Case Study of the Philippines National Red Cross

Community Based Disaster Risk Management Programming

Part II: Cost Benefit Analysis

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PART II: TABLE OF CONTENTS

ACRONYMS/GLOSSARY OF TERMS

Acronyms

AusAID	Australian Agency for International Development
BCR	Benefit to Cost Ratio
BDAT	Barangay Disaster Action Teams
BHW	Barangay Health Workers
BHWA	Barangay Health and Welfare Assistants
CBA	Cost Benefit Analysis
CBDP II	Community Based Disaster Management Project, Phase II
CBDRM	Community-Based Disaster Risk Management
DANIDA	Danish International Development Agency
DanRC	Danish Red Cross
DIPECHO	Disaster Preparedness Program of European Commission's Humanitarian Aid Department
DMS	Disaster Management Service
EWS	Early Warning System
FGD	Focus Group Discussion
(H)VCA	(Hazard) Vulnerability and Capacity Assessment
ICDPP	Integrated Community Disaster Planning (or Preparedness) Program
International Federation	International Federation of Red Cross and Red Crescent Societies
LGU	Local Government Unit
M&E	Monitoring and Evaluation
PNRC	Philippines National Red Cross
SpanRC	Spanish Red Cross

Glossary of Terms

Barangay	Community
Purok	Neighbourhood
Re-echo	The training of community members by teams of BDATs or BHWs trained by the PNRC
Sitio	Hamlet
Tanod	Volunteer (auxiliary) police officer

PART II: EXECUTIVE SUMMARY

The International Federation of Red Cross and Red Crescent Societies (International Federation), in partnership with the Philippines National Red Cross (PNRC), undertook a case study of the impact and cost effectiveness of three PNRC community-based disaster risk management (CBDRM) programmes carried out in partnership with three different national societies (the Danish, German and Spanish Red Cross societies) and three different donors (DANIDA, DIPECHO and the German Ministry of Foreign Affairs). A draft cost-benefit analysis (CBA) methodology was piloted as a key feature of the assessment process.

While each programme differed from the others in various ways, all directly or indirectly shared a common objective: to reduce the vulnerability of communities to, and strengthen their capacity to cope with disaster impacts. All three programmes included activities to: create and train local disaster preparedness and response teams (called Barangay Disaster Action Teams or BDATs); conduct a Hazard, Vulnerability and Capacity Assessment (HVCA); prepare local hazard maps; and produce a Barangay Disaster Action Plan (BDAP). Physical mitigation works were incorporated into all of the programmes, including the provision of health and water and sanitation facilities under the Danish-supported programme. The Danish- and German-supported programmes also trained and equipped Barangay Health Workers (BHWs) in the provision of basic health services and the German-supported program extended disaster preparedness and first aid training into schools.

Outcomes of Cost Benefit Analysis

The aim of undertaking the CBA was twofold: firstly, the study aimed to test the applicability of CBA as process that can be used more widely within the Red Cross/Red Crescent, and secondly the study aimed to produce indicative findings on the value of the programmes themselves. Due to considerable data limitations, the CBA could only be carried out on some of the small-scale physical mitigation projects undertaken through the PNRC's CBDRM programmes. The data limitations also meant that significant assumptions had to be made, and the results of the CBA should be viewed as an indicative, rather than as a definitive, basis for decision-making.

Despite these limitations, the analysis produced some interesting and useful indicative findings on the value of these projects. A CBA process was carried out for structural measures in three barangays – a hanging footbridge, a dyke and a sea wall. The results suggest that two of these activities brought a valuable range of quantitative benefits (e.g. protection of assets), in addition to the many qualitative benefits that cannot be valued in the CBA process (e.g. greater sense of safety). The analysis resulted in a range of Benefit to Cost Ratios, from 24 in the case of the footbridge and 4.9 in the case of the sea wall (positive returns), to 0.7 in the case of the dyke (negative return). In the case of the dyke, the negative return may be due to: gaps in the available data; a higher proportion of non-quantifiable benefits; or a possible need to have given greater consideration to maximizing benefits during project design and implementation.

As an early pilot, the process of conducting the CBA did not always go smoothly; a number of lessons were learned to strengthen the application of the methodology in an International Federation context, including improving data collection methods to be able to measure the value of disaster preparedness activities, and ensuring adequate training and technical support to the team conducting the next trial in the Sudan. The process of gathering baseline and monitoring and evaluation data for a CBA potentially could be integrated into existing needs assessment processes and tools, such as (H)VCA, and the Monitoring and Evaluation systems used by the Federation. However, the current level of Monitoring and Evaluation, as well as quantitative calculation and analysis, skills and experience of member

national societies needs to be carefully considered in further developing an impact evaluation and CBA methodology for wider use.

Recommendations for Development of CBA Methodology

1. CBA should be developed as part of wider needs and impact assessment methodologies within the Federation, and not as a stand-alone tool. Existing approaches and tools, such as VCA, potentially could be adapted to include CBA data collection and analysis needs (as was done in the Nepal Red Cross CBDRM programme).
2. Findings from all three pilots of the draft CBA methodology (Nepal, the Philippines and the Sudan) should be collated and reviewed by the International Federation in order to draw overall conclusions and identify next steps.
3. CBA should not be applied across the board to all Red Cross/Red Crescent programmes, but rather programmes should be selected based on the timeframe when they were implemented, the availability of data, and the relevance/applicability of CBA to making future programming decisions in the specific country/region context.
4. For programmes where CBA can add value to the assessment/planning process, training in the methodology should be provided for those national society and/or other personnel undertaking the CBA; additionally, an internal or external technical adviser should be made available to provide support to the data collection and analysis processes.
5. CBA should be incorporated into the needs assessment, design and monitoring and evaluation processes from the outset of a programme, wherever possible, to ensure the accuracy and reliability of post-programming assessments.
6. If CBA is to be integrated into broader qualitative effectiveness or impact evaluation processes, then the capacity of the national society to carry out such evaluations should also be assessed.

OBJECTIVES OF THE STUDY

The International Federation of Red Cross and Red Crescent Societies (International Federation), in partnership with the Philippines National Red Cross (PNRC), undertook a case study of the impact and cost effectiveness of 15 years of PNRC community-based disaster risk management (CBDRM) programming (Annex 1:TOR). The objectives were:

1. To document the evolution of the PNRC's Integrated Community Disaster Preparedness Programme (ICBDPP), touching on the approach to planning, implementation and follow-up;
2. To identify the key aspects and outputs of the program's evolution that have contributed towards sustainable outcomes leading to the enhanced awareness and capacity of at-risk communities; and
3. To undertake an impact and cost-benefit analysis of the ICBDPP program.

The case study was also intended to contribute to a Federation-wide effort to improve disaster risk reduction performance measurement and impact analysis.[1] For this purpose, a draft cost-benefit analysis (CBA) methodology was piloted as a key feature of the assessment process. The methodology was based on lessons learned from conducting a community-based CBA with the British and Nepal Red Cross Societies, as well as field testing of a tool that is currently under development by Oxfam America. More detailed information on the draft methodology can be obtained from the Disaster Preparedness and Policy Department of the IFRC Secretariat.

The findings of the case study are presented in two separate, but complementary, volumes. Part I outlines the results of the qualitative impact assessment, including an analysis of the different CBDRM models used over time. Part II summarises the outcomes of the CBA; it also provides an assessment of, and recommendations for, the future development of Federation-wide approaches to impact assessment and CBA. The annexes to both volumes can be found in Part III.

BACKGROUND

Disaster Context

The Philippines is the second most disaster-prone country in South East Asia and among the most-disaster prone in the world. A World Bank analysis found that large percentages of the population reside in disaster-prone areas that are exposed to multiple hazards; e.g. 36.4% of the population is exposed to three or more hazards and 73.8% of the population are exposed to two or more hazards.[2]

The Philippine archipelago, comprised of more than 7,100 islands, lies within the Pacific Ring of Fire and between two major tectonic plates. The country is affected by typhoons, earthquakes, landslides, tsunamis and volcanic eruptions. Since 2000, flooding has become the most prevalent disaster occurrence in the country, while earthquakes kill the most per event and cause the highest economic loss (World Bank, 2005). Many of the islands lie at only a few meters above sea level, meaning any rise in ocean levels will have significant consequences for the country.

Poverty and inequality contribute to the vulnerability of Filipinos to natural hazards. The Philippines ranked 105 out of 182 countries on the 2009 Human Development Index, with

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[1] The objective of this global initiative is "to globally map and quantify, on an on-going basis, International Federation DRR programmes and activities, including monitoring of performance, impacts and resultant increases in community safety and resilience."

[2] World Bank (2005). *Natural Hazards Hotspots: A Global Risk Analysis* (Disaster Risk Management Series no.5), pp 4-12.

45 per cent of the population of 88.6 million living on less than USD 2/day and 25 percent living below the national poverty line. The Philippines also has one of the highest levels of income inequality in Asia, with the poorest 20 per cent of the population accounting for only five per cent of total income (AusAID website, 2007). Maternal mortality is common and many families have limited or no access to preventive health care. Civil conflict, economic downturns, and global food price rises have further contributed to poverty and inequity.

While natural hazards are part of the Philippines reality, human settlement patterns and weak environmental management (such as denuded forests) also aggravate risks. For example, high population density along the Philippines' 17 000 km coast line has increased the risk and vulnerability of people to tidal surges (some associated with seasonal typhoons). The overall trend in the Philippines is a rise in the frequency and impact of disasters.

Role of PNRC

The PNRC was founded in 1947 and has chapters in all 77 provinces of the Philippines. The PNRC provides major services in the areas of: blood, disaster management, safety, volunteerism, community health and nursing and social services. It is particularly recognized for its strengths in the provision of disaster relief and blood bank services.

The PNRC is the only non-governmental member of the Philippine National Disaster Coordinating Council. The PNRC is mandated, under Presidential Decree 1566, with responsibility for: conducting disaster leadership training courses; assisting in the training of Disaster Coordinating Councils at all levels; assisting in providing emergency relief to disaster victims; and making blood and blood products available.

Description of Programmes

The case study focuses on three separate CBDRM projects/programmes undertaken by the PNRC in partnership with three different national societies and three different bilateral donors, and spanning a period of approximately 15 years. These included:

1. Integrated Community Disaster Planning Programme (ICDPP), Phases I-III, 1994-2004, supported by the Danish Red Cross (DanRC) and DANIDA (referred to as 'the Danish-supported ICDPP' in the case study); [3]
2. Community Based Disaster Preparedness Project, Phase II (CBDP II), 2003-2004, supported by the Spanish Red Cross (SpanRC) and DIPECHO;[4]
3. Integrated Community Disaster Preparedness Programme, 2007-09, supported by the German Red Cross (GerRC) and the German Ministry of Foreign Affairs (referred to as ' the German-supported ICDPP' in the case study). This programme has also been supported by DIPECHO, but the communities included were not covered by the assessment team. A new phase is currently under planning.

Another project of the PNRC also commenced implementation in 2005, 'Project 143,' with activities carried out in some of the same barangays as those covered by the three CBDRM programmes. Project 143 is not included in the case study, but reference will be made to it, where relevant to the analysis. The evolution of the programming is summarized in Annex 1.

While each programme differed from the others in various ways, all directly or indirectly shared the following broader common objectives:

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[3] Various documents written about the programme over the years have switched between using the word 'planning' and 'preparedness' but the official title of the project used the word 'planning'.
[4] DIPECHO = DP Program of European Commission's Humanitarian Aid Department

- To strengthen the capacity of communities to cope with disaster impacts; and
- To reduce the vulnerability of communities to disaster impacts.

All three programmes included activities to: create and train local disaster preparedness and response teams (called Barangay Disaster Action Teams or BDATs)[5]; conduct a hazard assessment using a Hazard Vulnerability and Capacity Assessment (HVCA) methodology; prepare local hazard maps; and produce a Barangay Disaster Action Plan. The trained BDATs were provided with basic equipment such as rain jackets, flashlights, and megaphones, except under the CBDM II. The Danish-supported ICDPP also included geophysical mapping activities implemented through a combination of PNRC staff and private sector companies.

The Danish- and German-supported ICDPPs trained and equipped Barangay Health Workers (BHWs)[6] or Barangay Health and Welfare Assistants (BHWA) to support the provision of basic health services in communities, while such training was not included in the CBDP II. The German-supported ICDPP also extended disaster preparedness and first aid training to primary and secondary school teachers.

Small-scale physical mitigation works were incorporated into all of the projects, albeit in different forms: 1) hazard reduction and health-related projects in the Danish- and German-supportedICDPPs; 2) hazard reduction projects in a small proportion of barangays supported through CBDM II when some undisbursed funds became available; and 3) rehabilitation/construction of buildings to serve as multi-purpose evacuation centres under the German-supported ICDPP.

Project 143 aims to increase the PNRC volunteer presence at the barangay level, particularly in more hard-to-reach locations. It is an effort to recruit and train 44 volunteers in every village comprised of one coordinator, nine first-responders to emergencies (BDATs), nine BHWAs, and 25 all-round team members who also engage in the promotion of voluntary blood donation. This volunteer presence is intended to: cope with the scale of emergency operations required to respond to the effects of climate change and to enable the PNRC to engage more in preventive health initiatives at community level.

METHODOLOGY

Overview

CBA is an economic tool used to compare the benefits against the costs of a given project or activity. CBA aims to value the economic benefits of a project (rather than simply the financial benefits), and therefore seeks to take account of any changes in human wellbeing arising from a given project or activity. In practice, it can be difficult to measure changes in human wellbeing in a quantitative manner. While CBA was developed as a pre-project decision making tool, it is increasingly being used both before an investment is made, to choose between project options (referred to as “ex-ante”), or after an activity has already been undertaken, to demonstrate the economic value of that activity (referred to as “ex-post”).

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[5] ‘*Barangay*’ is the Filipino term for community

[6] The term BHW refers to a person who has undergone training programs under any accredited government and non-government organization and who voluntarily renders primary health care services in the community after having been accredited by the Government of the Philippines (Republic Act No. 7883, 20 February 1995).

CBA Methodology

The CBA was conducted in three phases: preparation, field work and data analysis. The ***preparation phase*** entailed a review of key project documents related to the programmes and those of other agencies engaged in CBDRM programming in the Philippines (Annex 3), as well as detailed discussion with, and briefing of, two team members by the CBA consultant on how to apply the draft methodology to the PNRC ICDPP context.

The ***field work*** for both the impact assessment (See Part I) and the CBA took place over September-October 2009 and included 15 barangays across eight municipalities in the three provinces of Antique (CBDP II), Palawan (Danish-supported ICDPP, Phase II and German-supported ICDPP) and Surigao del Norte (Danish-supported ICDPP, Phase II). Three other barangays, one per province, that were not programme beneficiaries also were included in order to compare the capacity of communities to mitigate and cope with the impacts of natural disasters 'with' and 'without' the assistance provided (control groups). The PNRC selected the fieldwork sites, using a combination of purposive and convenience sampling. Communities were chosen based on differing geographic locations, time when they entered the program and ease of access, given the limited time available for the mission.

The main tools used to conduct the assessment included:

- Collection of secondary data from LGUs and Barangay Councils;
- Semi-structured key informant interviews with 28 (16 male/12 female) PNRC staff, local government partners and donors/partner national societies or PNS (list at Annex 4);
- A total of 44 focus group discussions (FGD) with 184 male and 283 female beneficiaries and with 82 BDAT and BHW volunteers trained through the programmes (Table 1); and
- Structured observation within each barangay, using transect walks.

The case study development process was led by two independent consultants. The field team included International Federation and PNRC staff, as well as a communications specialist; full details of the team composition can be found in Annex 5.

Table 1 Focus Group Discussions

Municipality	Barangay	Male	Female	Mixed	BDAT/BHW	TOTAL
Antique						
Sibalom	Alangan*	---	---	13 M ; 9 F	---	22
	Bongsod	10	18	---	12 M ; 0 F	40
	Indag-an	12	9	---	2 M; 3 F	26
	Pis-anan	7**	12	---	8 M; 2 F	29
Hamtik (Control)	Mapatag	15	12	---	---	27
Palawan						
Quezon	Malatgao	14	12	---	6 M; 3 F	35
	Alfonso XIII	4	6	---	3 M; 5 F	18
	Maasin	5	12	---	1 M; 1 F	19
Roxas	Abaroan	15	15	---	---	30
	Tagumpay	8	8	---	3 M; 2 F	21
El Nido (Control)	Bucana	15	8	---	---	23
Surigao del Norte						
Burgos	Bitaug	6	30*	---	3 M; 7 F	46
	Poblacion 1 & 2*	24	37	---	---	61
	San Mateo	6	17	---	3 M; 3 F	29
San Isidro	Roxas	14	13	---	2 M; 4 F	33
	Santa Paz	8	37	---	3 M; 6 F	54
Pilar (Control)	Jaboy	8	28	---	---	36
TOTAL		**171**	**274**	**13 M ; 9 F**	**46 M; 36 F**	**549**

* Estimate
** All *Tanod* (volunteer police)

With specific relevance to the CBA, the field work aimed to collect data to establish two scenarios:

- Hazards and their impacts on communities "**without**" any PNRC DRR measures; and
- The reduction in hazard impact "**with**" PNRC DRR measures.

Field tools were designed to facilitate data collection on relevant hazards (their magnitude and frequency), the impact of those hazards both without and with the CBDRM programmes (using the UK Department for International Development's *Sustainable Livelihoods Framework*[7] categories to ensure that a full range of both qualitative and quantitative impacts were included, as relevant), and finally a valuation of those impacts that could be quantified, based on the type of impact and availability of data. It is important to note that, wherever data was provided in a range, the more conservative end of the range was used to ensure that all analysis was producing conservative figures (e.g. if a protection measure was saving 25-50 houses each year, the analysis assumed that 25 houses were saved).

The costs of specific interventions were estimated both in terms of the initial capital outlay (programme inputs, government inputs, as well as any food for work or in kind contributions), as well as ongoing variable costs (for example maintenance) necessary to maintain the works over their lifetime. It is important to note that, in most cases, the costs associated with the projects involved spending money in the community (labor, materials) and therefore to some degree these costs also *benefit* the communities involved. However, this type of benefit is very difficult to quantify, and therefore is noted but not included in the CBA.

The ***data analysis*** was conducted by offsetting benefits against costs, as determined above, over the lifetime of the project, taken as the lifetime of the longest lived component within the CBDRM programme. For example, if the programme involved the building of a dyke, it was

[7] UK Department for International Development (DFID), 1999. *Sustainable Livelihoods Guidance Sheets*

assumed that benefits would accrue over the lifetime of the dyke, subject to regular maintenance being carried out. The costs and benefits were added up over this project lifetime; however, these figures need to be discounted over time, to reflect the fact that a dollar today is valued more highly than a dollar tomorrow. The discount rate was assumed to be 10% for the baseline analysis, as this is a figure typically used by development banks undertaking similar projects. The findings are reported in terms of a Benefit to Cost Ratio – a ratio greater than 1 indicates that the project was worth investing in from a *financial* perspective, whereas anything less than one indicates a negative financial return.

The data analysis also involved “sensitivity testing”, in which the key assumptions underlying the analysis were tested. So, for example, where the baseline analysis assumed that only 25 houses were protected from physical mitigation measures, the sensitivity analysis would re-examine the findings assuming that 50 houses were protected. The sensitivity analysis also tested the discount rate, as this often has a significant impact on the resulting cost benefit analysis. While 10% is a commonly used figure, there is a strong argument that suggests that a discount rate closer to 0% is more appropriate for development projects, as benefits to future generations should not be given less value than benefits to current generations.

Sensitivity analysis can also be used to test the likely return period of a given hazard, as the benefits associated with any programme activities will only typically accrue when a hazard occurs. This is particularly relevant in risk scenarios with infrequent hazards – for example, a cyclone with an estimated 20-year return period will be unpredictable, and hence sensitivity analysis may be used to test the cost benefit findings in a scenario in which a cyclone occurs every 10 years (e.g. under climate change) and equally every 30 years. However, in the case of the Philippines, the areas studied are subject to flooding on a yearly basis (in other words, there is a 100% probability of hazard occurrence), and therefore avoided losses were easily observed and furthermore this type of sensitivity testing was not necessary.

Limitations of methodology

The limited time and financial and human resources available did not allow the use of statistical sampling methods to select the project locations for the case study; thus, a certain amount of selection bias can be assumed and the results should only be considered reliable for those communities visited. However, enough of the communities visited had undertaken comparable activities to establish common broader trends in the findings.

In communities covered by the Danish-supported ICDPP and CBDP II programmes, some beneficiaries had difficulty recalling information from 6-10 years ago. A lack of baseline programme or LGU data from this same period made triangulation more difficult; while the team undertook a baseline reconstruction, some recall bias can be expected in the findings.

This also meant that insufficient quantitative data was available in many cases to carry out CBA calculations; three physical mitigation projects were ultimately selected for the CBA, where enough information was available. CBA can also be used to assess non-structural interventions (see for example first aid training in the Nepal Red Cross CBA[8]); however, in this particular case, the data was not available. Due to the significant constraints on the PNRC following major typhoons on Luzon, it was not possible to verify certain data, or fill these data gaps, so the CBA often relies on rough estimates, derived from the best data available. Hence the findings should be viewed as indicative, rather than conclusive. Overall, as this was the first time that the International Federation field-tested the draft CBA methodology, there were a number of ‘lessons learned’ regarding its adaptation and refinement for use in a Red Cross/Red Crescent context.

[8] Cabot Venton et al, 2008

Language variations also made finding sufficient and appropriate interpretation support for all team members challenging. The limited experience of most team members in conducting evaluations required some on-the-job training and use of a range of techniques in the field to compensate for this and to verify the accuracy of the data collected.

COST BENEFIT ANALYSIS: Findings

Case Study 1: Barangays Pis-anan and Indig-an, Sibalom, Antique Province

Pis-anan and Indig-an experience regular flooding – typhoons come 2-3 times a year, usually during the months of June to October. The impacts of these events are significant – houses, personal property, crops and livestock are damaged or destroyed every year, and large floods/typhoons have been known to destroy 100% of assets. Indig-an is cut off by the floods; hence access to markets, education, and medical facilities is interrupted.

In 2004, the community decided to build a hanging footbridge (under CBDP II), to allow safe crossing of the river in times of floods. The footbridge has brought a wide range of positive impacts to the community – including facilitating access to markets to sell crops, allowing access to medical treatment where necessary (particularly in the case of pregnant women who were previously not able to get sufficient antenatal care), and increasing enrolment in school.

Table 2 below describes the specific elements at risk to flooding in these two communities, comparing the scenarios without and with the hanging footbridge. Those elements that can be quantified are then included in the quantification table that follows.

Hanging Footbridge, Pis-anan

Table 2: Description of Qualitative and Quantitative Elements at Risk, Footbridge, Pis-anan/Indig-an

Elements at risk	Description of elements at risk – *without* scenario	Description of elements at risk – *with* scenario	Quantifiable? (elements that can be included in the CBA)
Physical	Houses, personal property, crops, livestock destroyed.	Houses, personal property, crops, livestock destroyed (footbridge does not help).	N/A
Financial	Loss of income from crops and fishing – interrupted for months.	Number of kids enrolled in preschool through high school has increased. Increase in number of stores and market accessibility for farmers. Still some loss of income - footbridge does not protect crops/fishing, but does increase market access.	Yes Yes
Human	Some children died in Indig-an in strong floods. Some diseases and lack of food. Pregnant women did not have prenatals from May to Oct.	Between 2006 and present, 100% having prenatals. Immunizations and nutritional status of children have increased.	No – not enough data.
Natural	Soil erosion especially along river bank, loss of trees.	Soil erosion especially along river bank, loss of trees (footbridge does not help).	N/A
Social	None	Increased sense of safety; no longer scared to send children to school.	No

Table 3: Valuation of Impacts of Hanging Footbridge, Pis-anan/Indig-an

Magnitude of Impact "Without"	Magnitude of Impact "With"	Values	Assumptions	Detailed Calculation of Annual Benefit
No secondary school age children in Indig-an can go to school in Pis-anan during flood times.	Now all secondary school age children in Indig-an can go to school during flood times, and also drop out rate for whole year has dropped from 16% to 1%.	• 118 children under age 18 • 43% of school-aged children are in secondary school. • Average daily wage rate: P160-200. • Official number of school days in the school year is 200.	Assume all children are now enrolled in school and therefore 50 children are secondary school age (43% of 118). Approximately 90 days per year the river is dangerous to cross (most of wet season). Assume the value of an education day is approximately half of average wage rates (or P80)	Increased attendance during flood times: • Without: 50 children*90 days*P80/day = P360,000 • With: 0 losses • **Benefit = P360,000** Drop out rate decreased: • Without: 16% of 50 children drop out each year, 110 school days (90 lost to flooding). 16%*50*110*P80 = P70,400. • With: 1% of 50 children drop out. 1%*50*110*P80 = P4,400 • **Benefit** = P70,400-P4,400 = **P66,000**
Farmers in both Pis-anan and Indig-an cannot access fields/ market[9]	Bridge allows access to fields/market for harvesting and selling crops.	Number of hhs Pisanan=416 Number of hhs Indig-an=113 Crops lost due to lack of access to market: 20 bags in a given wet season, value P200-300 per bag.	Each hh loses 20 bags of rice (this is based on anecdotal evidence). All HHs farm rice.	Increased access to markets for selling rice: 529 hhs*20 bags of rice*P200 per bag = **P2,116,000**

[9] Evidence during field visits suggested that farmers in both barangays are unable to access crops and market, because the location of fields can be on both sides of the bridge. Hence the full number of households in both locations is considered for the analysis.

The bridge cost a total of P870,000 to build (see Table 4 below for a breakdown of costs).

Table 4: Costs Associated with Hanging Footbridge, Pis-anan/Indig-an

DIPECHO contribution (materials)	P650,000
Local Government Unit (includes inputs of 3 technical specialists)	P100,000
Provincial Government	P 50,000
Barangay Councils of Pis-anan and Indig-an (estimate of in kind contributions)	P 20,000
Building of Gabion baskets (local congressman)	P 50,000
TOTAL COST	**P870,000**

The bridge requires regular maintenance, including rust-proofing and cleaning the verges. It is estimated that these variable costs amount to P2,000-3,000 per year (the upper end of this range is assumed to allow for a more conservative analysis). It is assumed that the hanging bridge, with regular maintenance, should be viable and bring benefits to the communities for approximately 15 years, and the discount rate is assumed to be 10%.

The Benefit to Cost Ratio (BCR), based on the above figures, is 24; in other words, P24 are realized for every P1 invested in the footbridge. A sensitivity analysis of the discount rate leads to a BCR ranging from 19 (discount rate of 15%) to 31 (discount rate 5%). These ratios make a very strong financial argument for the footbridge. The benefits that can be quantified far outweigh the costs. The greatest area of benefit is the ability to access the market to sell crops. While this figure is a rough estimate, due to data limitations, it was corroborated by several village members; in fact, it should be elevated as other crops were also lost without the bridge (eg. nuts, bananas, vegetables), but insufficient data was available to include these in the estimate. However, even if it is assumed that this figure is overestimated, and the benefits from access to fields/market are reduced by half, the analysis still yields a BCR of 14.

Further, there were a number of additional benefits that could have been included if data had been available. For example, it was suggested that: attendance of children at preschool in Tang-anan (a *sitio* within the area) had increased significantly; more shops were able to open, contributing to the local economy; and health benefits had improved through increased immunization and pre-natal care. There was also some suggestion that children had died in previous years crossing the river, whereas now they are able to cross safely. When the further qualitative benefits are also considered (as outlined in Table 2 above), there is clearly a strong argument for this particular measure.

Case Study 2: Barangays Poblacion 1&2, Burgos, Surigao Del Norte Province

Poblacion 1&2 are located on the coast, and suffer from annual typhoons and flooding/sea surges, primarily during the rainy season (October to December). These events regularly damage houses and crops, especially those located closest to the sea front.

In 1999-2000, Poblacion 1&2 decided to build a sea wall as part of the Danish-supported ICDPP (Phase II). This sea wall is approximately 200-300m in length and is estimated to protect approximately 25 houses and associated crops along the sea front, as well as a further 25-50 houses and household vegetable crops located in the streets just behind this row of sea front houses. The main crop fields of many of these houses are outside the residential area, as is the case in many Philippine villages where sharecropping dominates. Losses are avoided every year due to the regular occurrence of flood events and the proximity of these assets to the ocean front (very vulnerable).

Table 5 below describes the specific elements at risk to flooding comparing the scenarios without and with the sea wall. Those elements that can be quantified are then included in the quantification table that follows.

Seawall, Poblacion 1&2

Table 5: Description of Qualitative and Quantitative Elements at Risk, Sea Wall, Poblacion 1&2

Elements at risk	**Description of elements at risk – *without* scenario**	**Description of elements at risk – *with* scenario**	**Quantifiable? (elements that can be included in the CBA)**
Physical	Houses on ocean side damaged; some/minimal losses to household assets; also crop losses and flooding of highway.	25-75 houses and associated crops no longer damaged. Some fish vendors have been relocated behind the sea wall, allowing them to establish some more permanent buildings and operate more regularly.	Yes No – data not available
Financial	Loss of income from crops.	See “physical”.	No change
Human	No deaths or serious injuries reported.	No deaths or serious injuries reported.	No change
Natural	Loss of soil.	Loss of soil.	No change
Social	None reported.	None reported.	No change

Table 6: Valuation of Impacts of Sea Wall in Poblacion 1&2, Surigao del Norte

Magnitude of Impact "Without"	Magnitude of Impact "With"	Values	Assumptions	Detailed Calculation of Benefit
Houses and associated crops damaged by flood waters.	25 to 75 houses and associated crops no longer damaged due to sea wall.	An average house costs between P70,000 to P200,000 to build. Each household owns 5 to 10 banana trees and 5 to 10 coconut trees. Bananas yield 2 crops per year, approximately 100 pieces per tree, worth P120-190 per crop. Coconuts yield 3 crops per year, approximately 10-25 pieces per tree, worth P5-10 per piece.	Cost of damage unknown; hence conservative estimates used (25 houses@P70k each). Assumptions based on observations in market – depends on quality, etc.	Without: 25 houses*P70,000 = P1,750,000 With: 0 losses **Benefit = P1,750,000** Without: 5 banana trees * 2 crops * P120 = P 1,200 With: 0 losses **Benefit = P1,200** Without: 5 coconut trees * 3 crops * 10 coconuts * P5 / coconut = P 1,000 With: 0 losses **Benefit = P750**

The sea wall cost a total of P 2.6m to build (see Table 7 below for a breakdown of costs).

Table 7: Costs Associated with Sea Wall, Poblacion 1&2

Cost	ICDPP-PNRC Counterpart	LGU and Barangay Counterpart	Total
Project Cost	P1,339,606	P 762,761.00	P 2,102,367
Additional funds solicited by LGU (including in-kind labour)			P500,000
TOTAL COST			**P 2,602,367**

The maintenance budget for the sea wall is P 50,000 per year (which includes maintenance of lights and the fish vendor market, and hence is elevated for the purposes of this CBA).

Assuming that the sea wall has a 20-year lifetime, **the CBA yields a ratio of 4.9;** in other words, P 4.9 are realized for every P 1 spent (Annex 7 contains a more detailed table with the cost benefit flows over the project lifetime for the baseline analysis). As with the other analyses, conservative figures have been used. Sensitivity analysis can be used to test two of the more significant underlying assumptions – the number of houses damaged and the discount rate. If we were to assume that 50 instead of 25 houses are protected, the CBA ratio increases to 9.9. If the discount rate is reduced to 5%, the CBA ratio is 6.2 and an increase to 15% results in a CBA ratio of 4.1. Thus the analysis suggests that the investment in the sea wall, and ongoing maintenance over a 20-year lifetime, is cost effective under all scenarios tested.

Case Study 3: Barangay Roxas, San Isidro, Surigao Del Norte Province

Roxas experiences typhoons annually, especially in November and December, resulting in wind damage, and flooding that can last 2-3 weeks at a time. These events have significant impacts on the community, including loss of assets (crops, animals), and contamination of water supplies leading to increased cases of schistosomiasis.

In 1999-2000, the community decided to build a dyke as part of the Danish-supported ICDPP (Phase II). The dyke has resulted in substantial benefits to the community as it has provided protection against flooding, reducing the impacts to crops and health.

Table 8 below describes the specific elements at risk to flooding comparing the scenarios without and with the dyke. Those elements that can be quantified are then included in the quantification table that follows.

Table 8: Description of Qualitative and Quantitative Elements at Risk, Roxas

Elements at risk	Description of elements at risk – *without* scenario	Description of elements at risk – *with* scenario	Quantifiable? (elements that can be included in the CBA)
Physical	Water supply contaminated; roads cut off; damage to structures and crops.	Road not cut off, crops saved, no more cases of Schistosomiasis in kids	Yes – crops saved No data on change in Schistosomiasis cases, benefits of road.
Financial	Loss of income from crops, loss of animals.	See "physical"	N/A
Human	No deaths or serious injuries reported. No school days lost.	No deaths or serious injuries reported. No school days lost.	No change
Natural	None reported.	None reported.	N/A
Social	None reported.	None reported.	N/A

Table 9: Valuation of Impacts of Dyke, Roxas

Magnitude of Impact "Without"	Magnitude of Impact "With"	Values	Assumptions	Detailed Calculation of Benefit
Low lying hhs lost 70% of crops, upland hhs lost 20-30% of crops	No crop losses	218 hhs Losses occurred every 2-3 years. Assume average landholding of 1ha, which produces 15 sacks of rice over 1 harvest. A sack of rice is worth approximately P200-300.	No data available on value of crops, so had to estimate from other data. Assume 20% loss for all hhs as we do not know the number of low lying and upland houses (conservative estimate).	Without: 218 hhs * 20% crops lost * 15 sacks of rice * P200 = P130,800 With: 0 losses **Benefit: P130,800 (every 2-3 years)**

1

Dyke, Roxas

Dyke drainage outlet canal

The dyke was built through a combination of funds, for a total cost of **P495,549**. The barangay maintains the dyke with a budget of P7,000 per year which so far has been sufficient.

Table 10: Costs Associated with Dyke, Roxas

Source	Cost
ICDPP- PNRC counterpart	P297,330
LGU - Municipal counterpart	P118,931
LGU - Brgy. Counterpart (including in kind labour)	P 79,288
Total Cost	**P495,549**

Assuming that the dyke has a 15-year lifetime, the **CBA yields a ratio of 0.67;** in other words, there is a negative return on the investment. Clearly, the dyke brings other benefits that could not be included in the analysis. For example, the evidence suggests that a greater percentage of crops associated with low lying households are protected, but data on the number of low lying households at the time the dyke was built were not available. Similarly, the decrease in disease could have substantial financial impacts (through, for example, reduced medical costs that would offset the cost of the dyke). Sensitivity analysis can be used to test some of these underlying assumptions. For example, if it is assumed that 30% of crops can be saved (as opposed to 20%) every 2 years (as opposed to every 3 years), the CBA increases to 1.5, a more positive finding. Increasing frequency of natural disasters will result in benefits being realised on a more regular basis, and hence increased benefits in relation to the costs.

Nonetheless, the analysis suggests that, unlike the other two case studies, the construction of the dyke may have benefited from greater consideration for how to maximize its benefits. Further to this, the barangay has grown in size, and housing and livestock pens have been allowed to be built in the outlet channel of the dyke's drainage system; some garbage and debris were also visible and the future impact of this could not be measured.

Conclusions from CBA Findings

Due to data constraints, the CBA had to focus on specific case studies of more structural measures, rather than the costs and benefits of the full range of activities carried out in a particular place. Nonetheless, the case studies demonstrate how **quantifiable benefits can vary significantly**, even amongst a group of structural protection measures.

While Roxas produced the lowest CBA, the community really values and maintains the dyke, committing regular maintenance funds to look after it. This highlights the importance of placing the findings of CBA within a wider context, as unquantifiable qualitative benefits, such as a sense of safety from the presence of a dyke, may be substantial. Furthermore, assumptions and timings can have a significant impact on findings. For example, the barangay of Santa Paz in Surigao del Norte chose to build a dyke as part of their programme of activities. While data was not available to do a full CBA of this mitigation work, the focus group discussions revealed that the dyke was providing substantial protection to the barangay. In 2009, the dyke was damaged, and the community members do not have the funds to repair it; hence, the community is now affected by flooding again. Hence, it is possible that if a CBA had been conducted before 2008, it may have indicated a positive return; if a CBA had been conducted after the damage to the dyke, it most certainly would yield a negative return. Taking into account all of these factors, **CBA, if taken out of context, can lead to potentially misleading conclusions.**

Due to data limitations, it was not possible to conduct a CBA of some of the non-structural measures, such as training. Training can have significant quantifiable benefits, for relatively little cost – for example, evacuation training can result in protection of assets and reduction in injuries/lost lives, and first aid training can significantly reduce costs associated with injuries and illnesses (e.g. through treatment of diarrhoea with ORS). However, the time lag in many cases had been too long, and hence natural attrition plus a lack of follow up meant that community members and BDATs reported that many skills had been forgotten or were no longer used, and hence the benefits of training (if any) could not be observed. Furthermore, a lack of baseline data and monitoring and evaluation meant that it was not possible to assess any benefits, even in the absence of follow up training. **The fact that these activities could not be assessed points to 1) the need to collect baseline and monitoring data on impacts of activities, particularly in the case of long-term programmes and 2) the importance of programming that contains elements of follow up with the communities, so that skills are not lost, and benefits are realised over the longer term.**

Analysis of CBA Process

If CBA is carried out as part of a post-CBDRM impact assessment, full consideration needs to be given to the availability of the data required to complete the assessment. The CBA was conducted 10 years after many of the PNRC programme activities were initiated. The memories of programme participants become less reliable after such a long time period, and the availability of local level secondary baseline or monitoring data covering such a long time period is likely to be less, making the primary data hard to cross-check and verify. In order to reliably re-construct a baseline for a CBA, where a pre-intervention CBA has not been done, it is recommended that the International Federation only select projects and activities that have been completed within the past three-five years.

Sufficient time needs to be allocated to training and technical support where fieldwork is being undertaken by people who are not trained in CBA. While the team leader was given some advance briefing on the draft CBA methodology, neither she nor the other team members received training in its use. Time constraints and communication difficulties in the field meant that planned periodic progress reports and discussions with the CBA consultant regarding the data findings and further information needs could not take place. This contributed to both data gaps and the collection and collation of some data that was not relevant to the CBA. While the CBA methodology is being developed, the space and time needs to be allocated in the fieldwork programme to provide periodic backstopping support to those undertaking the field work.

Local government agencies need to be given sufficient time to collate data, especially if a considerable amount of information is being sought and/or covering a long period (5-10 years). It would be preferable to identify the data sets required to measure the actual intervention under study in advance (as is done in impact evaluation) and to forward secondary data requests to the National Society and relevant local level government agencies in advance.

Impact assessment and broader evaluation methodologies and techniques are still under development in the PNRC and this made conducting the CBA a challenge, as the draft methodology assumes a certain level of pre-existing knowledge of these concepts and approaches. As many other National Societies are also at an early stage of development of their M&E systems and processes, the adaptation of the CBA methodology for use by the International Federation will also need to consider this broader context. Likewise, the two pilots carried out to date have not included the compilation and analysis of the data by National Societies, a skill set which may not be readily available in many National Societies and may require considerable capacity-building.

Lessons Learned

- **The CBA process can be highly valuable, adding a more quantitative approach to existing qualitative assessments of CBDRM programming.** Like impact assessment, CBA can also help national society staff to think about programming in terms of outcomes rather than outputs.
- **The case study field work confirmed that CBA should not be used as a stand-alone tool, and must be part of a wider qualitative assessment process**. CBA cannot measure many of the qualitative impacts of a programme, such as gender impacts, and increased confidence and safety. The Sustainable Livelihoods Framework (SLR) provides a thorough framework for ensuring that both qualitative and quantitative benefits of DRR are documented. However, it is important that participatory approaches are used to determine the key areas of benefit under the SLR, and then data collection can focus only on those areas of primary impact, to ensure efficiency in data collection.
- At the same time, **if CBA is to be incorporated into a broader qualitative impact assessment process, adequate time and human resources must be allocated to successfully carry out this work**. As a rough guide, at least one day should be spent in each community visited and the field team should consist of two or more interviewers.
- **CBA is not an off-the-shelf product that can be implemented by following a guide – it requires training and capacity building.** Training in CBA could be combined with training activities on VCA, for instance. Similarly, “CBA champions” could be identified and trained to provide support to other staff.
- **Those conducting a CBA also should have a solid understanding of key principles and good practices for conducting effectiveness or impact evaluations, preferably as part of an established monitoring and evaluation system.** The capacity of a national society to undertake CBA and effectiveness or impact evaluation should be assessed, and an appropriate approach to building the required skills developed.
- **CBA is part of a risk assessment process and therefore uncertainty is inherent.** CBDRM and development programming at a community level requires decision making in the face of a large number of unknowns – hazard impacts and climate change, natural adaptation, and other factors can all have significant impacts on resilience, but cannot necessarily be predicted ahead of time. One of the objectives of CBA is to weigh up these factors and make the best decisions possible in the face of uncertainty using a range of qualitative and quantitative tools.
- **Any process, including CBA, will have methodological limitations, and hence it is vital to ensure that any weaknesses or data gaps in the assessment are identified, fully documented and addressed appropriately.** For instance, the attribution of benefits can be difficult, particularly in a location that has received support from a wide range of actors (for example, the Government of the Philippines undertook intensive programming to decrease the morbidity and mortality of malaria around the same time as the Danish-supported ICDPP was implemented and beyond. If the number of malaria cases has decreased, is this because of the programme’s interventions, the government’s interventions, or a combination of both?). The CBA process requires that a variety of assumptions are made, and these assumptions must be openly stated and clearly presented, so that they can be challenged and tested.
- **The CBA process can be carried out within the framework of wider assessment processes, such as (H)VCA, using many of the same tools.** The process of gathering quantitative data on outcomes or impacts in the field simply requires the introduction of additional lines of questioning (e.g. if crops are being destroyed, what is the value of those crops that are destroyed?). The CBA process can be facilitated by integrating

these types of questions within existing processes, such as VCA and monitoring and evaluation (one of the key outcomes for the British/Nepal Red Cross CBA).

RECOMMENDATIONS

1. CBA should be developed as part of wider needs and impact assessment methodologies within the Federation, and not as a stand-alone tool. Existing approaches and tools, such as (H)VCA, potentially could be adapted to include CBA data collection and analysis needs (as was done in the Nepal Red Cross CBDRM programme).
2. Findings from all three pilots of the draft CBA methodology (Nepal, the Philippines and the Sudan) should be collated and reviewed by the International Federation in order to draw overall conclusions and identify next steps.
3. CBA should not be applied across the board to all Red Cross/Red Crescent programmes, but rather programmes should be selected based on the timeframe when they were implemented, the availability of data, and the relevance/applicability of CBA to making future programming decisions in the specific country/region context.
4. For programmes where CBA can add value to the assessment/planning process, training in the methodology should be provided for those national society and/or other personnel undertaking the CBA; additionally, an internal or external technical adviser should be made available to provide support to the data collection and analysis processes.
5. CBA should be incorporated into the needs assessment, design and monitoring and evaluation processes from the outset of a programme, wherever possible, to ensure the accuracy and reliability of post-programming assessments.
6. If CBA is to be integrated into broader qualitative effectiveness or impact evaluation processes, then the capacity of the national society to carry out such evaluations should also be assessed.