from external agencies (IFRC, 2011, 43)

Resilient communities can cook and distribute food internally (IFRC, 2011, 44)

Resilient communities have access to general relief items (food, shelters, medicine etc) (IFRC, 2011, 45)

8.4.2 The community has access to a safe water supply in the event of an emergency.

Communities should ensure they have alternative sources of safe water for use during a disaster e.g. borehole, rainwater harvesting, water purification.

A resilient community has access to sufficient quantity and quality of water for domestic needs during crises. (Twigg 4.2.4)

Resilient communities store water (IFRC, 2011, 39)

Resilient communities can request assistance to provide water when required (IFRC, 2011, 41)

8.5 Financial Services

8.5.1 Community members have access to financial services e.g. saving accounts, money transfers.

Household and community asset bases (income, savings, convertible property) are sufficiently large and diverse to support crisis coping strategies. (Twigg 4.4.1)

Costs and risks of disasters are shared through collective ownership of group/community assets. (Twigg 4.5.2)

There are community/group savings and credit schemes, and/or access to microfinance services. (Twigg 4.5.3)

Community members have access to affordable insurance (covering lives, homes and other property) through insurance market or microfinance institutions. (Twigg 4.5.4)

A community disaster fund is available to implement risk reduction, response and recovery activities. (Twigg 4.5.5)

Community members have access to money transfers and remittances from household and community members working in other regions or countries. (Twigg 4.5.6)

Members of a resilient community have savings or access to grants and loans (IFRC, 2011, 9)

8.6 Social Protection
8.6.1 The community has a system of social welfare.

Social welfare systems include informal systems (e.g. individual, household, family), government welfare schemes and community based organisations (e.g. disaster committees, burial societies, women’s associations, faith groups or buddy systems) to assist particularly vulnerable people.

Mutual assistance systems support risk reduction directly through targeted risk reduction activities, indirectly through other socio-economic development activities that reduce vulnerability, or by being capable of extending their activities to manage emergencies when these occur. (Twigg 4.4.1)

Mutual assistance systems are in place that cooperate with community and other formal structures dedicated to disaster management. (Twigg 4.4.2)

Community has access to basic social services (including registration for social protection and safety net services). (Twigg 4.4.3)

Established social information and communication channels are in place to ensure vulnerable people not isolated. (Twigg 4.4.4)

A resilient community undertakes mitigation activities to address social problems (IFRC, 2011, 28)

8.7 Violence Prevention

8.7.1 The community has implemented a community policing or violence prevention programme.

A resilient community has high levels of personal security and freedom from physical and psychological threats. (Twigg 4.2.2)

9. Review and Improve

9.1 Lessons Learned

9.1.1 The community has a learning from events system to learn from unintended events.

Community retains a collective knowledge and experience of management of previous events (hazards, crises). (Twigg 4.4.5)

9.1.2 The community has identified the types of events to be reported and investigated e.g. fatalities, accidents, near misses, ill heath, failure of assets/barriers, property damage, environmental events, substandard conditions.

9.1.3 Reports identify the basic causes of loss and necessary improvement actions.
9.1.4 Investigation reports are communicated within the community and externally.

9.2 Review

8.2.1 The community measures its performance against its goals (sub process 1.1).

The community’s success or otherwise in risk reduction is measured by comparing its actual results against its goals. (see 1.1.2)

Community leaders should periodically also review their performance in the 9 elements of their “community resilience management system” as measured by this assessment to identify its strengths, weaknesses and areas for improvement.

8.2.2 Reports of results are communicated to relevant stakeholders.

Achievement in risk reduction should be recognised and celebrated within the community and externally.

8.2.3 Actions are identified to improve risk reduction.

9.3 Reporting to Stakeholders

8.3.1 The community reports its performance to its stakeholders (identified in sub process 1.3).

There may be legislative requirements to report accident or health data. In addition reports may be sent to may be sent to local government, donors, NGOs and others as required.
### 7.3 Lautoka Community Resilience Assessment

#### Community Resilience Alpha Assessment

<table>
<thead>
<tr>
<th>Possible Points</th>
<th>Available Points</th>
<th>Score</th>
<th>% Score</th>
<th>Evidence/Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>248</td>
<td>248</td>
<td>105</td>
<td>42</td>
<td></td>
</tr>
</tbody>
</table>

#### Leadership

<table>
<thead>
<tr>
<th>1. Vision and Goals</th>
<th>1.1 The community has a defined vision addressing long term risk reduction</th>
<th>220 No</th>
<th>Stated verbally, not verified</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.2 The community has defined goals for risk reduction</td>
<td>220 No</td>
<td>Stated verbally, not verified</td>
</tr>
<tr>
<td></td>
<td>1.3 Community goals are specific and measurable</td>
<td>220 No</td>
<td>No evidence</td>
</tr>
<tr>
<td></td>
<td>1.4 The vision and goals have been effectively communicated within the community</td>
<td>220 No</td>
<td>No evidence</td>
</tr>
<tr>
<td></td>
<td>1.5 The vision and goals have been effectively communicated to external stakeholders</td>
<td>220 No</td>
<td>No evidence</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1.2 Community Committees</th>
<th>1.2.1 The community has a central committee to manage the overall activities of the community</th>
<th>221 No</th>
<th>Done</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.2.2 The chairperson of the central committee has been appointed with overall responsibility for the wellbeing of the community</td>
<td>221 No</td>
<td>Done</td>
</tr>
<tr>
<td></td>
<td>1.2.3 The central committee has representatives from all groups within the community</td>
<td>222 Yes</td>
<td>Meets regularly</td>
</tr>
<tr>
<td></td>
<td>1.2.4 Central committee meetings are open to all members of the community to attend</td>
<td>221 Yes</td>
<td>Open to the public and attended by 150 to 300 community members.</td>
</tr>
<tr>
<td></td>
<td>1.2.5 The central committee meets regularly</td>
<td>221 No</td>
<td>No evidence</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1.3 Stakeholder Engagement</th>
<th>1.3.1 The community has identified its key stakeholders e.g. government, business, Red Cross, NGOs</th>
<th>221 No</th>
<th>Done</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.3.2 The community has regular consultation with key stakeholders</td>
<td>221 No</td>
<td>Done but not systematically</td>
</tr>
<tr>
<td></td>
<td>1.3.3 Community Leaders ensure stakeholders understand the expectations of the community</td>
<td>221 Yes</td>
<td>Done but not systematically</td>
</tr>
<tr>
<td></td>
<td>1.3.4 The community aligns its activities with the expectations of its stakeholders</td>
<td>221 No</td>
<td>No evidence but based on media poll, community members consider committees are well run</td>
</tr>
<tr>
<td></td>
<td>1.3.5 Risk reduction partnerships are effective</td>
<td>221 No</td>
<td>No evidence but based on media poll, community members consider committees are well run</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1.4 Community Risks</th>
<th>1.4.1 The community has identified the major risks to its well-being e.g. access to safe water, food, sanitation, health services and secure livelihoods</th>
<th>220 No</th>
<th>Stated verbally but partial. No evidence.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.4.2 Community members participate in risk assessment.</td>
<td>220 No</td>
<td>No evidence</td>
</tr>
<tr>
<td></td>
<td>1.4.3 The potential losses (people, property, economics, environment) associated with each risk has been identified</td>
<td>220 No</td>
<td>No evidence</td>
</tr>
<tr>
<td></td>
<td>1.4.4 The likelihood of the loss occurring has been evaluated</td>
<td>220 No</td>
<td>No evidence</td>
</tr>
<tr>
<td></td>
<td>1.4.5 Risks are communicated to necessary internal and external stakeholders</td>
<td>220 No</td>
<td>No evidence</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1.5 Community Plan</th>
<th>1.5.1 A community planning process is in place</th>
<th>221 No</th>
<th>Done</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.5.2 The community plan is consistent with goals and includes risk reduction activities</td>
<td>221 Yes</td>
<td>No evidence</td>
</tr>
<tr>
<td></td>
<td>1.5.3 The plan is adequately resourced</td>
<td>221 Yes</td>
<td>Fiaz: “We have lots of plans but not enough resources to implement plans”</td>
</tr>
<tr>
<td></td>
<td>1.5.4 The community has a system to safeguard key documents</td>
<td>220 No</td>
<td>No evidence</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1.6 Leadership Commitment</th>
<th>1.6.1 Community leaders regularly visit the homes and community spaces of individual community members and discuss risk reduction issues</th>
<th>221 Yes</th>
<th>Fiaz recruits people to his committees. “I don’t want people to join (my committees) just for the name. I want people’s commitment, dedication, sacrifice…Committee members are the eyes and ears of the people. We are not rewarded in any way. It is in our own cost and our own time”. Fiaz has 20 advisory councillors reporting to him</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.6.2 Community leaders discuss and plan risk reduction activities in community meetings</td>
<td>220 No</td>
<td>Done but not systematically. Committee meetings well organised</td>
</tr>
<tr>
<td></td>
<td>1.6.3 Community leaders are trained in risk reduction topics</td>
<td>220 No</td>
<td>No evidence</td>
</tr>
<tr>
<td></td>
<td>1.6.4 Community leaders track improvement actions to completion</td>
<td>220 No</td>
<td>Verbally stated that improvement activities followed up in committee meetings</td>
</tr>
</tbody>
</table>

#### Communication

<table>
<thead>
<tr>
<th>2. Communication</th>
<th>2.1 The community uses appropriate channels to communicate with internal and external stakeholders (e.g. meetings, newsletter, personal visits, mobile phone)</th>
<th>221 Yes</th>
<th>Fiaz presents on a weekly radio programme. Advisory councillors have regular informal meetings with community members, bus drivers pass on key messages, mobile phone text messaging. External communication is not done systematically. It depends on personal and ad hoc meetings between community leaders</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>2.1 Communication System</th>
<th>2.1.1 Community uses appropriate channels to communicate with internal and external stakeholders e.g. meetings, newsletter, personal visits, mobile phone</th>
<th>221 Yes</th>
<th>Fiaz presents on a weekly radio programme. Advisory councillors have regular informal meetings with community members, bus drivers pass on key messages, mobile phone text messaging. External communication is not done systematically. It depends on personal and ad hoc meetings between community leaders</th>
</tr>
</thead>
</table>

#### Community Meetings

<table>
<thead>
<tr>
<th>2.2 Community Meetings</th>
<th>2.2.1 Most community members attend community meetings</th>
<th>220 No</th>
<th>Well attended but no evidence on how many attend out of the total population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.2.2 Community leaders participate in community meetings</td>
<td>222 Yes</td>
<td>Meetings led by community leaders</td>
</tr>
<tr>
<td></td>
<td>2.3 Risk reduction efforts are discussed in community meetings</td>
<td>220 No</td>
<td>Some examples given.</td>
</tr>
<tr>
<td></td>
<td>2.4 Risk reduction strategies are discussed in community meetings</td>
<td>220 No</td>
<td>No evidence</td>
</tr>
</tbody>
</table>

#### Awareness Campaigns

<table>
<thead>
<tr>
<th>2.3 Awareness Campaigns</th>
<th>2.3.1 A system is in place for conducting awareness campaigns</th>
<th>220 No</th>
<th>No evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.3.2 Awareness campaigns address risk reduction issues</td>
<td>220 No</td>
<td>No evidence</td>
</tr>
<tr>
<td></td>
<td>2.3.3 Awareness campaigns are planned and conducted on a regular basis</td>
<td>220 No</td>
<td>No evidence</td>
</tr>
</tbody>
</table>

#### Legislation

<table>
<thead>
<tr>
<th>3. Legislation</th>
<th>3.1 Community members have access to legal assistance</th>
<th>220 No</th>
<th>No evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.2 Community members are aware of their legal rights</td>
<td>220 No</td>
<td>No evidence</td>
</tr>
</tbody>
</table>

---

**Notes:**

- **Evidence/Comment:**
  - Stated verbally: The statement is made but not documented.
  - Stated verbally but partial: The statement is made but not fully documented.
  - Done: The activity was completed.
  - No evidence: There is no evidence of the activity or statement.

---

**Possible Points:**

- Leadership: 60 points
- Community Committees: 14 points
- Stakeholder Engagement: 10 points
- Community Risks: 10 points
- Community Plan: 8 points
- Leadership Commitment: 8 points
- Communication: 16 points
- Communication System: 2 points
- Community Meetings: 8 points
- Awareness Campaigns: 8 points
- Legislation: 6 points

**Available Points:**

- Leadership: 60 points
- Community Committees: 14 points
- Stakeholder Engagement: 10 points
- Community Risks: 10 points
- Community Plan: 8 points
- Leadership Commitment: 8 points
- Communication: 16 points
- Communication System: 2 points
- Community Meetings: 8 points
- Awareness Campaigns: 8 points
- Legislation: 6 points

**Score:**

- Leadership: 60 points
- Community Committees: 14 points
- Stakeholder Engagement: 10 points
- Community Risks: 10 points
- Community Plan: 8 points
- Leadership Commitment: 8 points
- Communication: 16 points
- Communication System: 2 points
- Community Meetings: 8 points
- Awareness Campaigns: 8 points
- Legislation: 6 points

**% Score:**

- Leadership: 42%
- Community Committees: 42%
- Stakeholder Engagement: 30%
- Community Risks: 30%
- Community Plan: 37%
- Leadership Commitment: 50%
- Communication: 50%
- Communication System: 50%
- Community Meetings: 50%
- Awareness Campaigns: 50%
- Legislation: 50%
### Legal Rights

- Information on their legal rights is communicated to community members e.g. constitutional rights, human rights, women's rights, children's rights, social welfare.

### Health

<table>
<thead>
<tr>
<th>4.1 Health Committee</th>
<th>10</th>
<th>10</th>
<th>6</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1.1 The community has a health committee managing the community’s health and safety programme</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>Verbally stated</td>
</tr>
<tr>
<td>4.1.2 A member of the health committee has been appointed with overall responsibility for the health of the community</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>No evidence</td>
</tr>
<tr>
<td>4.1.3 The health committee meets regularly</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>Every week</td>
</tr>
<tr>
<td>4.1.4 The health committee meetings are open to all members of the community to attend</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>Suggested committee meetings are well attended</td>
</tr>
<tr>
<td>4.1.5 The health committee is considered effective by community members</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>No evidence</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4.2 Health Hazard Identification and Evaluation</th>
<th>8</th>
<th>8</th>
<th>3</th>
<th>38</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.2.1 The activities or conditions which may affect the health of community members have been identified</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>No evidence</td>
</tr>
<tr>
<td>4.2.2 All health hazards have been identified</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>Health hazards well known</td>
</tr>
<tr>
<td>4.2.3 The potential losses associated with each health hazard have been identified</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>No evidence</td>
</tr>
<tr>
<td>4.2.4 The likelihood of the loss occurring has been evaluated</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>No evidence</td>
</tr>
</tbody>
</table>

### Education

<table>
<thead>
<tr>
<th>5.1 Early Childhood Education</th>
<th>22</th>
<th>22</th>
<th>11</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1.1 A system is in place to provide early childhood education to all community members aged 0 to 8 years</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>No systematic provision of early childhood education</td>
</tr>
<tr>
<td>5.1.2 Early childhood education curriculum is comprehensive (and in line with UNESCO guidance)</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>5.1.3 Adequate facilities and resources are available for early childhood education</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

### Management of Physical Assets

<table>
<thead>
<tr>
<th>6.1 Build</th>
<th>20</th>
<th>20</th>
<th>4</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1.1 Physical assets/barriers (e.g. buildings, water provision, sanitation, communication embankments, roads, food storage, water storage) have been built to address the risks identified in sub-process 1.4</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>Done in urban locations but not systematically in rural locations. See results of Physical Barriers Assessment</td>
</tr>
</tbody>
</table>

### Disaster Preparedness

<table>
<thead>
<tr>
<th>7.1 Disaster Committee</th>
<th>40</th>
<th>40</th>
<th>33</th>
<th>81</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1.1 The community has a disaster committee managing the community’s disaster risk reduction programme</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>Active disaster committee in place facilitated by the Fiji Red Cross</td>
</tr>
<tr>
<td>7.1.2 A member of the disaster committee has been appointed with overall responsibility for disaster risk reduction</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>Not verified</td>
</tr>
<tr>
<td>7.1.3 The disaster committee meets regularly</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>Not verified</td>
</tr>
<tr>
<td>7.1.4 The disaster committee meetings are open to all members of the community to attend</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>Not verified</td>
</tr>
<tr>
<td>7.1.5 The disaster committee is considered effective by community members</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>Not verified</td>
</tr>
</tbody>
</table>

### Disaster Needs Assessment

| 8.1 A comprehensive list of possible disaster scenarios has been developed | 4 | 2 | 2 | No evidence |
| 8.2 The community has identified its emergency needs based on a risk assessment of potential disasters | 2 | 2 | 1 | No evidence |

### Emergency Plan

<table>
<thead>
<tr>
<th>9.1 The community has an emergency plan</th>
<th>8</th>
<th>8</th>
<th>8</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.2 The emergency plan has been communicated to relevant stakeholders</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>Not verified</td>
</tr>
</tbody>
</table>

Maintenance of public building is typically the responsibility of government bodies. Other maintenance is organised on an ad hoc basis by central committee who raise resolutions on maintenance issues which are then addressed to the relevant person or organisation.
### 7. Emergency Communications

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1.1</td>
<td>The community has identified all relevant individuals and groups that need to be contacted in an emergency</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>7.1.2</td>
<td>Systems are in place to ensure relevant information is communicated to necessary people in an emergency</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>7.1.3</td>
<td>Alternative communication systems are available e.g. backup power source for mobile phones</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

### 8. Emergency Resources

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>8.1</td>
<td>The community is well informed about and prepared for an emergency</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8.1.1</td>
<td>The community measures its performance against its goals (sub process 1.1)</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8.1.2</td>
<td>The community has evaluated opportunities to create new or different ways to generate income</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8.1.3</td>
<td>Improvement actions are implemented to create new or different income generation to ensure a sustainable income</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8.2</td>
<td>The community has a learning from events system to learn from unintended events</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8.2.1</td>
<td>The community measures its performance against its goals (sub process 1.1)</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8.2.2</td>
<td>A member of the youth committee has been appointed with overall responsibility for youth development</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8.2.3</td>
<td>The youth committee is considered effective by community members</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8.2.4</td>
<td>The youth committee meetings are open to all members of the community to attend</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8.2.5</td>
<td>The youth committee is considered effective by community members</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8.3</td>
<td>Good environmental management practices are in place to ensure the preservation of key natural resources</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8.3.1</td>
<td>The community reports its performance to its stakeholders (identified in sub process 1.3)</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8.3.2</td>
<td>The community activities have been identified which may impact local natural resources and/or the wider environment e.g. water sources, soil, forests</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8.3.3</td>
<td>The environmental impacts associated with each activity has been identified e.g. contamination of water, soil degradation, deforestation, damage to animals and plants</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8.3.4</td>
<td>Good environmental management practices are in place to ensure the preservation of key natural resources</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8.4</td>
<td>The community has reserve stocks of staple foods for emergency use</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8.4.1</td>
<td>The community has reserve stocks of staple foods for emergency use</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8.5</td>
<td>Community members have access to financial services e.g. saving accounts, money transfers</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8.5.1</td>
<td>Community members have access to financial services e.g. saving accounts, money transfers</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8.6</td>
<td>Social Protection</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8.6.1</td>
<td>The community has a system of social welfare</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8.7</td>
<td>The community has implemented a community policing or violence prevention programme</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8.7.1</td>
<td>The community has implemented a community policing or violence prevention programme</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

### 9. Review and Improve

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>9.1</td>
<td>Lessons Learned</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>9.1.1</td>
<td>The community has a learning from events system to learn from unintended events</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>9.1.2</td>
<td>The community has identified the types of events to be reported and investigated e.g. fatalities, accidents, near misses, ill health, failure of assets/barriers, property damage, environmental events, substandard conditions</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>9.1.3</td>
<td>Reports identify the basic causes of loss and necessary improvement actions</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>9.1.4</td>
<td>Investigation reports are communicated within the community and externally</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>9.2</td>
<td>Review</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>9.2.1</td>
<td>The community measures its performance against its goals (sub process 1.1)</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>9.2.2</td>
<td>Reports of results are communicated to relevant stakeholders</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>9.2.3</td>
<td>Actions are identified to improve risk reduction</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>9.3</td>
<td>Reporting to Stakeholders</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>9.3.1</td>
<td>The community reports its performance to its stakeholders (identified in sub process 1.3)</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>
About DNV GL
Driven by our purpose of safeguarding life, property and the environment, DNV GL enables organizations to advance the safety and sustainability of their business. We provide classification and technical assurance along with software and independent expert advisory services to the maritime, oil and gas, and energy industries. We also provide certification services to customers across a wide range of industries. Operating in more than 100 countries, our 16,000 professionals are dedicated to helping our customers make the world safer, smarter and greener.