FINAL REPORT

Community Based Flood and Glacial Lake Outburst Risk Reduction Project (CFGORRP)

PIMS #4657 (GEF ID 4551)

March 2018

Nepal

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Document Control

Title:					
Date	**Version**	**Description**	**Prepared by:**	**Reviewed by:**	**Authorised by:**
18/12/17	Draft	Draft Final Report	Bapon Fakhruddin	Govinda Basnet	Bapon Fakhruddin
18/03/18	Final	Final Report	Govinda Basnet	Bapon Fakhruddin	Bapon Fakhruddin

Distribution:

UNDP Nepal copies

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Abbreviations

AMAT	Adaptation Monitoring and Tracking Tool
AEWS	Automated Early Warning System
BZMC	Buffer Zone Management Committee
BZUC	Buffer Zone User Committee
CBDM	Community Based Disaster Management
CBDRR/M	Community Based Disaster Risk Reduction/Management
CBEWS	Community Based Early Warning System
CBFEWS	Community Based Flood Early Warning System
CBO	Community Based Organizations
CCA	Climate Change Adaptation
CDRMP	Comprehensive Disaster Risk Management Programme
CDMC	Community Disaster Management Committee
CFGORRP	Community Based Flood and Glacial Lake Outburst Risk Reduction Project
CPAP	Country Programme Action Plan
DDC	District Development Committee
DRR	Disaster Risk Reduction
DDRC	District Disaster Relief Committee
DEOC	District Emergency Operation Center
DHM	Department of Hydrology and Meteorology
DNPWC	Department of National Parks and Wildlife Conservation
DRM	Disaster Risk Management
DRMC	District Risk Management Committee
DRR	Disaster Risk Reduction
DRRAP	Disaster Risk Reduction Action Plan
DSCO	District Soil Conservation Office
DSCWM	Department of Soil Conservation and Watershed Management
DWIDP	Department of Water Induced Disaster Prevention
DWIDM	Department of Water Induced Disaster Management
ETW	Elevated Tube Well
EWS	Early Warning System
GEF	Global Environment Facility
GLOF	Glacial Lake Outburst Floods
GoN	Government of Nepal
GRMCC	GLOF Risk Management and Coordination Committee
ICIMOD	International Centre for Integrated Mountain Development
IPCC	Intergovernmental Panel on Climate Change
km	kilometre
KU	Kathmandu University
LAPA	Local Adaptation Plan for Action
LDCF	Least Developed Country Fund
LDRMP	Local Disaster Risk Management Plans
LRP	Local Resource Person
LSAR	Light Search and Rescue
M	meters
M&E	Monitoring and Evaluation
MoEST	Ministry of Environment, Science and Technology

MoF	Ministry of Finance
MoFALD	Ministry of Federal Affairs and Local Development
MoFSC	Ministry of Forests and Soil Conservation
MoHA	Ministry of Home Affairs
MoPE	Ministry of Population and Environment
MTR	Mid-Term Review
NAPA	National Adaptation Programme of Action on Climate Change
NEOC	National Emergency Operation Centre
NRs	Nepali Rupees
NSDRM	National Strategy for Disaster Risk Management
NWRS	National Water Resources Strategy
PEB	Project Executive Board
PEP	People's Embankment Programme
PIR	Project Implementation Reviews
PPCR	Pilot Programme on Climate Resilience
PPG	Project Preparation Grant
PSC	Project Steering Committee
RBMF	Results-Based Management Framework
RCCRP	Regional Climate Risk Reduction Project in the Himalayas
RDRC	Regional Disaster Relief Committee
SDG	Sustainable Development Goals
SNP	Sagarmatha National Park
SFDRR	Sendai Framework for Disaster Risk Reduction
TAG	Technical Advisory Group
UNDAF	United Nations Development Assistance Framework
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	U.S. Agency for International Development
USD	United States Dollars
VDC	Village Development Committee
VDRMC	Village Disaster Risk Management Committees

Executive summary

Background

As a standard requirement for all projects implemented by the United Nations Development Programme (UNDP) and financed by the Global Environment Facility (GEF), UNDP initiated this Terminal Evaluation (TE) of the 'Community Based Flood and Glacial Lake Outburst Risk Reduction Project' (CFGORRP). In accordance with the UNDP partnership protocol with the GEF, the final evaluation of the project includes ratings on the project's relevance, effectiveness, efficiency, impact, and monitoring & evaluation. The evaluation has also rated the likelihood of the results (outputs and outcomes) that can be sustained. The most recent UNDP Guidance[1] for Conducting Terminal Evaluations has been applied. The key data of the project are presented in Table A1.

Table A1: Project summary table

Project Title:	**Community Based Flood and Glacial Lake Outburst Risk Reduction Project (CFGORRP)**		
Region:	Asia		
Country:	Nepal	**Finance**	**Total (US$)**
Atlas Award ID:	00069781	**Total allocated resources:**	**26,971,510**
Project ID:	00084148	**Total project finance:**	**7,568,430**
PIMS#	4657	GEF-LDCF Financing:	6,300,000
Start date:	2013	UNDP (in-cash):	949,430
End date:	2017	UNDP/TRAC (in-cash):	319,000
Management Arrangement:	NIM	**Total Co-financing:**	**19,403,080**
PAC Meeting date:	10-Apr-13	UNDP (CDRMP) (in-kind):	7,682,900
Executing Agency (EA):	DHM	NRRC (parallel co-financing):	2,857,811
Implementing Agency (IA):	UNDP	Govt. Nepal/DWIDP (In-kind):	7,000,000
Other Partners Involved:	DNPWC	USAID-ADAPT ASIA (parallel co-financing):	157,369
	DSCWM	ICIMOD (parallel co-financing):	1,705,000

Project description

The CFGORRP is the first project implemented under the GEF-administered Least Developed Countries Fund (GEF-LDCF) after the endorsement of the National Adaptation Programme of Action (NAPA) in 2010. The project was a joint undertaking of the Government of Nepal (GoN), GEF, and UNDP. It was implemented by the Department of Hydrology and Meteorology (DHM) under the Ministry of Population and Environment (MoPE) as the lead Implementing Agency with the following collaborating partners: the Department of Water Induced Disaster Management (DWIDM), the Department of Soil Conservation and Watershed Management (DSCWM), and the Department of National Park and Wildlife Conservation (DNPWC).

The objective of the project was to reduce human and material losses from Glacial Lake Outburst Flood (GLOF) in Solukhumbu district and from catastrophic floods in the Terai and Churia ranges. It had two outcomes/components.

[1] UNDP Guidance for Conducting Terminal Evaluations of UNDP-supported, GEF-financed Projects. http://web.undp.org/evaluation/documents/guidance/GEF/UNDP-GEF-TE-Guide.pdf

Outcome/Component 1 aimed at reducing GLOF risks from Imja Lake. The major outputs included the construction of an artificially controlled drainage system for Imja Lake; development of protocols for GLOF risk monitoring and maintenance of the artificial drainage system; design of a practical, low-maintenance, and gender-sensitive community-based early warning system; training in GLOF risk management; and institutionalization of GLOF risk management skills and knowledge.

Outcome/Component 2 aimed at reducing human and material losses from recurrent flooding events from Churia-originated river systems in flood-prone Terai districts. The flood component consisted of four outputs: sediment control and stabilization of hazard-prone slopes and river banks through structural and non-structural measures; flood proofing and water and sanitation system in selected Village Development Committees (VDCs); institutionalization of flood risk management skills and knowledge; and flood preparedness training in four flood-prone districts.

The project was implemented in 12 former VDCs in five districts. Component 1 was implemented in four VDCs in Solukhumbu district and Component 2 was implemented in eight VDCs of four Terai districts, namely Udayapur, Siraha, Saptari, and Mahottari.

Project findings

Design

The project was designed so that people living in areas vulnerable to climate change and disasters benefit from improved risk management and greater resiliency to hazard-related shocks. Implemented in National Adaptation Programme of Action on Climate Change (NAPA) priority areas, it adopted a blend of hardware (infrastructure) and software (community capacity strengthening), which was a major strength of the design. The two components of the project were diverse and the activities were not interlinked. A greater input of the DWIDM and the DSCWM at the implementation level was essential for effective and sustainable sediment control and stabilization of hazard-prone slopes and river banks. The DNPWC, another collaborating partner of the project, was more involved in the implementation of Component 1 activities.

A shortcoming of the project design was that it did not include an integrated watershed management approach in Component 2. Instead, flood risk management activities were largely concentrated in downstream stretches, although upstream areas are equally important in reducing flood risks at downstream. Similarly, a livelihood component in the overall project design could have delivered greater impacts.

Project implementation

The DHM was the project's executive body and it hosted the Project Management Unit (PMU). The DWIDM, the DSCWM, and the DNPWC were collaborating partners. The MoPE Secretary chaired the Project Steering Committee (PSC) with representation from relevant ministries. The PSC ensured that LDCF resources were exclusively utilized to implement activities related to the approved project objectives and outcomes. There was also a Project Executive Board (PEB) to ensure timely attainment of the project objectives within the agreed overall budget while following agreed strategies. An eight-member Technical Advisory Group (TAG) provided technical inputs and strategic guidance to the project. The project established a Field Coordination Office (FCO) in one district (Siraha) to manage the field programs in Component 2.

The project had an elaborate system of project management, but unlike Component 2, there was no dedicated staff in place for Component 1. However, a partnership with the Bufferzone Management Committee and the Sagarmatha National Park helped to mitigate the problem to some extent.

Implementation of activities for both components were adversely affected by the economic crisis in late 2015 and early 2016. Political unrest in the Terai districts during the post-blockade period also adversely affected project implementation.

Project results

The project results have been assessed and rated against the M&E criteria in terms of their relevance, efficiency, effectiveness, sustainability, and impact. The assessment results and TE comments are presented in Table A2.

Table A2: Overall Rating of Project Performance

Criteria	Scale	Rating[2]	TE Comments
Monitoring and Evaluation			
M&E design at project start up	6-pt scale	5/6 (S)	The design of the M&E systems relied on the standard UNDP requirements, including annual Project Implementation Reviews (PIRs). The major shortcoming was that no evaluation had been done based on the baseline and the achievement against each indicator. Section 3.2.3 presents a detailed discussion on it.
M&E Plan Implementation	6-pt scale	5/6 (S)	M&E implementation was satisfactory. The project's Mid-Term Evaluations were completed on time. The GEF Secretary deemed the project M&E satisfactory, as did the TE team.
Overall quality of M&E	6-pt scale	5 (S)	
1. IA & EA Execution			
Quality of UNDP Implementation (IA)	6-pt scale	4/6 (MS)	UNDP managed the project very well with strategic guidance. Some of the events such as occurrence of an earthquake and an economic blockade could not have been foreseen. Nevertheless, the contractual complications and delays could have been better assessed.
Quality of DHM Execution	6-pt scale	5/6 (S)	The DHM drew upon the experience of Tso Rolpa lake lowering and also managed the project effectively. Furthermore, they established community connections and built staff capacity on GLOF.
Overall Quality of Project Implementation/Execution	6-pt scale	4.5	
2. Assessment Outcomes			
Relevance	2-pt scale	2/2 (R)	Activities planned in both components were very relevant considering the country context of CCA/DRR.

[2] Details of the ranking and scale are summarized in Table 2 in the main report.

Criteria	Scale	Rating[2]	TE Comments
Efficiency	6-pt scale	5/6 (S)	Good engagement of the community in execution contributed to higher efficiency.
Effectiveness	6-pt scale	5/6 (S)	All activities of Component 1 were very effective. In Component 2, CBEWS, ETWs, and capacity strengthening were highly effective. The embankment activities did not cover all the vulnerable stretches and were moderately effective.
Overall Quality of Project Outcomes	6-pt scale	5 (S)	
3. Sustainability			
Financial resources	4-pt scale	3/4 (ML)	The communities may not have financial resources to ensure the sustainability of some activities (e.g. embankments, EWS). In Component 1, BZUCs was able to finance some of the initiatives for sustaining them at community level.
Socio-political	4-pt scale	4/4 (L)	Although confusion remains because of the transitional phase to the new state structure, community people and local level leaders are enthusiastic about contributing to sustainability.
Institutional framework and governance	4-pt scale	4/4 (L)	Integration of taskforces in Component 1 with the BZUC, and alignment of LDRMC/CDMC with new municipalities will contribute to institutional sustainability. Capacities of national institutions were enhanced but more cooperation and coordination are required among inter-agencies to sustain these initiatives.
Environmental	4-pt scale	3/4 (ML)	A major concern is sustainability of embankments if comprehensive conservations measures are not initiated upstream and linked with downstream works.
Overall likelihood of sustainability	4-pt scale	4 (L)	
4. Impact			
Progress towards stress/status change	3-pt scale	3/3 (S)	Several positive impacts on community ownership, livelihood improvement, and business investment are taking place. Community level networks have been strengthened through early warning systems, especially between upstream and downstream communities.
Overall Project results (aggregated)	6-pt scale	**5**	**Satisfactory**

Conclusion

The project undertook all of the planned activities. In some cases, achievements were more than initially planned (for example, the water level in Imja Lake was lowered by 3.4 m while the initial target was 3 m; 34 elevated tube wells were installed even though the initial target was 24).

A strong institutional network including communities and government institutions has been established and strengthened for GLOFs and flood risk management, although further coordination is essential. The task force committees in the GLOF component are being integrated with the Buffer Zone Management User Committees, which have a permanent institutional and legal base. The Local Disaster Risk Management Committee and Community Disaster Management Committees will have to be integrated in newly formed municipalities and rural municipalities.

Community Based Early Warning Systems (CBEWS) were very effective in minimizing losses from massive floods that occurred in August 2017. The river embankment largely withstood the 2017 flood, reinforcing their effectiveness.

Blending the structural and non-structural components was a strong point of the project design. However, a more comprehensive integrated watershed management approach could have enhanced the effectiveness and sustainability of the flood risk management component.

Overall, the project can be rated as **Satisfactory**, with some components exceeding that rating.

Lessons Learned

- Engagement of capable national institutions (e.g. the Nepalese Army) in project implementation could sustain this type of projects. Although the Nepalese army was not initially included in the activities for lowering the water level in Imja Lake, their participation ensured timely completion of the work at a high standard. It also enhanced the capacity of a national institution, which is at the forefront in the immediate aftermath of disasters.
- Engagement at the implementation level of the DWIDM and the DSCWM could enhance the effectiveness of the project.
- An integrated watershed management approach should be adopted while dealing with CCA/DRR.
- Media outreach has significant impact on community understanding of risk and develops confidence in the early warning system.
- The community-based effective early warning system generates greater livelihood opportunities at the community level including tourism and investment.

Recommendations

Component 1:

- Floods from moraine-dammed lake failures can have long standing effects not only on riverine landscapes but also on mountain communities due to the high intensity (i.e. great

depth and high velocities) and damaging capacity of glacial lake outburst floods. Policy, strategy, and guidelines are essential for GLOF risk management. More research of sound scientific basis need to be developed for predicting glacier response to climate change along with clear criteria for prioritizing mitigation efforts.

- The risk of GLOFs cannot be completely eliminated unless the lakes are fully drained. In fact, reinforced dams and partially drained lakes have produced GLOFs (Carey et al., 2012[3]). The non feasibility of draining all hazardous lakes calls for the development of integral approaches to reduce the GLOF hazard and risk. This includes soft (land use planning) and hard (geotechnical works) mitigation measures in the frame of coordinated plans including actions before, during, and after the emergency.
- Glacial lake evolution is complex, driven in part by sediment deposition and reduced numbers of surrounding ice cliffs. Geophysical tools for measuring subsurface properties of glacial lakes and moraine dams could be monitored on a regular basis. This could enable to understand subsurface characteristics.
- The implementing agency (e.g. DHM) could consider the risk and assumptions of similar project designs and the feasibility of conducting construction works in a remote, high altitude area, as well as a procurement plan.
- The DHM could share the success stories of the Imja Lake experience with other mountainous countries and apply a similar technology and management for other high risk glacial lakes.
- The evacuation centers, especially in Component 1, differed widely in terms of convenience of access, area of open space, and facilities. Standardization of safe evacuation shelters is needed along with a proper shelter management plan.

Component 2:

- In any future design of flood risk management projects, the Integrated Watershed management approach should be adopted. A livelihood component and pro-poor recovery should also be an integral part of the design.
- Flood risk mapping and increased lead time using NWP models for EWS should be done. Rapid damage mapping for response could enhance flood response and recovery in the Terai area.
- The river systems in the Terai provide a source of irrigation for the local communities. In some areas, construction of embankments has obstructed the irrigation system. Embankments should be integrated with the drainage and irrigation infrastructure.
- The 'Build back better' culture could be adopted in flood prone areas following the Sendai framework of disaster risk reduction.
- In order to ensure sustainability of the project effects and to strengthen its institutional base, exit workshops should be conducted with relevant stakeholders for documenting and sharing project achievements, its institutional basis, and the works to be done.

[3] Carey, M., Huggel, C., Bury, J., Portocarrero, C., Haeberli, W., 2012. An integrated socio-environmental framework for glacial hazard management and climate change adaptation: lessons from Lake 513, Cordillera Blanca, Peru. Clim. Chang. 112, 733–767.

- Asset management and ownership of resources is important in this type of inter-agency programs. An inter-agency Letter of Agreement for resource handover and maintenance would ensure sustainability of the project.

1 Introduction

The United Nations Development Programme (UNDP) Nepal conducted the terminal evaluation (TE) of the UNDP and Global Environment Facility (GEF) funded 'Community Based Flood and Glacial Lake Outburst Risk Reduction Project (CFGORRP)'in 2017. CFGORRP (2013-2017) is the first project under the GEF-administered Least Developed Countries Fund (LDCF). It was a joint undertaking of the Government of Nepal (GoN), GEF, and UNDP. The project was implemented by the Department of Hydrology and Meteorology (DHM) under the Ministry of Population and Environment (MoPE) as the lead Implementing Agency, with the Department of Water Induced Disaster Management (DWIDM), the Department of Soil Conservation and Watershed Management (DSCWM), and the Department of National Park and Wildlife Conservation (DNPWC) as key collaborating partners.

The overall objective of CFGORRP was to reduce human and material losses from glacial lake outburst floods (GLOF) in Solukhumbu district and from catastrophic floods in the Terai and Churia ranges of Nepal. The project was designed to help the GoN overcome some of the key barriers in managing the growing risks of GLOFs, with an emphasis on community engagement, empowerment and social inclusion. There was insufficient institutional capacity to manage GLOF risks, as they are highly complex, site-specific, and costly. At the same time, there had been a lack of cohesion among different agencies to manage the risks associated with recurrent flooding in the Terai. The project aimed to assess the gaps and help increase the institutional knowledge and capacity of the various stakeholders. It also aimed to build local community capacity to reduce their vulnerability to GLOFs.

The project covered five working districts, 12 former VDCs, and 27 risk settlements (see baseline section 2.4 for details).

1.1 Purpose of the Evaluation

A terminal evaluation is mandatory for all GEF-financed full-sized projects. Its purpose is to "*provide a comprehensive and systematic account of the performance of a completed project by assessing its design, process of implementation, achievements vis-à-vis project objectives endorsed by the GEF including any agreed changes in the objectives during project implementation, and any other results.*"[4]

The Terms of Reference (TOR) for this Terminal Evaluation sets out the objectives in Appendix A.

In addition to assessing project results, the TE also drew lessons that can both improve the sustainability of benefits from this project and enhance overall UNDP programming. Specifically, the TE:

1 Conducted an in-depth assessment of progress, or lack thereof, towards the achievement of the stated goal, objectives and results;

2 Determined the extent of progress in improving technical capacity, institutional knowledge, and community capacity to reduce human and material losses from GLOF events;

3 Assessed strategies developed by CFGORRP/DHM to sustain the project;

4 Documented lessons learned and best practices from program components, such as the Community Based Early Warning System (CBEWS), GLOF risk monitoring system and risk communications, the mechanism to reduce the water level in Imja Lake, access to elevated tube wells, gender-sensitive disaster management plans, and training and capacity building, etc.

[4] UNDP Guidance for Conducting Terminal Evaluations of UNDP-supported, GEF-financed Projects. http://web.undp.org/evaluation/documents/guidance/GEF/UNDP-GEF-TE-Guide.pdf

1.2 Scope and Methodology

The most significant challenge in undertaking an evaluation is ensuring that the findings are evidence-based. Therefore, visiting a sufficient number of stakeholders and end-users is important. In order to validate information and understand the program's performance, the TE team interviewed key informants at the community, district, and national levels. The TE team followed the guidance established by UNDP and GEF, as reflected in the UNDP Evaluation Guidance for GEF-Financed Projects[5], in addition to UNDP Nepal's evaluation policy. Table 1-1 below illustrates this.

Table 1-1 : Criteria and emphasis

Criteria	Emphasis in Final Evaluations
Relevance	In order to obtain lessons learned for future projects in the sector, a more complete design analysis is undertaken.
Efficiency	This is reduced as management is virtually over. A sampling rather than complete audit approach is adopted.
Effectiveness	This is key, and may require clarification of the results, project purpose, and overall objective in order to enable rigorous analysis. It builds on the design analysis.
Impact	Central importance and involves the clarification process
Sustainability	Central importance
Lessons learned	Central importance
Mainstreaming	Gender aspects

The TE benefitted from a baseline set by the mid-term review (MTR), but previous achievements were considered as well. The TE was carried out by two consultants working as a team. Neither member of the team had participated in the preparation, formulation, or implementation of the project.

The TE team adopted a participatory approach of interacting with different groups of stakeholders, working in close consultation with the project team to develop specific methods and to identify key informants, specific field study sites, and stakeholders. The team interviewed representatives from government agencies, the GEF operational focal point, UNDP Country Office staff, district-level agencies, and community organizations. The evaluation ensured transparency in the methodology and status of progress.

The evaluation utilized quantitative and qualitative methods to analyze data obtained through multiple information sources. This meant combining (where possible) qualitative, quantitative, perceptual, and factual data, and using several methods and sources of information. The mixed methods permitted the quantification of levels of achievement within the results framework (e.g.,

[5] UNDP Guidance for Conducting Terminal Evaluations of UNDP-supported, GEF-financed Projects. http://web.undp.org/evaluation/documents/guidance/GEF/UNDP-GEF-TE-Guide.pdf

perceived effectiveness of tools and utility of products). It also allowed careful integration of rich information from project stakeholders that may escape quantification.

The evaluation recognized the heterogeneity within and across the different groups of stakeholders. There is a diversity of ethnicity, capabilities, gender, and proximity to disaster-prone areas. Such factors were considered while conducting consultations at the community level to ensure that diverse perspectives were captured in the study. Two basic tools were used in the search for primary data and information: 1) document review, as per the ToR and GEF focal area CCA Tracking Tool; and 2) face-to-face consultations based on evaluation questions, as summarized in Appendix D and Appendix E.

Two field studies were conducted in Terai districts (November 22-26) and Solukhumbu (December 2-5). Figure 1 shows the five project districts and the sites visited. Details of the field study are presented in Appendix B. Altogether seven focus group discussion sessions (with a total of 38 participants), key informant interviews (18 participants), and consultations with representatives of relevant organizations were conducted. The list of participants is summarized in Appendix C. The field study had to make adjustments in the study plan because of the election environment and the public holidays limiting the number of people to be interacted.

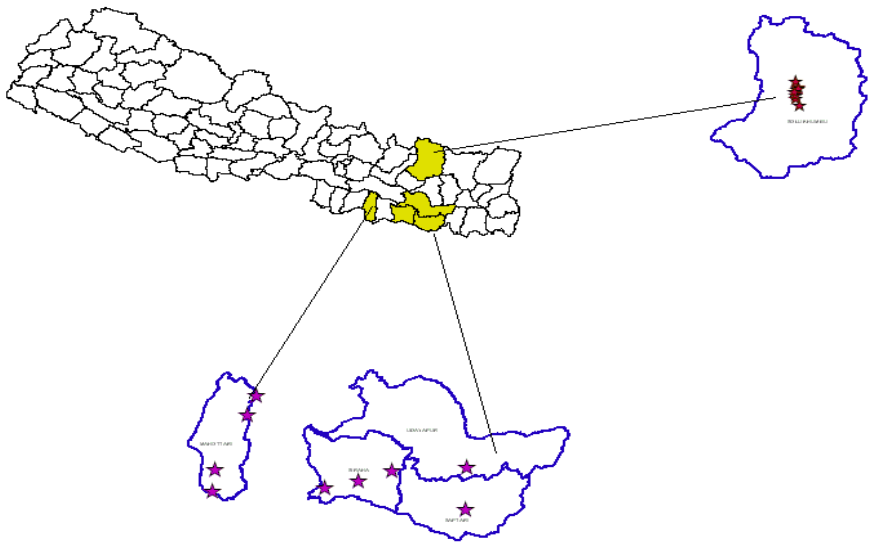


Figure 1: Site visited and project areas

The assessment of impacts was partly facilitated by the mid-term review undertaken in May 2016. With limited time to perform the evaluation, an extensive survey was not undertaken. The TE team tried to distinguish between local and global impacts. For global impacts, the team developed hypotheses on impact pathways using global frameworks (i.e. the Sendai Framework). The TE provided evidence-based information that is credible, reliable and useful, based on the information generated from field studies.

The process of triangulation involved validating empirical evidence from at least two other sources; for example, a report was validated with information from interviews and another source (i.e. MTR and project final report). If the information was available only from consultations, the evaluators sought to corroborate the opinions expressed and information given by posing the same questions to more than one interviewee. Anecdotal evidence was only taken into account if, in the judgment of the evaluator, the information was important and the source was considered reliable. In such cases,

the possible limitations of the information were noted. The overall methodology is shown in Figure 2.

Figure 2 Overall approach of the review

A set of standard ratings was used to assess the project as shown in Table 1-2.

Table 1-2 Evaluation criteria and rating

Evaluation Ratings:			
1. Monitoring and Evaluation	**Rating**	**2. IA & EA Execution**	**Rating**
M&E design at entry	6-point scale	Quality of UNDP implementation	6-point scale
M&E plan implementation	6-point scale	Quality of execution - Executing Agency	6-point scale
Overall quality of M&E	6-point scale	Overall quality of implementation /execution	6-point scale
3. Assessment of Outcomes	**Rating**	**4. Sustainability**	**Rating**
Relevance	2-point scale	Financial resources	4-point scale
Effectiveness	6-point scale	Socio-political	4-point scale
Efficiency	6-point scale	Institutional framework and governance	4-point scale
Overall project outcome rating	6-point scale	Environmental	4-point scale
		Overall likelihood of sustainability	4-point scale

Ratings Scales		
Ratings for Outcomes, Effectiveness, Efficiency, M&E, I&E Execution	**Sustainability ratings:**	**Relevance ratings**

6: Highly Satisfactory (HS): The project had no shortcomings in the achievement of its objectives in terms of relevance, effectiveness, or efficiency 5: Satisfactory (S): There were only minor shortcomings 4: Moderately Satisfactory (MS): there were moderate shortcomings 3. Moderately Unsatisfactory (MU): the project had significant shortcomings 2. Unsatisfactory (U): there were major shortcomings in the achievement of project objectives in terms of relevance, effectiveness, or efficiency 1. Highly Unsatisfactory (HU): The project had severe shortcomings	4. Likely (L): negligible risks to sustainability 3. Moderately Likely (ML): moderate risks 2. Moderately Unlikely (MU): significant risks 1. Unlikely (U): severe risks	2. Relevant (R) 1. Not relevant (NR) Impact Ratings: 3. Significant (S) 2. Minimal (M) 1. Negligible (N)

Evaluations of this nature are considered independent and confidential. Evaluators must be comprehensive and fair, and must disclose the full set of findings. Other requirements are related to accounting procedures, the accuracy and transparency of which are covered by a Code of Conduct. To this effect, the evaluators signed an Agreement Form (Appendix F).

1.3 Structure of the evaluation report

This final report follows the structure proposed in the ToR of UNDP (Appendix A).

2 Project description and development context

CFGORRP is the first project implemented under the LDCF after the endorsement of the NAPA in 2010. The project addresses the objectives outlined in NAPA Profile 3 'Community-based Disaster Management for Facilitating Climate Adaptation' and NAPA Profile 4 'GLOF Monitoring and Disaster Risk Reduction'), in which UNDP was found to have a comparative advantage as a result of its range of existing baseline projects and investments in disaster risk management. The Government of Nepal requested UNDP to develop a proposal for LDCF funding that addressed both of these priority actions in a single project. Thus, the project s divided into two separate components in two distinct geographic areas, corresponding to NAPA Profiles 3 and 4. Project Outcome 1 focused on reducing risks from imminent GLOFs in high-risk areas (NAPA Profile 4), while Outcome 2 addressed community-based disaster risk reduction and climate-proofing communal water sources for disaster-prone community priorities (NAPA Profile 3). The project was developed through close consultation with key government partners engaged in climate risk management, particularly flood risk management, and with government glaciologists, hydrologists, and GLOF experts. Consultations with local government authorities, communities, CBOs and NGOs in the target areas also shaped the project.

Nepal faces a variety of natural hazards of geological and climatic origin. It is vulnerable to climate-induced disasters such as floods, landslides, and drought every year.[6] Rising temperatures enhance

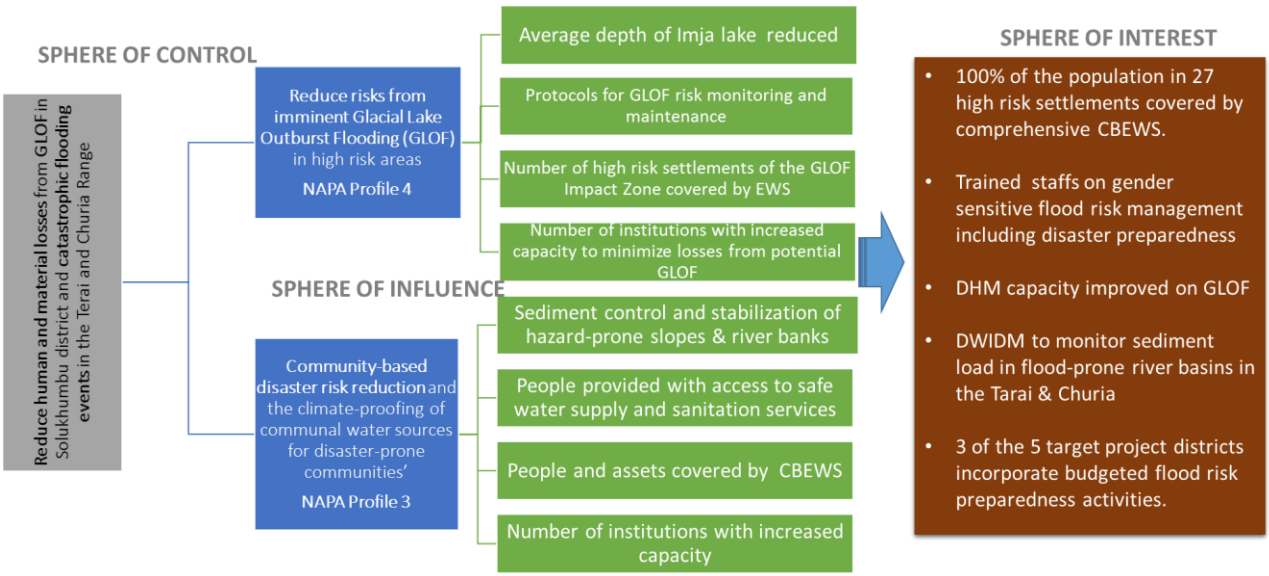
[6] Komal Raj Aryal, 2014. Disaster vulnerability in Nepal. International Journal of Disaster Risk Reduction 9 (2014) 137–146.

the risk of GLOF in the high mountains. At the same time, floods occur frequently in monsoon season in the southern plain, posing serious threats to life and property. Imja Lake, located at an altitude of 5010 m in the Sagarmatha National Park, is at high risk of GLOF.[7] Out of 1466 glacial lakes, 21 are listed as potentially dangerous, and six (including Imja) are at high risk.[8] Imja was identified during the 1960s as a small supra lake. It later expanded to an area of 1.28 km^2, 148.9 meters deep, and holding 75.2 million cubic meters of water in 2014. To date, Nepal has witnessed 24 GLOF events; of these, 14 are believed to have occurred in Nepal and 10 were the result of flood surge overspills from Tibet.

Selecting the four flood-prone districts for project intervention was similarly based on vulnerability assessments conducted during the NAPA and additional analyses. Out of the four Terai project districts, Udayapur and Saptari rank as 'very high' and Mahottari and Siraha rank as 'high' (out of five categories of very high, high, moderate, low, and very low) in climate change vulnerability. Similarly, Mahottari ranks 'very high', while Saptari and Siraha rank 'high', and Udayapur 'very low' in flood vulnerability. However, Udayapur ranks very high in landslide vulnerability (GoN 2010). The project was designed to reduce GLOF risks in Solukhumbu and mitigate flood hazards in Churia and Terai with emphasis on the following:

- Develop early warning systems (EWSs) against climate-related extreme events;
- Monitor conditions for, and development of, programs to respond to flooding and GLOFs; and
- Raise awareness and understanding among local communities about the necessity and benefits of preparedness for climate hazards.

Realizing the importance of reducing human and material losses from GLOFs and related catastrophic floods, UNDP-GEF initiated this project to strengthen the institutional capacity of state agencies and community-based organizations to cover the full spectrum of risk reduction. The sphere of control, influences, and interests of the project are shown in Figure 3.



[7] Pro-doc final report LDCF, p 38
[8] ICIMOD, 2011. Glacial Lakes and Glacial Lake Outburst Floods in Nepal. prepared by the International Centre for Integrated Mountain Development (ICIMOD) for the Global Facility for Disaster Reduction and Recovery (GFDRR)/ The World Bank.

Figure 3 Project expectations (same as objectives and outcomes)

2.1 Project start and duration

The project began in late 2013 with a start-up meeting between collaborating partners on September 2, 2013. The inception workshop took place at the central level in October 2013, and a local level workshop followed in November 2013. A field scoping visit was conducted soon after the inception meeting, and the Field Coordination Office (FCO) was established in Lahan, Siraha district. The field-level work gained momentum after the establishment of the FCO and district project office in the targeted districts. Baseline studies and detailed technical studies for both components were completed in 2014. Based on the results of the technical studies, activities were designed and rolled out in 2015 and 2016. The 2017 period was dedicated to consolidating ongoing work and producing knowledge products. The project intervention strategy is presented in Table 2-1.

Table 2-1 Project Intervention Strategy

Year	Priorities
2013	Project start up
2014	Detailed technical studies undertaken
2015	Full phase implementation
2016	Implementation, monitoring and evaluation, knowledge documentation
2017	Knowledge documentation, institutionalization and handover

2.2 Problems the project sought to address

Nepal is one of the most vulnerable countries in the world to the impacts of climate change. The increasing average annual temperature (at an annual rate of 0.04°C, and much higher in the higher elevations) contributes to glacial retreat and the expansion of lakes, thus increasing GLOF risks. At the same time, the entire country is extremely earthquake-prone, which magnifies the GLOF risk due to the weak geomorphology of the high Himalayan region (GoN, 2017[9]).

Fragile geology and deforestation/degradation of the Churia hills, compounded by concentrated rainfall, cause flash floods and huge sediment transport in rivers. This leads to severe flooding and inundation, posing a great threat to human lives and property downstream. The Project Document describes the challenges as:

"The long-term solution to managing the risks associated with climate change-induced flooding in Nepal is to shift from a primarily reactive post-disaster response to a situation of increased adaptive capacity as a result of greater proactive disaster preparedness combined with concrete mitigation measures that reduce the risks of flood-related damage to people's lives, assets and infrastructure. Specific options for increasing adaptive capacity and disaster preparedness, and the barriers that need to be overcome to achieve this situation, vary in the two very distinct geographic areas targeted

[9] Government of Nepal, 2017. Community based flood and glacial lake outburst risk reduction project. Reducing risk through community resilience: best practice, lessons and success stories. November 2017

by this project, i.e. the High Mountains and the low-lying Terai and foothills and slopes of the Churia hills."[10]

The project intended to help the Government of Nepal to overcome some of the key barriers to managing the growing risks of GLOFs in the High Mountains and flooding in the Terai and Churia Range of southern Nepal, with an emphasis on community engagement, empowerment, and social inclusion. The project document identified the following barriers.

2.2.1 *Technical and management challenges*

The government departments with the mandate for disaster risk management such as the DWIDM and the DHM have a limited budget and technical human resources to address all of the country's disaster risk reduction needs. GLOFs in particular require highly technical skills to properly monitor and reduce the risks. Furthermore, there are very few experts globally with the technical knowledge required to oversee activities to lower the water level in Imja Lake. Such new technology and methods require time and capacity building to master. In addition to reducing the volume of lake water, several other preventative structural measures were noted in the project document: removing masses of unstable rocks to guard against avalanches or rockfalls hitting the lake surface and causing a surge wave; implementing measures to protect infrastructure downstream; check-dams, mini dams, spillways, and slope stabilization and reinforcement. Additionally, a last resort measure might be to relocate people and critical infrastructure from high-risk areas.

Government and disaster management authorities have limited understanding and experience of managing growing climate risks. These risks include current variability and the projected impacts of climate change, which are increasing the range and magnitude of disasters in Nepal. The DHM is mandated to monitor all flood risks in the country including GLOFs. It had little capacity for regular monitoring of GLOF risks, which are exceptionally challenging to monitor for technical, logistical, and financial reasons.

Several complementary and integrated strategies were proposed to effectively address climate-related flood risks in the Terai and Churia Range, including low-cost structural (bio-dykes, bioengineering, earthen embankments, and bamboo spurs) and non-structural mechanisms (community awareness and training programs, the development of a community-based EWS, drills, etc.) that can easily be scaled up and replicated by communities, local authorities, and other important local and national actors. The project document noted the possible challenges to further replication and up-scaling of this community-based approach across the wider region: institutional, technical, and financial capacity challanges, upstream land use patterns, and individual knowledge and capacity at the local community level.

When considering floods, the country's overall water resources management must be addressed. Inter-agency coordination to link hydrology, meteorology, and disaster management is essential for proper flood risk management. There has been a lack of cohesion among different agencies to manage the risks associated with recurrent flooding in the Terai. The project aimed to improve information sharing and coordination at the central and local levels and among the various ministries, departments, and non-governmental actors.

2.2.2 *Financial Challenges*

One of the biggest challenges of managing and mitigating GLOF risks in Nepal is the lack of adequate financial resources available at the national and local levels. The DHM has limited financial resources to implement a GLOF early warning system and to conduct overall hydro-met hazard monitoring.

[10] Project document, 2013, P. 29-30

The local authorities (e.g. district and village) with the mandate for disaster preparedness and mitigation activities generally have very limited funds for this.

GLOFs are unique events requiring a sufficient research and monitoring fund. However, there is currently no special allocation for highly specific hazard information research and monitoring.

2.2.3 *Information, knowledge, and awareness barriers*

The Initial assessments during the project design phase found that there was insufficient institutional knowledge and capacity at the DHM to understand and manage GLOF risks, as they are highly complex, site-specific and costly. For example, the DHM has experience managing GLOF risks in Tso Rolpa, but that knowledge provides minimal institutional capacity to undertake the task of a much larger scale as in the case of Imja Lake. The project aimed to assess the gaps and help increase institutional knowledge and capacity of the various stakeholders, while also building capacity among local communities to reduce their vulnerability to GLOFs in the mountains and to flooding in the Terai.

2.3 Immediate and development objectives of the project

The objective of the project was to reduce human and material losses from GLOFs in Solukhumbu district and from catastrophic floods in the four districts of Udayapur, Saptari, Siraha, and Mahottari in the Terai and Churia ranges. In order to achieve this objective, the project was divided into two components with specific outcomes for each component:

- **Outcome/Component 1** - Reduce GLOF risks arising from Imja Lake
- **Outcome/Component 2** - Reduce human and material losses from recurrent flooding events in flood-prone Terai districts

The project contributed to Profile 3 (Community-Based Disaster Management for Facilitating Climate Adaptation) and Profile 4 (GLOF Monitoring and Disaster Risk Reduction) of the country's NAPA. The project was aligned with UNDAF/CPAP (Outcome 7) presented below and contributed to the Sustainable Development Goals (SDG 13 on Climate Action and SDG 6 on Clean Water and Sanitation).

UNDAF Outcome 7: People living in areas vulnerable to climate change and disasters benefit from improved risk management and are more resilient to hazard-related shocks.

UNDAF/CPAP Output 7.1: Government officials at all levels have the capacity to lead and implement systems and policies to effectively manage risks and adapt to climate change.

UNDAF/CPAP Output 7.3.2: Water level in Imja Glacier Lake reduced by 3 meters and risk mitigation measures adopted in four of the most vulnerable Terai districts.

2.4 Baseline Indicators Established

The project set up key baseline indicators in the logical framework (2013-2017) which, however, did not provide much information. The table below shows the baseline indicators.

Table 2-2: Baseline indicators in the logical framework (2013-2017)

Outcome/Component 1	***Outcome/Component 2***

• Average depth of Imja Lake • Percentage of high risk settlements of Imja GLOF Impact Zone residents (including women, children and elderly people) with a clear understanding of how the EWS works and what to do in the event of a GLOF • Number of targeted institutions with increased capacity to minimize exposure to GLOF risks	• Number of additional people provided with access to safe water supplies and basic sanitation services • Number of people and value of their material assets covered by a CBEWS in the four target project districts • Number of targeted institutions with increased capacity to minimize exposure to flood risks in the Terai and Churia ranges

2.5 Main stakeholders

The project had multiple stakeholders including government agencies, academic institutions, research institutions, and community organizations. Details of the stakeholders are shown in Table 2-3. The DHM was the lead Executing Agency with collaborating partners that included the Department of Water Induced Disaster Management (DWIDM), the Department of Soil Conservation and Watershed Management (DSCWM), and the Department of National Parks and Wildlife Conservation (DNPWC). A total of 12,690 vulnerable people residing in high-risk settlements within 50 km downstream from Imja Lake were the direct beneficiaries of the GLOF component. Similarly, 59,062 vulnerable people residing in the eight VDCs in Terai were the direct beneficiaries of the flood component.

Table 2-3 Stakeholder groups

Institutions	Involvement in the project
Government Institutions	
Climate Change Management Division (CCMD), Ministry of Population and Environment (MoPE)	During the implementation phase of the project (FSP), MoPE played the role of cooperating agency and was responsible for ensuring coordination of the LDCF initiative with other ongoing initiatives including promoting the various sub-initiatives undertaken in this project. MoPE ensured alignment of the proposed project with Nepal's NAPA follow-up program. MoPE chaired the Project Steering Committee (PSC).
Department of Hydrology and Meteorology (DHM), MOPE	The DHM was the executive agency for project implementation and coordination, and supported MoPE in organising the PSC. The DHM was also responsible for reconciling all substantive and financial reporting by various responsible parties and for reporting to UNDP as per the agreed work plan.
Department of Water Induced Disaster Management (DWIDM), Ministry of Irrigation (MoI)	The DWIDM was responsible for providing technical inputs and for monitoring project activities implemented under Component 2.

Department of Soil Conservation and Watershed Management (DSCWM), Ministry of Forests and Soil Conservation (MoFSC)	The DSCWM provided technical inputs and support on issues related to upstream watershed management and soil conservation activities to reduce flood risk in the Terai region (Component 2).
Department of National Parks and Wildlife Conservation (DNPWC), MoFSC	The DNPWC helped to coordinate with the Sagarmatha National Park and the Buffer Zone Management Committee to complement ongoing initiatives while implementing project activities for the GLOF risk reduction component (Component 1) on Imja Lake.
Ministry of Home Affairs (MoHA)	MoHA is responsible for operating the Emergency National Operation Centre and for coordinating the Early Warning System. Since MoHA has the mandate to work on disaster risk and preparedness activities under GON, the work was closely linked under their jurisdiction.
Ministry of Federal Affairs and Local Development (MoFALD)	MoFALD played a vital role in facilitating community mobilization, institutional empowerment and capacity building. It integrated the project purpose, objectives and activities into local development planning for both components. Community organizations such as LDRMCs formed under Component 2 were linked with local elected bodies.
Ministry of Finance (MoF)	MoF is the Operational Focal Point of GEF/LDCF. A senior official is assigned as the GEF/LDCF responsible authority. MoF was responsible for the transfer of LDCF resources to the Implementing Partner, DHM and associated responsible parties according to a work plan agreed by all key stakeholders including UNDP. It also performs fiscal monitoring of project spending within the Government system.
President Chure-Terai Madhesh Conservation Development Board (PCTMCDB)	The project coordinated with the PCTMCDB in the works undertaken in the Terai districts
Development Agencies	
United Nations Development Programme (UNDP)	The project was implemented under the National Implementation Modality where UNDP plays an active role as the Senior Supplier in the Project Board. In this role, UNDP provided oversight support to the project as per its role as a GEF IA. UNDP provided project cycle management services via the UNDP Country Office, with specialized technical and oversight support by the UNDP-GEF unit at the regional and global levels.
Research Institutions	

International Centre for Integrated Mountain Development (ICIMOD)	ICIMOD assisted the pilot project on automated flood warning systems in the Ratu River. It provided guidance on technical matters being part of the Technical Advisory Group. It also provided support in project formulation.
Academic Institutions	
Kathmandu University (KU) and Tribhuvan University (TU)	KU and TU provided guidance and technical expertise as a part of the Technical Advisory Group of the project.

2.6 Expected Results

The two components/outcomes of CFGORRP had four outputs each.

Component 1/Outcome 1: Focused on actions required to reduce risks from imminent Glacial Lake Outburst Flooding (GLOF) in high risk areas (NAPA Combined Profile 4)

- Output 1.1: Water level of Imja Lake lowered through controlled drainage. (Lowering the lake level by 3 m which reduced the risk of breach forming in the natural moraine dam.)
- Output 1.2: Protocols for GLOF risk monitoring and maintenance of artificial drainage system of Imja Lake developed and implemented
- Output 1.3: Design and implementation of a practical, low-tech and gender-sensitive low-maintenance CBEWS
- Output 1.4: GLOF risk management skills and knowledge institutionalized at local and national levels.

Component 2/Outcome 2: Addressed the actions needed to address community-based disaster risk reduction and the climate-proofing of communal water sources for disaster-prone community priorities (NAPA Combined Profile 3)

- Output 2.1: Sediment control and stabilization of hazard-prone slopes and river banks through structural and non-structural measures
- Output 2.2: Flood proofing and establishing water and sanitation systems
- Output 2.3: Institutionalization of flood risk management skills and knowledge, including training to relevant district line agency representatives
- Output 2.4: Installation of an effective CBEWS in consultation with and participation of local communities and representatives concerned. Flood preparedness training for district and VDC representatives, NGOs, CBOs and local communities in four flood-prone districts.

2.7 Project Working Area

CFGORRP was implemented in 12 former Village Development Committees (VDCs) of five districts. Component 1 covered Chaurikharka, Namche, Khumjung, and Jubing VDCs of Solukhumbu district. Component 2 was implemented in four Terai districts: Mahottari, Siraha, Saptari, and Udayapur districts in four river basins. Sarpallo and Nainhi VDCs in the Ratu river basin in Mahottari district; Tulsipur and Pipra Pra Pi VDCs in the Gagan river basin in Siraha district; Pakari and Dhigwa VDCs in the Khado river basin in Saptari district; and Hadiya and Jogidaha VDCs in the two tributaries (Hadiya and Kong) of the Triyuga river basin in Udayapur district. In addition to these VDCs, upstream VDCs

such as Bardibas, Gauribas, Hatilet in the Ratu river system, Rayapur and Shambhunath in the Khado River system; and Felhi and Lalpur in the Gagan river system were also touched upon by the project. While the project was progressing, these VDCs were realigned with the new rural municipalities and municipalities formed under the new political/administrative setup. All of the project VDCs in Solukhumbu district have now been included in the Khumbu Pasang Lhamu Rural Municipality. Similarly, in Mahottari district the Sarpallo VDC has now become the Manhara Rural Municipality and the Nainhi VDC has become the Jaleshwar municipality; in Siraha the Tlusipur and Pipra Pra Pi VDCs have been included in the Aurahi Municipality; in Saptari the Pakari VDC has become the Mahadeva Rural Municipality and the Dighwa VDC the Rajabiraj Municiapality; and in Udayapur the Hadiya VDC has become the Chaudandigadhi Municipality and the Jogidaha VDC is the Triyuga Municipality.

3 Findings

3.1 Project Design / Formulation

This section assesses the quality of the project design as reflected in the original project document, including its identification and formulation. The evaluation team reviewed the mid-term evaluation's analysis of the project design and formulation and confirmed the initial findings which are presented in the following. In addition, the evaluators observed that no major changes or modifications have been made to the project document since the mid-term evaluation. As described earlier, the project was designed taking into account Nepal´s National Adaptation Plan of Action, and was also aligned with the UNDAF as well as the Country Programme Action Plan (CPAP), 2013-2017.

The TE team made the following observations related to the project design:

- The project blended hardware (infrastructure) and software (community capacity) components, which was a major strength of the project design.
- The two components of the project were diverse and had two distinct features. There was little complementarity between the two components.
- The TE team recognized that the design stage of the project was more service provider-driven and did not involve the beneficiaries (e.g. communities). However, targeted communities were involved in designing detailed plans within the broader initial plan. For example, they were engaged in vulnerability and capacity analysis, prioritization, and designing the implementation plan.
- The project did not adopt the watershed management approaches comprehensively in reducing flood risk in the Terai district. Few conservation activities were designed in upstream areas. However, to a limited extent, it was addressed by constructing sedimentation traps in upstream Ratu tributaries.
- A comprehensive watershed management system for one river basin could set a good example for practice in other basins.
- The project reflects national and local priorities and strategies in the design stage based on NAPA.

Although relevant stakeholders were appropriately involved and participated in the project, the TE team recognized that greater implementation-level inputs from the DWIDM and the DSCWM were essential for sustainability of sediment control and stabilization of hazard-prone slopes and river banks through structural and non-structural mechanisms (Output 2.1).

3.1.1 *Analysis of LFA/Results Framework (Project logic/strategy; Indicators)*

The project implementation and reporting, for the most part, carefully followed the expectations and indicators set out in the results framework. At the Objective level, the main question is whether the flooding risks have been substantially reduced for the targeted communities, i.e. effectiveness of the mitigation work, EWSs and flood preparedness. The indicators (e.g. number of settlements covered by EWS; number of institutions with strengthened capacity) are quite general. The baseline situation of the impact indicators was well described in the LFA (Appendix A).

One target from the results framework that may be doubtful is "DWIDM will have the necessary technologies, skills and systems to monitor sediment load in flood-prone river basins in the Terai and the Churia Range" and the sustainability of the sediment analysis lab established in Siraha. The MTR's comments on the results indicators are compared with the comments of the TE team in Table 3-1.

Table 3-1: MTR and TE Team comments on results indicators

Results	**Project Indicators**	**MTR Comments**	**TE comments**
Objective: To reduce human and material losses from Glacier Lake Outburst Flooding (GLOF) in Solukhumbu District and catastrophic flooding events in the Terai and Churia Range	Number of high-risk settlements of the GLOF Impact Zone of Solukhumbu district downstream of Imja Lake area covered by an Early Warning System. Number of institutions with increased capacity to minimize human and material losses from potential GLOF events in the High Mountains and climate-related flooding in the Terai and Churia Range.	The operational effectiveness of the EWS may depend upon (i) (extent/level of use of the EWS and DRR equipment used by communities) and (ii) reliability of the technologies that are being used and maintained. The relative risk reduction of Imja Lake drawdown by 3 m is estimated at about 20% compared to potential GLOF events, and the number of people directly living behind flood protection works compared to baseline has not seen estimated.	The early warning system is operational in the GLOF impact zone with siren and 10 GLOF sensors using iridium and telecommunication to trigger warnings. The EWS is operational and automated in 6 locations based on sensor detection and controlled by the DHM in 3 additional locations based on the decision support system established at the DHM. The vulnerability assessment of the GLOF could be further enhanced using advanced science and an accurate Digital Elevation Model. The risk of GLOF is also reduced by lowering the Imja Lake water by 3.4 meter. The task force is highly active in the communities and best utilizes DRR equipment for day-to-day incident operations (i.e. accident, rescue, etc.). Community level capacity has been increased through task force development which could be a new institutional setup within the Buffer Zone Management Committee (BZMC). Capacity of the LDRMCs and CDMCS could be further enhanced.

Results	Project Indicators	MTR Comments	TE comments
			Capacity at the national level such as that of the DHM, the DWIDM and the DSCWM has been developed.
Outcome 1 Risks of human and material losses from Glacial Lake Outburst Flooding (GLOF) events from Imja Lake reduced	Average depth of Imja Lake Percentage of high risk settlements of Imja GLOF Impact Zone residents (including women, children and elderly people) with a clear understanding of how the EWS works and what to do in the event of a GLOF Number of targeted institutions with increased capacity to minimize exposure to GLOF risks	Some measure of EWS reliability (maintenance and use by communities) would be useful to carry out more in-depth monitoring of achievements – including whether the systems are operating as planned. Capacity of the DHM and partners to monitor and manage the lake level control structure and flood warnings could be rated in a more systematic way.	An open channel with a design capacity of 15 cumecs with regulatory structures; store house, office building and warehouse have been constructed. By October 2016, the level of Imja Lake was lowered by 3.4 meters. The EWS system is fully operational using advanced technology. Hydro met stations have been installed at the lake periphery and Imja Lake Monitoring Protocols are functional at the DHM. Task Forces at the community level are well organized and active in raising awareness of the population on GLOF risk. Awareness billboards were not found well maintained in some places but they were observed to contain sufficient information to understand GLOF risk. The relationship with the BZMC could be further enhanced.

Results	Project Indicators	MTR Comments	TE comments
Outcome 2 Human and material losses from recurrent flooding events in 4 flood-prone districts of the Terai and Churia Range reduced	Number of additional people provided with access to safe water supply and basic sanitation services Number of people and value of their material assets covered by a CBEWS in the four target project districts Number of targeted institutions with increased capacity to minimize exposure to flood risks in the Terai and Churia Range	The beneficiaries described the reduced time to carry water from other sources during monsoon flooding. Some survey and testing of data on the CBEWS functionality would be helpful The effectiveness of limited training for enhancing the capacity of CDRMs, VDCRMCs and DDRMCs to establish flood response procedures is not fully captured by this indicator	35 elevated tube wells (ETWs) constructed for improving community access to potable drinking water during monsoon. The community in the area has access to safe water supply. Seventy-eight first aid, early warning and local search and rescue, gender sensitive Taskforces comprising 312 members (134 women) formed and operationalized. Three safe shelters with gender neutral toilet facilities constructed to provide safe shelter for vulnerable communities during floods and disasters. The 2017 flood was a good lesson for the community to test the CBEWS in order to save lives and properties. A total of 133 front line institutions (LDRMC, CDMCs & Taskforces) have been formed and operationalized to deal with GLOF/flood risks. Eight LDRMCs and 35 CDMCs with 555 members (incl. 248 women) formed and operationalized. The technical capacity of 1,519 officials and representatives (497 females) at national, district, VDC & community levels enhanced on GLOF and flood risk management.

As suggested above and in the MTR report, not all of the indicators provide useful information for measuring achievements, and the project team was aware of the difficulties in measuring risk reduction. The key results to focus on are whether the EWSs were operating as expected and whether the affected communities had a high level of awareness and commitment to maintaining the project's gains in risk reduction. However, there was good coherence between the objective of the project and the expected outcomes. The log frame was relevant because it was based on a clear and detailed timetable for achieving results.

3.1.2 *Assumptions and Risks*

An assessment of this kind requires an appreciation of the assumptions in the logical framework that may affect the achievement of the project objectives. The project's logical framework set out several risks and assumptions, but these risks were not categorised as low, medium, or high. During project implementation, Nepal also faced critical challenges, including an earthquake and a crisis following the political unrest in the southern border, especially in eastern and central Nepal. There were also contractual delays in the construction work, especially related to activities for lowering Imja Lake. The political unrest was connected mostly to the promulgation of a new constitution and state restructuring in the districts of Component 2 which also affected the timely implementation of the project. Some of the risks like the earthquake and the economic embargo could not have been foreseen, but in the case of other risks (like contractual delay in Component 1), the LFA apparently underestimated them. The project completion report has come up with a plan A and plan B, which seems highly effective for project implementation and sustainability. Engaging Nepal's Army as plan B for construction work was not foreseen by UNDP in the design stage.

3.1.3 *Lessons from other relevant projects (e.g., same focal area) incorporated into project design*

As the project executing body the DHM had experienced the implementation of a GLOF risk reduction project in the Tsho Rolpa glacial lake in 2000, and thus drew upon some of the lessons from that experience. The lessons from Tsho Rolpa constituted the baseline for the design process for Component 1. Although the scale of operation differed in Tso Rolpa and Imja, the experience provided important learning. As a learning from Tsho Rolpa, this project strongly emphasized community engagement which ensured ownership of the initiative contributing towards sustainability.

Component 2, drawing from the experience of other Community-Based Disaster Risk Management Programs that UNDP has implemented, strongly emphasized community engagement focusing on different components of disaster risk management in order to make the programme comprehensive. The specific activities were designed in participation of local communities and implemented through committees such as the LDRMC and the CDMC. It also drew upon the learning from the work of the People's Embankment Program of the DWIDM in the Terai districts such as Mahottari, Saptari and from the soil conservation and watershed management program of the DSCWM. The President Terai Chure Madhesh Conservation Development Program also works in the districts of Component 2 on soil conservation and watershed management. The sediment control activities in the upstream of the Ratu River system were linked with the soil conservation initiative of these institutions. The project also drew upon lessons from the community-based early warning system of the ICIMOD and other institutions. The community-based early warning system was implemented in technical partnership with the ICIMOD.

3.1.4 *Planned stakeholder participation*

The Department of Hydrology and Meteorology as a lead Executing Agency engaged with a wide set of stakeholders. The collaborating partners included the Department of Water Induced Disaster and

Management (DWIDM), Department of Soil Conservation and Watershed Management (DSCWM), and Department of National Parks and Wildlife Conservation (DNPWC). The DWIDM, which is implementing the People's Embankment Programme in Terai districts, and DSCWM which is responsible mainly for soil and water conservation in upstream areas collaborated in Component 2. The DNPWC is the umbrella organization of the Sagarmatha National Park which has jurisdiction in the project area of Component 1. In addition to supplementing with technical inputs, the collaboration also included regular monitoring. The President Chure-Terai Madhesh Conservation Development Board, which has a mandate to address the conservation and development issues in the Chure range, was another stakeholder of the project. Although not initially planned, the Nepalese Army was the principal agency for lowering the water level in Imja Lake. ICIMOD provided technical support in project formulation and implementation of the community-based flood early warning system in the Terai.

In addition to national level institutions, the project also strongly emphasized engaging and strengthening community level organizations. In Component 1, the project worked with the Bufferzone Management Committee and task forces were formed in vulnerable settlements. In Component 2, community organizations such as the Local Disaster Risk Management Committee and Community Disaster Management Committees as well as task forces were formed. These community institutions provided an interface between the project and local communities and formed an avenue for local participation. In the case of Component 2, a total of 59,062 people residing in the eight VDCs of four Terai districts directly benefited from the project. In addition, 48,991 people benefitted from early warning systems. The project engaged a large number of people in different stages and activities. It directly benefited a total number of 71,752 people living in the targeted area in mountainous and Terai regions. A total of 12,690 vulnerable people residing in high risk settlements along 50 km downstream from Imja Lake were direct beneficiaries of Component 1. In addition, 74,992 floating populations (tourists and porters) and the people residing along the trekking route benefited from the project. The project has impacted a significant number of beneficiaries as shown in Table 3-2.

Table 3-2 Beneficiaries of different activities

Training/Capacity building	Total population
Flood/GLOF risk management training at community level	1,465 (M-939, F-526)
Flood/GLOF risk management training at sub-national level	87 (M-81, F-6)
Flood/GLOF risk management at national level	110 (M-96, F-14)
Mock drills (51 events)	5,246
Street dramas (33 events)	8,025
Local Disaster Risk Management Committees formed	8 committees (158 M and 53 F members)
Community Disaster Management Committees formed	35 CDMCs (397 members)

Taskforce formed	210 members

3.1.5 *Replication approach*

The project document mentioned greater potential for upscaling and replication across Nepal covering more GLOF and flood risk areas, unlike the more costly structural adaptation measures. As mentioned earlier, six glacial lakes have been identified as high risk and Imja Lake is the second highest (ICIMOD, 2011). The lessons from Imja Lake could be drawn upon by other GLOF risk management projects.

Replication is further justified given the project's emphasis on capacity development, which promotes knowledge transfer and skill development through training workshops at national, district and community levels. Outcomes 1 and 2 focus particularly on district, national and international learning and knowledge transfer including dissemination of knowledge, experiences and lessons learned with key stakeholders and the public through a range of communication media.

3.1.6 *UNDP's comparative advantage*

The agreed comparative advantage of UNDP for the GEF lies "*in its global network of country offices, its experience in integrated policy development, human resources development, institutional strengthening, and non-governmental and community participation. UNDP assists countries in promoting, designing and implementing activities consistent with both the GEF mandate and national sustainable development plans. UNDP also has extensive inter-country programming experience." Furthermore, it has been agreed that UNDP can "play a primary role in ensuring the development and management of capacity building programs and technical assistance projects*."

In Nepal, UNDP has rich experience in initiating/promoting the community-based approach to disaster risk management thereby putting itself in a position of advantage for implementing projects of this nature. UNDP's role is primarily to assist countries to develop knowledge, capacity and governance. The project design was fully in line with UNDP's comparative advantages under the UNDAF and Country Programme Action Plan. It has also contributed to the Sendai Framework and the Sustainable Development Goals (SDG) on climate action and clean water and sanitation. Based on the partnerships built and experience gained in the implementation of this GLOF project, UNDP is in an excellent position to continue the work for other high risk GLOF event reduction.

3.1.7 *Linkages between project and other interventions within the sector*

As mentioned earlier, the project linked up with several national programs such as the President Chure-Terai Madhesh Conservation Development, the People's Embankment Programme which is implemented by the DWIDM, and the watershed management activities of the DSCWM. It also coordinated with the Community Based Flood Early Warning System Programme of the ICIMOD. The project assisted in the development of standard operation procedures for emergency response and capacity building of local communities and district level government officials for effective disaster response. The MTR summarized several co-financing opportunities which could have provided leverage in this project, such as UNDP's Comprehensive Disaster Management Programme (CDRMP), USAID's Adapt Asia, and the currently approved National Adaption Programme (NAP). Component 1 of the project was very specialized and highly technical, and was developed based on a previous ICIMOD study. Component 2 dealt more with capacity building and community-based early warning activities, and linked up with other programs.

3.1.8 *Management arrangements*

The project was nationally executed as per the UNDP National Implementation Modality Guidelines. The DHM was the executive body for project implementation and M was responsible for establishing the PMU. The overall project management at the central and field levels are shown in Figure 4 Project management

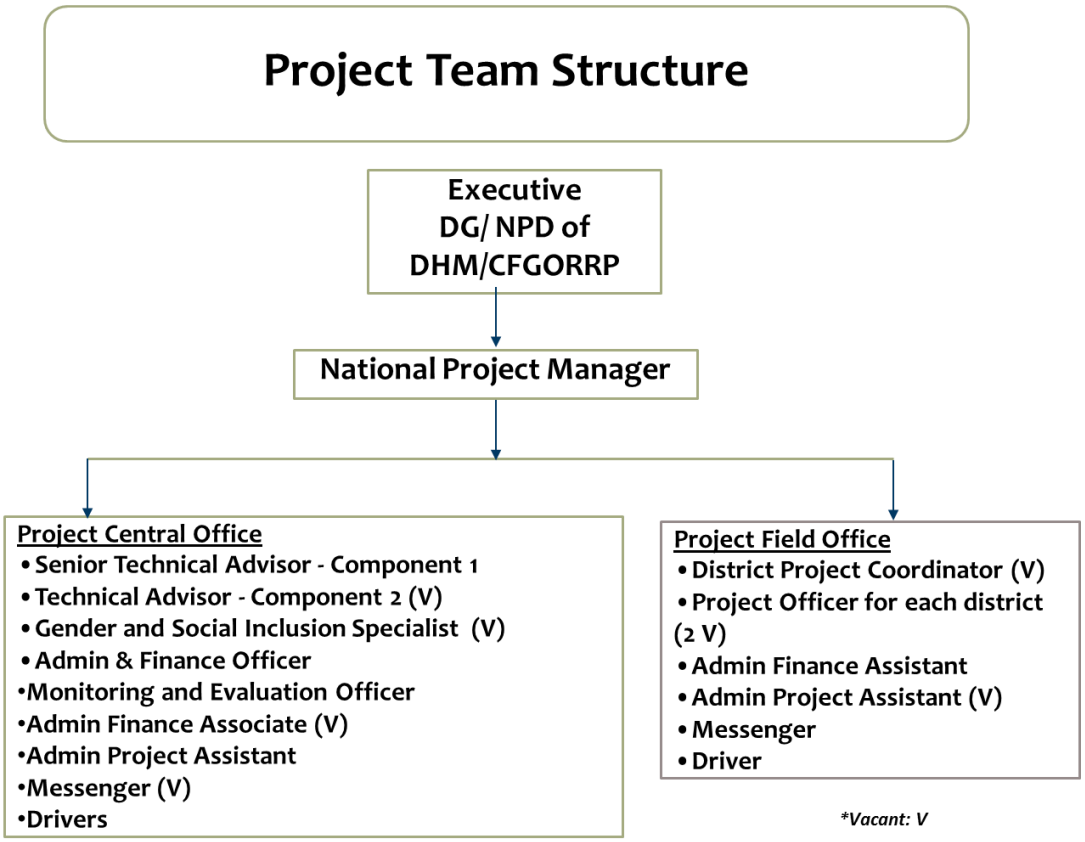


Figure 4 Project management organization structure (source: Pro-doc)

The DWIDM under the Ministry of Irrigation and the DSCWM under the Ministry of Forest and Soil Conservation were responsible for providing technical oversight for Component 2. The project had three tiers of management – a) Project Steering Committee, b) Project Executive Board, and c) Technical Advisory Group (TAG).

The Project Steering Committee (PSC) was a high-level committee aiming to ensure that LDCF resources were exclusively utilized to implement activities related to the approved project objectives and outcomes. The composition of the PSC is shown in Table 3-3.

Table 3-3: Project Steering Committee

Secretary, MoPE Chair	Representative, MoFALD
Representative, Office of the PM and Council of Ministers	Representative, MoHA
Representative, NPC Secretariat	Representative, Donor Community

Representative, MoF	Representative, KU & TU
Representative, MoFSC	Representative, Civil Society/NGOs
Director General, DNPWC	Representative, Private Sector
Director General, DSCWM	Representative, Ministry of Tourism and Civil Aviation (and/or Nepal Tourism Board)
Director General, DWIDM	UNDP-GEF representative in the role of Senior Advisor (representing the interests of the different parties of the project)
Representative, MoI	Representative, ICIMOD
Representative, MoE	DG/National Project Director DHM/CFGORRP-Member Secretary,
Representative, WECS	

The Project Executive Board (PEB) was a decision-making body to ensure that the project followed agreed strategies of implementation. It reviewed the project performance and approved the annual/quarterly work plans. The PEB consisted of:

- DG/ National Project Director, DHM/CFGORRP (Chair)
- Director General, DWIDM
- Director General, DSCWM
- Director General, DNPWC
- Representative, Ministry of Finance
- Representative, Ministry of Federal Affairs and Local Development
- Representative, Environment and Climate Change unit, UNDP
- National Project Manager (NPM) (Member Secretary)

The Technical Advisory Group (TAG) was a eight-member group that provided technical inputs and strategic guidance to the project. Personnel from the collaborative departments acted as focal persons for the project. All quarterly and annual work plans were prepared in consultation with focal points before being presented to the PEB.

The project established a Field Coordination Office (FCO) in one district (Siraha) to manage the field programs in Component 2. The FCO was managed by the Field Project Coordinator and had one Field Project Officer in each district.

3.2 Project Implementation

3.2.1 *Adaptive management (changes to the project design and project outputs during implementation)*

The project's logical framework was not changed during the period of implementation even when there were periods of critical situations (earthquake, economic embargo, and delay in contract for undertaking lake lowering work).

The involvement of the Nepalese Army in water level lowering in Imja Lake ensured the successful completion and also strengthened the capacity of the national institution.

The project had an elaborate system of project management but unlike Component 2, there was no dedicated staff for the project in Component 1. This had an impact on the effective implementation of activities and field level coordination in Component 1.

Implementation of the project activities was adversely affected by the economic embargo in late 2015 and early 2016 in both the components. Political disturbance in the districts of Component 2 also affected the implementation of the project. Financial constrains regarding construction work emerged during the economic embargo. Adaptive management encouraged cutting some other component activities so that the focus would remain on the construction work. The reduction of facilities for safe shelters was a critical result of unforeseen circumstances but also a critical example of adaptive management.

As the cost of the lake lowering activities increased by 0.8 million USD because of the delay, UNDP/TRAC provided an additional fund of $ 319,000 to contribute to the undertaking of other activities. The fund was provided during November 2016 and activities were revised accordingly.

3.2.2 *Partnership arrangements (with relevant stakeholders involved in the country/region)*

As described in the earlier section, the project had a three-tier management arrangement. The Project Steering Committee (PSC) was a high-level committee that ensured that LDCF resources were exclusively utilized to implement activities related to the achievement of the approved project objectives and outcomes. The broader partnership arrangement is elaborated in section 3.1.4.

In Component 1, the Sagarmatha National Park (SNP) was a major partner for the Imja Lake lowering works including community-based activities in downstream of Imja Lake. Chief Warden and other officials of SNP were a part of the ongoing works and their inputs and feedbacks were duly incorporated and implemented. The project coordinated with the Tengboche Monastery to have local rituals performed by local Lamas (religious priests) before the initiation of the construction work and during the inaugural ceremony of the Imja Lake lowering works. The project aimed to respect the cultural and religious values of indigenous communities by performing these rituals. Four local monasteries and six schools in the Khumbu region were designated as safe evacuation centers and strengthened with drinking water and toilet facilities in coordination with schools and monastery management committees. The project coordinated and sought advice from the Sagarmatha Pollution Control Committee (SPCC) for managing garbage and solid waste produced by the workforce at the Imja Lake lowering construction site. SPCC Guidelines were followed for managing garbage and solid waste in and around Imja Lake. Regular coordination with the task forces and Local Resource Persons (LRPs) was maintained during the implementation of activities and in particular, during the construction phase and while carrying out controlled water release from Imja Lake.

In both components, Red Cross Societies at district level were coordinated with and mobilized to facilitate mock drill events. Red Cross Societies and media representatives in respective districts visited project areas to observe the changes brought about by the project interventions. Partnerships at local level with most popular FM radio stations such as Himal FM and Khumbu FM were established to air awareness raising programs and public service announcements under both components.

The project also partnered with various consulting firms such as the Integrated Development Services, Innovative Support Hub, Axis international, Images Nepal, Ojaswi institution, and Adapt Nepal in order to undertake different assignments. Partnership with Nepal Telecom was established for operating VSAT in the Imja Lake periphery. This has helped to operationalize the automated GLOF early warning system.

3.2.3 *Feedback from M&E activities used for adaptive management*

After the inception phase, a clear framework was developed spelling out the roles and responsibilities for different M&E functions, with particular emphasis on the Annual Project Implementation Reviews (PIRs) and related documentation, the Annual Project Report (APR) as well as midterm and terminal evaluations planned in the project.

The MTR did not provide any strong recommendations on M&E, although there were a few important findings on weaknesses in construction work delayed and risks to the implementation of the project's major components. The MTR mentioned "the inclusion of AMAT indicators for GEF programme level monitoring diverges from the core results expected of the project and provides only generic indication of expected project results. It would have been more useful to focus the Results Framework around a distinct project theory of change rather than having project monitoring pre-programmed by the AMAT tracking tool which has a very different purpose. The layering of AMAT over the project design has a way of reducing the M&E accuracy at a project level". The type of M&E activities carried out in the project are shown in the Appendix E (provided by PMU). The project results framework was a critical component of the project's overall M&E framework. The major shortcoming was that there was no evaluation conducted based on the baseline and the of achievements against each indicator. For example, the baseline for total direct & indirect cost of potential GLOF damages including replacement of major infrastructure was estimated at $8.98 billion. There was no cost benefit assessment made to justify if the project would be able to save same amount. Similarly, existing tubewells in 6 VDCs become flooded during the flooding season making it difficult for 22,500 population, but there was no evidence whether 35 ETWs were able to serve the purpose. We also recommend to include another weakness which is lack of adequate CSO participation. With the current movement to "localize" development and Hum. Action, it is even more important to include Civil Society Organizations (CSO) in M&E to localize development.

Project Finance

The total project finance was 7.2 million USD as per the Project Document. The status of the project finance is shown in the following Table 3-4.

Table 3-4: Status of the project finance.

Co-financing (type/source)	UNDP own financing (mill. US$)		Government (mill. US$)		Partner Agency (mill. US$)		Total (mill. US$)	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
Grants	0.9	1.2					0.9	1.2
• Additional	0.3						0.3	
• GEF/LDCF					6.3	6.2	6.3	6.2
Loans/Concessions								
• In-kind support								
• Co-financing			7.0	7.0	12.4	12.4	19.4	19.4
Totals	1.2	1.2	7.0	7.0	18.7	18.6	26.9	26.8

The project implementation report mentions that an additional USD 319,000 was provided from UNDP/TRAC due to an increase in the price of construction materials during the economic crisis period. The total project budget is summarized here.

Total allocated resources: 7,249,430 USD

- GEF-LDCF 6,300,000 USD
- UNDP (in-cash) 949,430 USD
- UNDP/TRAC (additional) 319,000 USD

Figure 5 shows the outcome-wise expenditure of the project. The cumulative GL delivery against total approved amount (in pro-doc) was 91.98%. The cumulative disbursements of the finance are shown in Figure 6.

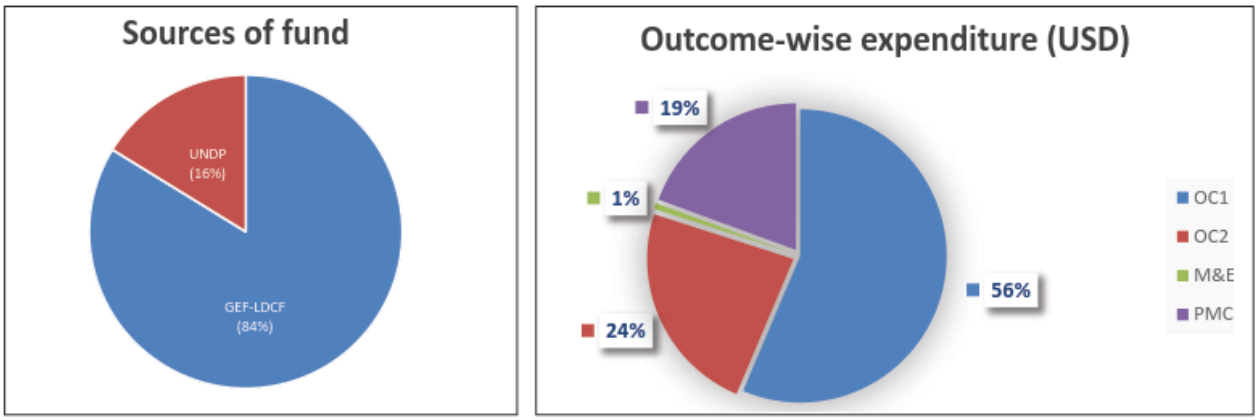


Figure 5 Outcome-wise expenditure

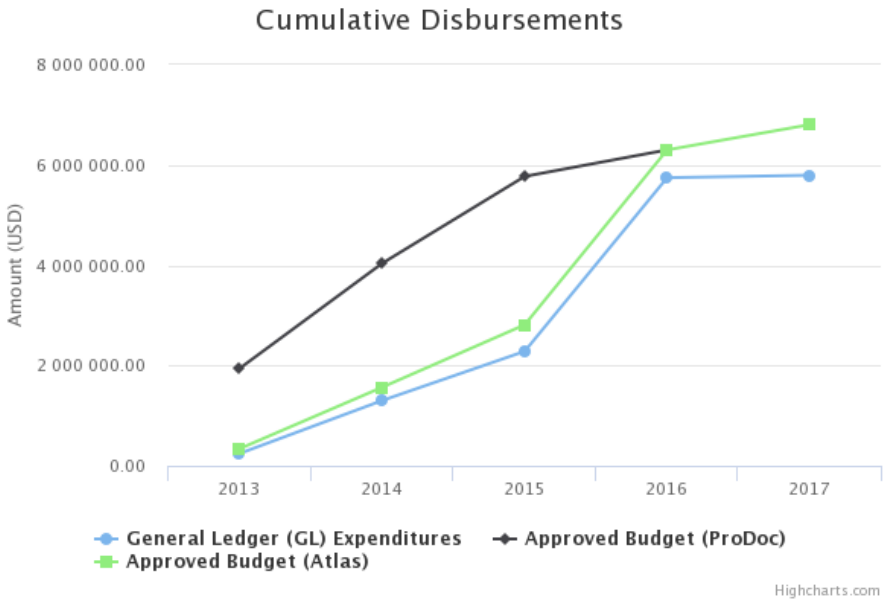


Figure 6 Cumulative disbursements of project finance

The Pro-doc also claimed co-finance of 19 million USD as leverage to the project.

Co-finance (kind – parallel co-financing in USD)

- UNDP (CDRMP) 7,682,900
- NRRC 2,857,811
- Govt Nepal/DWIDP 7,000,000
- USAID-ADAPT ASIA 157,369
- ICIMOD 1,705,000

Total Co-finance 19,403,080

During the evaluation process and finalisation of the report, the TE team did not receive any new figures other than from the MTR or the Pro-doc. The TE team also was not able to meet with the co-financing organization to get details on its expenditure and validation thereof. However, out of 22 plus million worth of co-financing pledged, about half was from the International Cooperation Partners supporting the DHM. Their support (primarily through their own projects) was successfully completed as planned during the project implementation period.

3.2.4 *Monitoring and evaluation*

M&E design at the project start up:

The design of the monitoring and evaluation systems at entry relied on the standard UNDP requirements, including annual Project Implementation Reviews and the project's Mid-Term Evaluations completed on time. In addition, the progress of the project was monitored on an ongoing basis by the project team for regular PEB, PSC and TAG meetings. The project appointed a dedicated M&E officer to ensure regular M&E activities of the project.

M&E Plan Implementation

The M&E plan had a total of 102,000 USD for strictly maintaining the quality of work and outputs at different stages such as ARR/PIR, quarterly progress reports, project board meetings, quarterly ATLAS QPR , Mid-Term evaluation, Final evaluation, etc. The MTR did not put forward any recommendations on M&E despite the challenges of procurement issues with regard to major construction work. In interviews during the final evaluation mission, the executing agency and stakeholders expressed their satisfaction with the way the PEB had worked and ensured that they receive relevant and timely information throughout the project implementation to perform their expected duties.

The GEF Operational Focal Point, although not available for discussion during the evaluation mission, had maintained systematic oversight of the project implementation through the annual PIRs, including comments and recommendations on project progress.

Criteria	Scale	Rating
M&E design at project start up	(rate 6 pt. scale)	5
M&E Plan Implementation	(rate 6 pt. scale)	5
Overall quality of M&E	(rate 6 pt. scale)	5

3.3 Project Results

3.3.1 *Overall results (attainment of objectives)*

The Project had two major components/outcomes. Component 1 aimed at reducing GLOF risks arising from Imja Lake in Solukhumbu district. Component 2 aimed at reducing human and material

losses from recurrent flooding events from Churia-originated river systems in four flood prone Terai districts.

Component 1:

The project has delivered on reducing the imminent risk posed by the Imja Glacial Lake to over 12,000 vulnerable people living downstream of the Imja Dudh Koshi river valley. Imja Lake has been lowered by 3.4 meters and as a result reduced a number of high GLOF risk lakes listed by ICIMOD in 2010, from 21 to 19. . Only two glacial lakes have been lowered in Nepal in the past decades, Imja Lake being one. The DHM had earlier worked to lower the water level in Tso Rolpa and this time with UNDP/GEF support, worked on lowering the water level in Imja Lake. Furthermore, the water level lowering technique has been verified by an independent environmental audit as being fully compliant with environmental and social safeguards. The audit report fully acknowledges that the project has directly contributed towards the reduction of the GLOF risk to people's lives and assets and that in the process no environmentally damaging measures (such as use of explosives, construction garbage on site etc.) had been taken. A successful example has been set where capacity building of national and local institutions such as the DHM, the Nepalese Army and development partners has taken place to enable them to joined hands to lower GLOF risks, which can be used for future glacial lake lowering measures. Compared to the previous effort of Tsho Rolpa Lake lowering, the Imja has set a precedent of a cost-effective method that also safeguards compliance. However, due to the Gorkha earthquake the project team had to make necessary adjustments in field work, including carrying out additional ground studies that unexpectedly increased the total cost of the component. In addition to actual risk reduction through a glacial lake level lowering, the project operationalized the automated early warning system. The system operated by the DHM now consists of hydro-met and GLOF sensors and automatic sirens in six major vulnerable settlements using a decision support system that uses 10 GLOF detection sensors to verify events as well as the Iridium communication system to trigger warnings. The DHM now receives data and information through its web portal www.hydrology.gov.np and is able to communicate GLOF risk warnings to NEOC/ MoHA. This means that the DHM now has a functional system of informing vulnerable communities and tourists/porters in the region with regard to risk of Imja GLOF events using SMS messages through Ncell and Nepal Tele Com, the major mobile service providers in Nepal. The Task forces (for light search and rescue, first aid, and community-based early warning) formed and strengthening of evacuation centers have all contributed in reducing the risks of GLOF events in the targeted areas.

Component 2:

Flood risk reduction measures such as embankments (14.3 km), a combination of gabion revetments and slope stabilizing bio-engineering methods now protect the local population and their properties from flood events. A 7.4 km flood proofed drainage canal has improved flood water transmission capacity during the monsoon periods as evident in the massive flood that occurred in 2017. The elevated tube wells (34) and evacuation centers (3) have helped people in securing freshwater from shelters during the flood event. The community-based early warning systems (established in 18 places) in all five targeted river basins have helped people to achieve better preparedness. The early warning system now covers over 59, 000 people with this service downstream and over 48,000 people upstream. The early warning system was very effective in protecting people in the August flood of 2017 not only within the country but also across the border. It was reported that it also indirectly strengthened the upstream and downstream community bonds/ interactions.

The project also strengthened community level institutional setups to deal with flood hazards by forming and strengthening community level organizations such as eight Local Disaster Risk

Management Committees (LDRMCs), 35 Community Disaster Management Committees (CDMCs) and 78 task forces. These community organizations have been trained and enabled to perform respective tasks as well as coordinate local level response measures. The LDRMCs have formulated Local Disaster Risk Management plans. These flood risk reduction ground measures as well as local mechanisms through community mobilization and empowerment have together created greater resilience against hazard risks and the capacity for response. During the last stretch towards its finalization the project focused on documenting all technical findings and lessons learned for future actions.

Taking into account the overall achievements and results, the project has been rated along the criteria of Monitoring and Evaluation, IA and EA execution, Relevance, Efficiency, effectiveness, Sustainability, and Impact. The performance is rated in the scale of 1 to 6 (six being the best performance) for all criteria except relevancy, sustainability, and impact. Relevancy is rated in the scale of 2, sustainability in the scale of 4 and impact in the scale of 3. The performance of the project per criteria is presented in Table 8. The overall aggregated score 5.5 based on conditions, geography and complexity of the project nature leads the TE team to deem the project as **Satisfactory**.

The overall ratings are shown in Table 3-5.

Table 3-5 Overall rating of the project

Criteria	Scale	Rating[11]	TE Comments
Monitoring and Evaluation			
M&E design at project start up	(rate 6 pt. scale)	5/6 (S)	The design of the monitoring and evaluation systems at the entry relied on the standard UNDP requirements, including annual Project Implementation Reviews (PIRs)
M&E Plan Implementation	(rate 6 pt. scale)	5/6 (S)	The M&E implementation plan was quite satisfactory. The project Mid-Term Evaluations was completed on time. The GEF evaluated M&E as satisfactory. The TE team also report the same.
Overall quality of M&E	(rate 6 pt. scale)	5 (S)	
5. IA & EA Execution			
Quality of UNDP Implementation (IA)	(rate 6 pt. scale)	4/6 (MS)	UNDP had managed the project very well with strategic guidance. The project design, risks and assumptions were underestimated and were not foreseen well ahead.
Quality of DHM Execution	(rate 6 pt. scale)	5/6 (S)	With the experience from Tsho Rolpa glacier management, the DHM managed the project well and established community connection and staff capacity building on GLOF.
Overall Quality of Project Implementation/Execution	(rate 6 pt. scale)	4.5	

[11] Detail of the ranking and scale are summarized in Table 2 in the main report.

Criteria	Scale	Rating[11]	TE Comments
6. Assessment Outcomes			
Relevance	(rate 2 pt. scale)	2/2 (R)	Activities planned in both component were very relevant considering the country context of CCA/DRR
Efficiency	(rate 6 pt. scale)	5/6 (S)	Engagement of the community in execution contributed to higher efficiency
Effectiveness	(rate 6 pt. scale)	5/6 (S)	All activities of Component 1 were highly effective. In Component 2, CBEWS, ETWs, capacity strengthening were all highly effective, but the embankment program was moderately effective as it was not comprehensive enough
Overall Quality of Project Outcomes	(rate 6 pt. scale)	5 (S)	
7. Sustainability			
Financial resources	(rate 4pt. scale)	3/4 (ML)	The communities may not have financial resources to ensure the sustainability of some activities (embankment, EWS)
Socio-political	(rate 4pt. scale)	4/4 (L)	The delegation to new political/administrative setup and community enthusiasm will contribute to sustainability
Institutional framework and governance	(rate 4pt. scale)	4/4 (L)	Integration of task forces in the component with the BZUC, and alignment of LDRMC/CDMC with new municipalities will contribute in institutional sustainability. Capacities of national institutions will ensure sustainability
Environmental	(rate 4pt. scale)	3/4 (ML)	A major concern is sustainability of embankment if the comprehensive conservations measures are not initiated at the upstream
Overall likelihood of Sustainable	(rate 4pt. scale)	4 (L)	
8. Impact			
Progress towards stress/status change	(rate 3pt. scale)	3/3 (S)	Several positive impacts on community ownership, livelihood improvement, and business investment are taking place.
Overall Project results (aggregated)	(rate 6 pt. scale)	**5**	**Satisfactory**

3.3.2 *Relevance*

The key criteria for assessing project relevance have been defined in the UNDP guidance for terminal evaluations to understand the extent a project design is aligned with the objectives of international,

regional and national policies and strategies and whether results outlined in the logical framework are relevant to actors and beneficiaries in project areas.

The project was funded by the LDCF after the endorsement of NAPA in 2010. The project contributes to NAPA's Combined Profile 3 "Community-based Disaster Management for Facilitating Climate Adaptation" and Combined Profile 4 "GLOF Monitoring and Disaster Risk Reduction" with regard to imminent GLOF risks at Imja Lake in Solukhumbhu district and catastrophic flooding from Churia-originated rivers.

The trend of rising global temperature due to climate change poses an increasing risk of GLOF originating in the High Mountains due to glacial retreat and expansion of the glacial lakes. Similarly, the entire country is highly prone to earthquakes thereby increasing the risk of GLOF due to the weak geomorphology of the High Himalayan region. Furthermore, flash floods and catastrophic floods in Churia-originated Rivers caused by extreme rainfall events in the Terai pose high risks to human lives and properties. The 2017 flash floods critically affected the Terai region and brought forward important lessons for the community to test the early warning and emergency response capacity. This time the downstream community in India has also benefitted from the early warning system developed under the project. The project purpose of CFGORRP/DHM has been highly relevant and appreciated by every actor and beneficiary interviewed by the TE team.

The project was aligned with UNDAF and CPAP and contributed to the Sustainable Development Goals (SDGs) target number 13- Climate Action and target 6-Clean Water and Sanitation. UNDAF Outcome 7: People living in areas vulnerable to climate change and disasters have benefited from improved risk management and are more resilient to hazard-related shocks. UNDAF/CPAP Output 7.1: Government officials at all levels have the capacity to lead and implement systems and policies to effectively manage risks and adapt to climate change. UNDAF/CPAP Output 7.3.2: Water level in Imja Glacier Lake reduced by 3 meters and risk mitigation measures adopted in 4 most vulnerable Terai districts.

The project has also been relevant to the needs and priorities of Nepal in following the Sendai Framework for DRR (target 7, establishment of early warning system for multi-hazards by 2030). It has enabled the GLOF Automated Early Warning System (AEWS) and its integration into the DHM system through the web portal. Critical vulnerable communities receives early warning of GLOF from Imja outburst by siren alarms. The flash flood early warning system is also semi-automated but further improvement could be made in the future.

The added value and unique selling point of the design relevance was linked to community action and being equipped with resources for EWS and response. Villagers were consulted in both components and found the design relevant in terms of physical preventive measures and capacity strengthening on first aid, light search and rescue, and early warning system. There was additional relevance with regard to Nepal's National Framework for Disaster Response (2013) which emphasized capacity building and emergency response capacity for disaster response. The TE team observed limited representation of the National Disaster Management Authority and the District Administration in the project but noted strong and substantial work at the village/community level. The task forces developed under the project in Component 1 have been linked with the BZUCs and those in Component 2 are linked with the LDRMCs. The Sagarmatha National Park Management Plan (2016 -2020) has recognized the need to address climate risk and DRR. They have incorporated project outputs and ownership of the Imja activities and integrated the Task Force under the Buffer Zone User Committee.

By taking into account all of the above and as further confirmed by the interviews during the terminal evaluation mission as well as by the observations of the MTR, the project can be considered as fully **relevant (R)** addressing imminent Glacial Lake Outburst Flooding (GLOF) in high risk areas and flood management. The project has also contributed to the national strategic priorities in

disaster risk reduction together with those of the UNDAF/CPAP and the GEF. No changes took place in the project environment and other circumstances during its implementation that could have diminished this relevance.

3.3.2.1 Relevance Rating

Qualification of relevance – R[12]

3.3.3 *Effectiveness*

Effectiveness is the study of result attainment and the relative importance of a project's set of results in achieving its purpose. The achievements of expected outcomes and objectives measured in the progress of indicators are the key to measuring the effectiveness of the project.

The logical framework (LF) was used as part of project reporting and as a management tool to update assumptions and empower adaptive management. The project purpose as stated in the logical framework was achieved in terms of the results as specified in the 'project completion report 2017'.

Component 1

An open channel with a design capacity of 15 cumecs with a regulatory structure; store house, office building and warehouse were constructed at the Imja which lowered the water level of the lake by 3.4 m. It is still very early to conclude the effectiveness of its design. The environmental audit and UNESCO report mentioned that the construction work at Imja had fully complied with the existing rules and regulations, including environmental safeguard measures which indicated that an effective system had been developed to reduce the risk of GLOF.

The automated GLOF Early Warning System is fully operational at the DHM with protocols for GLOF risk monitoring and maintenance. These include hydro met and GLOF sensors in the periphery of Imja Glacial Lake. Automatic sirens at six major vulnerable settlements have been operationalized by using a decision support system that uses 10 GLOF detection sensors to verify the events and use Iridium communication system to trigger warnings. The display board at the District Administration Office, Salleri, Solukhumbu, which functions as the District Emergency Operation Centre (DEOC), also provides weather information from the Chaurikharka meteorological station as well as hydro-met information from Imja and GLOF warnings through the DHM web portal. After receiving confirmation of Imja GLOF event, the DHM informs vulnerable communities and tourists/porters in the region by sending SMS messages through major mobile service carriers in Nepal such as Ncell and NTC. This shows that an effective early warning is in place.

Officials (38) from line agencies especially from the DHM have been capacitated on GLOF Risk Management and appraised on mitigation work (lake lowering), preparedness (EWS) and response mechanism (task force capacitated with equipment and training on light search and rescue), and early recovery (awareness raising). An Imja Lake AEWS Hands- on Manual is being developed in consultation with the DHM. Three DHM officials have visited Imja to learn and get acquainted with the infrastructures and equipment installed. A plan is underway to provide equipment such as inflated boat, echo sounder and differential geographical positioning system (dGPS) to enhance the technical capacity of the DHM for undertaking risk assessment of other potentially dangerous lakes. These initiatives are targeted towards institutionalization of GLOF risk management at the national level.

[12] The ratings of importance are: 2. Relevant (R); 1. Not Relevant (NR)

More than 3,300 units of flyers have been disseminated in a bid to sensitize locals and visitors on GLOF risk reduction. Radio programs to educate people on GLOF risk management are aired in both local Sherpa and Nepali language through local FM stations.

Trained and operational task forces are highly effective at the community level to utilize the knowledge and resources provided under the project for day to day incident management. Twelve task forces have been further capacitated and mobilized through a combination of mock drill events and awareness raising activities in a bid to respond and manage GLOF events. Through participating in 10 mock drill events, 495 community people, task force members and LRPs have learned skills, knowledge and techniques on how to deal better with GLOF and other disasters. Testing of the automatic sirens installed in vulnerable settlements was completed in the presence of local people, LRPs, and task force members.

Component 2

The flood early warning system for the downstream area is working. The system, which is semi-automatic /manually operated in some places, was very helpful in the massive flood of August 2017. Not only had it helped in saving lives and properties in downstream communities in the country but also across the border in India. A network has been put in place with institutional linkages helping to enhance the effectiveness of the early warning system.

The 7.4 km flood proofing drainage system, maintained by the community people, and the drinking water system are effective in Mahottari and Siraha districts in draining flood water. Thirty-five elevated tube wells were constructed and are effectively used by the communities, some mostly during floods and others all the time. Local communities have assigned the responsibility of managing these elevated tube wells to specific community members which indicate the effectiveness of the service of these initiatives as well as ownership of the communities. As many as 59,062 vulnerable community members including 27,682 women i.e. 100% of the community people living in the eight targeted VDCs have benefited from increased access to potable drinking water during floods and inundations with access to elevated tube wells (ETWs).

Altogether 14.37 km of embankment with gabion revetment and bioengineering works was constructed in Ratu, Gagan, Kong, and Hadiya river basins to safeguard local vulnerable communities from flash floods. In general, these embankments withstood the flood of 2017. In the sections where these embankments were constructed, there was effective protection of life and properties. However, due to the lack of availability of boulders, the gabion revetment design was not of high quality and the revetment was damaged in some sections during the 2017 flood. Most of these breached sections have been already repaired but certain sections have not as they are low in priority in vulnerability ranking. There is a risk of flooding from these unprotected sections. Also, as a result of one side of the embankments being protected, the force of the flood water had diverted to the unprotected bank of the river either because it was along VDC areas outside the jurisdiction of the project or because of its low priority. Sediment trap measures in 11 sediment laden upstream tributaries of Ratu River were constructed but the measures may not provide value addition considering the wide area of the river basin. However, in areas where these were constructed, the intervention has helped in trapping the sediment controlling erosion, and has also increased the water availability in those sections.

Three emergency shelters were built and these are maintained well by the local communities. The shelters are used for multi-purposes.

LDRMCs and CDMCs functioned effectively in the construction of embankments, emergency shelters, elevated tube wells, and overall flood management. The committees were formed

following the erstwhile political administrative setup and need to be realigned with the new setup. The MTR recommendations and TE team comments are shown in the Table 3-6.

Table 3-6 MTR recommendations and TE team response

MTR recommendations	TE team Comments
1. Prepare a concise Monitoring and Contingency Plan for Imja construction period	Letter of Agreement signed with the Nepalese Army in March 2016 after the MTR and the project was successfully completed.
2. Assist GLOF Risk Management and Coordination Committee through SNP and BZMC	The project did not continue the GLOF Risk Management and Coordination Committee. Rather it was directly overseen by the Buffer Zone Management Committee. This called for more efforts from the DHM and the DNPWC to sustain the Task Force developed under the project.
3. Early Warning System in the Imja Lake impact zone should be fully tested	The automated GLOF warning is functional and tested with a false alarm. People evacuated the area and went to the safe shelter.
4. Operations and maintenance plan for the Imja Lake EWS	A hands on Manual of Imja AEWS including Decision Support System completed and operationalized.
5. Bioengineering aspects of the project embankments (6.5 km target) including green belts should be assessed	The project uses local species to support erosion protection. A detailed assessment was not included due to budget downsizing for supporting Imja Lake lowering works.
6. Assist LDRMCs and CDMCs in identifying opportunities to finance from VDC budgets or elsewhere	This activity was partially achieved. Some LDMCs were able to allocate emergency funds during the 2017 floods in Component 2. The task forces in Component 1 are new and are being absorbed by the SNP. SNP is committed to allocate emergency funds in the future.
7. A joint DHM-DWIDM-DSCWM monitoring team should provide regular oversight of the micro-watershed rehabilitation projects	A joint DHM-DWIDM-DSCWM monitoring team was established and provided guidance for the micro watershed rehabilitation projects. But team did not meet frequently and no support materials were found on specific outputs.

8. Consolidate lessons from the project's Terai flood risk reduction activities	The 2017 flood was a good lesson for the area to understand the effectiveness of the project and provided good lessons for future project designs.
9. Strategy for effective utilization of the Sediment Monitoring Protocol in watershed management	Sediment Monitoring Protocols were developed and disseminated which provide methodologies for collecting & analyzing sediment data from Churia- originated river basins.

3.3.3.1 Effectiveness rating

Satisfactory (S)[13]

3.3.4 *Efficiency*

Efficiency analysis considers how well and timely activities and inputs were used to produce physical outputs and value for money.

Management Efficiency

The Project Executive Board (PEB) and the Technical Advisory Group (TAG) enhanced technical inputs and provided strategic guidance to the project (19 PEB). The Project Steering Committee (PSC) was in place and met twice to provide policy level guidance. The TE team recognized MoHA's representation in the PEB which helped enhance institutionalization of the DRR initiatives.

The level of monitoring and evaluation in the project was very good. There were baselines reported for key logical framework indicators and counterfactuals in operation. This attribution helped in the validation of project outcomes.

An earthquake, economic embargo and procurement process delayed the construction activities of the Imja Lake lowering project. Risk was underestimated in the LF. UNDP also came up with a Plan A and Plan B in the project design. Completion of the project within these limitations represented a highly efficient management system followed by the DHM.

Technical Efficiency

The Imja Lake lowering technical studies and design works were of high quality and were peer reviewed by well recognized experts. The EPA-SPCC guideline and environmental audit represent highly efficient work on the lake lowering.

The design of evacuation shelters in the Solukhumbu area did not meet the standard safe evacuation location criteria, nor was any shelter management plan in place. Budget deficiency may have affected this component.

Financial Reporting

Financial reporting is well acceptable. Cumulative GL delivery against expected delivery as of 2017 is 91.98%. The MTR shows co-financing as of April 2016 to be 19 million. An additional 3M was recently approved for the NAP assessment under GCF to support other high GLOF risk assessment.

[13] The ratings of importance are shown in Table 1-2.

Overall, the quality of the outputs is satisfactory and they represent good value for money when one considers the difficulties faced in the project implementation period.

The annual district plans of three to five targeted project districts had incorporated budgeted flood risk preparedness activities but were not observed on the ground. However, VDC level disaster risk management fund was found to have been allocated.

3.3.4.1 Efficiency rating

Satisfactory (S)

3.3.5 *Country ownership*

As discussed under project relevance, the project design with the key strategy for GLOF risk reduction and community-based disaster risk management was consistent with the key strategy documents of NAPA and national disaster risk reduction goals. The important benefits of the project in terms of increased capacity on GLOF early warning system and CBDRR in general were also unanimously emphasized by all stakeholders interviewed by the TE team.

The GLOF early warning system is fully functional at the DHM. The MOPE is well committed to support any maintenance budget for the GLOF EWS. The other high risk glaciers are being considered to be assessed under the Green Climate Fund support. The National Adaptation Plans (NAPs) have been approved by GCF which have a provision for the assessment of other high risk glaciers.

As evidenced by the project completion report, 19 Project Executive Board meetings and two Project Steering Committee meetings were held to provide strategic guidance. All important decisions and approvals sought before final decision showed clear commitment to project completion.

Discussions with the DNPWC showed they were fully supportive to own the Imja management and task forces and to allocate emergency funds for disaster risk reduction at the community level. SNP developed its Management Plan for the period 2016-2020, which incorporates Imja Lake lowering activities, climate change and disaster risk reduction.

The Engineering Department of the Nepalese Army was identified as the appropriate partner to undertake the lake lowering works after two international bids became unresponsive in 2015. The Nepalese Army has technical and managerial capacity and would be able to lead other glaciers risk management in the country and in other mountainous countries.

A total of 22 national level officials from the DHM, the DSCWM, the DWIDM, the President Churia Terai Madhesh Conservation Development Board (PCTMCDB), the Central Department of Environmental Science and Institute of Engineering - Tribhuwan University, enhanced their skills and knowledge on flood hazard modelling and sediment monitoring by taking part in the national level training on enhancing national capacity on embankment and sediment control.

3.3.6 *Mainstreaming*

The UNDP Guidance for Terminal Evaluation calls for an assessment of the extent the project has achieved the requirement of “mainstreaming other UNDP priorities, including poverty alleviation, improved governance, the prevention and recovery from natural disasters, and women's empowerment”.

The UNDAF outcomes were stated in the pro-doc as – “People living in areas vulnerable to climate change and disasters benefit from improved risk management and are more resilient to hazard-related shocks”. CFGORRP/DHM developed a Gender Strategy, which targeted to attain 33%—50% participation and representation of women and socially excluded and vulnerable groups in project

activities, local institutions (CDMC, LDRMC, Taskforces, etc.) and different decision-making positions. It prioritized the participation and representation of women and marginalized people in its activities thereby creating a platform for decision making and empowerment.

A total of eight LDRMCs and 35 CDMCs were formed, capacitated and made operational and have about 38% of women holding key positions such as that of chairperson, secretary and treasurer. Similarly, amongst 444 members of 90 various task forces, about 41 % members were women who were trained, equipped and mobilized. This is expected to contribute towards the sustainability of the project interventions. These initiatives undertaken at ground level will contribute significantly towards building resilient communities as stated in the UNDAF outcomes above.

The project also constructed gender-friendly structures such as toilets in evacuation centers intended to improve women's access to safe sanitation facilities during emergencies. Similarly, two disabled-friendly elevated tube wells were made operational that provide easy access to potable drinking water for disabled people living in the two respective areas. Women and marginalized people in vulnerable settlements actively participated in events such as mock drill exercises which played a catalytic role in educating women about GLOF and flood risk preparedness.

Although the project envisaged integration of DRR and CCA, due to NAPA priority however, it was unable to reflect a very cohesive strategy since it had two distinct components as mentioned in the MTR.

Awareness building using monthly radio episodes were conducted and daily PSAs were aired on local FM targeting wider audiences with GLOF risk management messages. Information boards, flyers and brochures were produced and installed/distributed.

Integration of task forces in the BZMUC resulted in good mainstreaming of disaster prevention and improved governance of the project.

3.3.7 *Sustainability*

For sustainability, the GEF guidelines establish four areas for considering risks to sustainability, each of which should be separately evaluated and then rated as to the likelihood and extent that they will impede sustainability of the project outcomes. These risks include: 1) financial risks, 2) socio-economic risks, 3) institutional framework and governance risks; and 4) environmental risks. It is also to be noted that the assessment below is primarily based on the situation analysis in the project area and project document support to the TE Team.

Financial resources

In the aftermath of the Gorkha Earthquake 2015 followed by the economic blockade by India including the political disturbance in Terai during 2015, the country faced tremendous stresses in various sectors. The project felt the impact of such crises and the cost of Imja Lake Lowering construction works shot up an additional USD 0.8 million from the earlier estimated cost of USD 2.4 million. This had implications on the planned activities and the project had to realign and cut down some activities to meet the shortfall. Hence, plans for 2016 and 2017 were prioritized and downsized to meet the budget deficit. The VAT return helped to offset some of the deficit.

An additional fund of $ 319,000 was provided from UNDP/TRAC source during November 2016 and activities were revised accordingly which smoothened the efforts to some extent.

The project initiated a process for VAT refund from the Inland Revenue Department (IRD) against the expenses made on the Imja construction works. After the first instalment of VAT refund of US $ 141,129 was received, the second tranche of VAT refund of USD 183,628 was received during June 2017. From this VAT refund, the project undertook prioritized activities under Component 2 that were geared towards the sustainability of the project achievements.

To sustain the efforts of Imja activities, NAP has recently been approved by GCF. The rest of the high risk GLOF activities will be carried out under GCF. Given the above, financial sustainability at the outcome level is considered as Likely (L).

Socio-economic

It can be concluded that the current level of awareness about the Task Forces, LDRMCs/ /CDMCs is good and good understanding of disaster risk reduction, GLOF and flood risk management has been achieved. The community is well equipped with gear for supporting day-to-day incident management as well. The integration of concrete measures to support this through relevant government policies, strategies, applicable incentives and other financial support is still largely missing and fluid due to the government's new structure and transition phase.

The project also had significant impact on the peace of mind of the local community and their livelihood capacity. Given the above, the socio-economic sustainability at outcome level is considered as Likely (L).

Institutional framework and governance sustainability

Undertaking of water level lowering work in Imja Lake by the Nepalese Army strengthened the capacity of the NA. Their continued presence would contribute in ensuring the sustainability of the work as well as asset management and security at community level.

The agreement between the DHM and the DNPWC for monitoring the lake provides the institutional means for sustaining the technical work and early warning system.

Integration of the Task Forces formed in Component 1 with the Buffer Zone Management User Committees will contribute in sustaining the Task Forces.

8 LDRMCs and 35 CDMCs comprising 555 (248 women) members were formed and are operational. It is not clear how long the transition period will last before the municipalities/ rural municipalities accommodate the LDRMCs/ ±/CDMCs formed in Component 2. The institutional basis for sustaining the project benefits/effects will be adversely impacted if the transition period extends to a longer duration. The project supported the preparation of gender sensitive Local Disaster Management Plans (LDRMPs) of the eight targeted VDCs. These LDRMPs will be the guiding documents for disaster management, including allocation of resources for disaster management at local level. This is expected to contribute towards the sustainability of the project interventions. The outcomes are Likely (L).

Technical and Managerial

Thorough technical assessments during implementation, enhanced technical capacities of responsible parties and a strong institutional basis in Component 1 would ensure the sustainability of the project's effects. Sustainability of Hydro-met monitoring stations and the Automatic Early Warning System was the key concern of the project intervention. One of the options for this is to involve the hydro-power companies of the of Dudhkoshi river basin. An initial consultative meeting with hydropower basin was held to discuss the possibility of collaboration for sustainable functioning of the system. The meeting yielded a clear indication of cost sharing if the hydrological data requirement for hydropower design, licensing and post installation safety could be provided. Hydropower producers are ready to work with the departments concerned such as the Department of Energy Development and the DHM towards getting quality data and to share part of the operation and maintenance cost of the EWS.

The network, technical capacity and institutional linkages that have been developed will make the community-based early warning system sustainable in Component 2.

The sustainability of the sediment monitoring and control initiatives will also depend upon future programs within the DHM and other agencies to further maintain and expand the sediment database using the Sediment Monitoring Protocol that has been developed by the project, and to apply the information and analyses to river basin management strategies. The process for a national approach to sedimentation issues is uncertain, although efforts to continue with this work are under discussion with the President Chure-Terai Madhesh Conservation Development Board.

The outcomes are Likely (L).

Environmental

The SNP has integrated most of the elements of the project in the park management plan and has also taken steps to resolve issues with the BZMC within a month or so by convening a GRMCC meeting. The outcome of the meeting will be critical to developing local ownership, institutionalizing the project activities and finally promoting sustainability of the project outputs. There are also potential options to gain support from hotels in Khumbu and hydro-electricity projects at the downstream. However, there was no concrete plan available during the project review. Environmental risks were addressed in the IEE which was included in the updated park management plan.

As recommended by the UNESCO mission to undertake an independent environmental audit of the Imja Lake lowering construction works in Sagarmatha National Park (SNP), a UNESCO World Heritage Site, the project provided support to the DNPWC to undertake the study. Accordingly, an independent team of experts conducted the Environmental Audit during June 2017. The audit report concluded that the Imja Lake lowering works undertaken by the Nepalese Army had fully complied with the existing rules and regulations, including environmental safeguard measures as stipulated in the Letter of Agreement. The report praised the work undertaken by the project stating that it had contributed towards reducing risks from GLOF thereby saving lives and properties as well as the local biodiversity of the SNP.

The Nepalese Army has fully complied with the SPCC (Sagarmatha Pollution Control Committee) guidelines of bringing back the principle of clearing all garbage and rubbish generated during the construction phase. No explosives were used and local materials, knowledge and skills were employed.

As there is a continuous rise of the river bed originating from the Chure hills, there is a risk that the current embankment may not hold flood water after some years unless comprehensive conservation measures are initiated in the upstream. The unprotected stretches of the rivers threaten to mitigate/nullify the achievements of the protection works undertaken.

The communities have taken ownership of both the elevated tube wells and emergency shelters, thus ensuring the sustainability of these initiatives. Local level technicians can easily manage the repair of tube wells. However, communities were not found to levy charges for other uses of emergency shelters. Such fees will help in meeting the expenses of regular maintenance of these shelters.

The outcomes is Likely (L).

Overall likelihood

The MTR concluded that the project was on track and was rated as ‘satisfactory’ as it achieved significant results despite various constraints and focused on the sustainability aspects of the interventions. The TE team recognized that the project was able to achieve significant success in sustaining the project outcomes in Component 1 and partially in Component 2.

Sustainability has been recognized as an important aspect of this community-based project. The project developed an 'Exit Strategy and Plan' in December, 2016 in close consultation with the partners. The exit strategy states that, by the end of the project:

- The glacial lake lowering knowledge will be transferred to the DHM for further replication of the intervention in other critical glacial lakes.
- Local Resource Persons and the Task Force members at Khumbu will be able to operate and maintain the CBEWS and institutionalize the EWS knowledge at community level.
- The SNP Office will have the necessary resources and capacity to address and communicate with the community.
- The community will receive GLOF risk warnings and will be equipped for mitigation and preparedness measures - including institutionalization of Smart Card Readers, and Mobile Applications. The DHM's annual work plan will incorporate mechanisms to share pre-disaster warnings and risk communication strategies with key partners via MoHA and NEOC.
- The project plan was that by the end of 2017, the Task forces and the GRMCC would be integrated under the Buffer Zone Management Committee's program and plan as a sub committee of the BZMC.

3.3.7.1 Sustainability rating

Likely (L): negligible risks to sustainability

Criteria	Scale[14]	Rating
Financial resources	(rate 4pt. scale)	L
Socio-political	(rate 4pt. scale)	L
Institutional framework and governance	(rate 4pt. scale)	L
Environmental	(rate 4pt. scale)	L
Overall likelihood of Sustainability	(rate 4pt. scale)	L

3.3.8 *Impact*

The project took a pioneer approach by bringing together community outreach integrating science, institution and society. This made a real difference at community level as evidenced by the impacts. The EWS was found very effective in reducing the loss suffered from the 2017 flood in downstream communities. The embankment constructed in the four districts worked well in the 2017 floods but the TE team was unable to make any cost benefit assessment in terms of savings amount of the community due to the EWS. The local community, however, expressed their satisfaction with the information provided by the DHM.

By lowering the Imja Lake level by 3.4 meter, risk from Imja GLOF for 12,690 local inhabitants residing in downstream and about an estimated 74,992 annual floating population (tourists/porters/guides) in the region has been reduced. This has also safeguarded the livelihood of locals, the majority of whom are involved in the tourism business (137 hotels, 64 teashops and guides/porters). Khumbu region, among the most popular tourist destinations in the world, has also been made safer for tourists and trekkers. The successful undertaking of the most challenging Imja Lake lowering works above 5010 masl was well covered by global media like BBC, CNN, etc.

[14] Detail scale in Table 1-2

New champions impact pathway- local representatives/task forces/LDRMCs/LDMCs/CDMCs made an enormous impact at community level to establish CBEWS with good equipment, gear and information.

The project has clearly transformed the mind-set of the Buffer Zone Management User Committees towards integrating DRR.

Gender sensitive Local Disaster Management Plans (LDRMPs) of the eight targeted VDCs have been enabled to create local disaster management plans.

Reduction of risk of disasters both in Components 1 and 2 as a result of the project intervention has led to 'peace of mind' of local communities and opportunities have opened up for business investment

The project's publications has impacted information dissemination (including radio episodes and daily PSAs aired on local FM, information boards, flyers and brochures, etc.) to enhance awareness of wider communities.

The project has created a safer environment and new economic and livelihood opportunities have cropped up. People have started making new investments in hotel construction, house building, commercial vegetable cultivation etc. Land value has increased in these areas as well.

Capacities of national institutions and community organizations have been strengthened.

The Community Based Early Warning System greatly helped in the downstream of Gagan and Ratu rivers and across the border in India during the 2017 flood. The data in the previous section support this statement.

Disaster response gear and GLOF/flood EWS are the project's most important appropriate technology. Spread effects are observed in terms of response to local incidents.

One of the contributions of this project, stemming from lessons learned, is that the DHM has proposed a new project to GCF.

3.3.8.1 Impact rating[15]

Progress towards stress/status change: Significant (S)

4 Conclusions, Recommendations & Lessons

Despite considerable challenges and constraints that could not have been foreseen during project development, the project has delivered high quality products and has engendered strong ownership among stakeholders from village communities. Ownership is an evolving process but the steps taken in the project towards its development are highly appreciable and the momentum needs to continue in the transition period.

4.1 Corrective actions for the design, implementation, monitoring and evaluation of the project

Component 2 of the project covered a wide area and thus was unable to make any significant impact on a larger scale. However, the impact was significant at the implementation site. The project span was only four years, whereas it should have been longer to yield a greater overall impact. The one basin approach design is recommended for the future as it can have impacts in a short duration project period.

[15] Detailed rating Table 1-2

Considering the challenges faced, the result framework had required more thought on risk and assumption for the GLOF project as well as a clearer work plan and a road map for main delivery components. For project design, the evaluation highlights the importance of investing adequate resources and time on proper situation analysis, even for smaller projects. Typically for medium-size projects, far less resources are available and allocated for project preparation; although from the viewpoint of the identified (or non-identified barriers), the targeted results and complexity, their implementation can be as demanding as of many full-size projects. While many defaults of the initial project design can be compensated by good adaptive management, and in most cases this is unavoidable anyway, such actions typically also delay project implementation and in the worst case can lead to unnecessary waste of resources. Especially for smaller projects with already stretched resources, this can be quite damaging indeed.

Greater attention is recommended on concrete monitoring and reporting plan and formats at project inception along with quality control. Going beyond the standard UNDP requirements is recommended as well.

4.2 Actions to follow up or to reinforce initial benefits from the project

As mentioned earlier, the project has clearly had a significant impact in terms of increasing general awareness on acceptance of early warning system and community based disaster response with obvious effect on livelihoods.

The original project design did not include a livelihood component which proved to be a design flaw. Inclusion of a livelihood component could have resulted in a more comprehensive impact. The project could have emphasized synergies between disaster risk reduction and climate change adaptation for a 'win-win' situation that would have enhanced reduction of climate-related losses, led to efficient use of resources, and increased effectiveness and sustainability of both approaches. For example, due to the absence of a livelihood component, climate vulnerability and risk assessment for different elements at risk were not prioritized. Instead, only hazard assessment was highlighted in the risk assessment.

4.3 Proposals for future directions underlining main objectives

Proposals supporting sustainability of the project results have been already discussed above. However, some main points could be further highlighted as follows:

- Experience in glaciated mountains worldwide reveal several mitigation measures to reduce the risk of GLOFs such as lake monitoring, dam reinforcement, lake lowering, flood attenuation, land use planning, flood defence construction, GLOF awareness programs and early warning systems. Some aspects were well taken under this project and some others could be considered in the future. A proper policy and guidance are also necessary on GLOF risk management.
- Adoption of the one river basin approach in flood risk management could effectively integrate the upstream and downstream issues as well as build community ownership and result in addressing climate risk and disaster resilience in a comprehensive manner.
- Inter-agency coordination and collaboration is challenging and requires strong support.
- With the implementation of this project, an institutional framework that brings together the DHM, local communities, the National Army and other collaborating partners has been successfully tested and can be used for future glacial lake lowering measures.
- The technical capacity and institutional memory of the Department of Hydrology and Meteorology have been enhanced by the undertaking of the Imja Lake lowering works.

This learning and experience need to be replicated while executing GLOF risk mitigation works in other dangerous lakes in the future.

4.4 Best and to-be improved practices in addressing issues relating to relevance, performance and success

Best Practices: The Project assisted in mainstreaming climate change into DNPWC's strategic plan. It also showcased the fact that disaster response has value addition at community level and is absorbed in the BZMC.

GLOF EWS received its organizational integration at the DHM and it could be further enhanced in future. This institutional mechanism would enhance sustainability.

The project has helped the Nepalese Army to gain the skill and knowledge on lake lowering activities and to be able to share the skill and knowledge for GLOF risk management in Nepal and the region.

Knowledge management in both components has resulted in a large number of knowledge products. Websites and social media have been used effectively in disseminating the knowledge products to a wide audience. Substantial summaries have been produced on some of the outputs on GLOF and flood EWS.

4.4.1 *Practices for improvement*

Inter-agency & Inter-component cooperation are highly critical for sharing of good experiences and to further re-think collaboration strategies for a one basin approach project.

The project was designed with two components having fully diverse objectives. The result was that the project achievements could not showcase full-scale DRR and CCA mainstreaming.

Procurement of services through a huge contract for undertaking the tremendous task of Imja Lake lowering remained a major challenge for this project.

Proper maintenance of the project assets also proved challenging due to budget constraints and lack of ownership.

4.5 Recommendations

Component 1:

- Floods from moraine-dammed lake failures can have long standing effects not only on riverine landscapes but also on mountain communities due to the high intensity (i.e. great depth and high velocities) and damaging capacity of glacial lake outburst floods. Policy, strategy, and guidelines are essential for GLOF risk management. More research of sound scientific basis need to be developed for predicting glacier response to climate change along with clear criteria for prioritizing mitigation efforts.
- The risk of GLOFs cannot be completely eliminated unless the lakes are fully drained. In fact, reinforced dams and partially drained lakes have produced GLOFs (Carey et al., 2012[16]). The non feasibility of draining all hazardous lakes calls for the development of integral approaches to reduce the GLOF hazard and risk. This includes soft (land use planning) and

[16] Carey, M., Huggel, C., Bury, J., Portocarrero, C., Haeberli, W., 2012. An integrated socio-environmental framework for glacial hazard management and climate change adaptation: lessons from Lake 513, Cordillera Blanca, Peru. Clim. Chang. 112, 733–767.

hard (geotechnical works) mitigation measures in the frame of coordinated plans including actions before, during, and after the emergency.

- Glacial lake evolution is complex, driven in part by sediment deposition and reduced numbers of surrounding ice cliffs. Geophysical tools for measuring subsurface properties of glacial lakes and moraine dams could be monitored on a regular basis. This could enable to understand subsurface characteristics.
- The implementing agency (e.g. DHM) could consider the risk and assumptions of similar project designs and the feasibility of conducting construction works in a remote, high altitude area, as well as a procurement plan.
- The DHM could share the success stories of the Imja Lake experience with other mountainous countries and apply a similar technology and management for other high risk glacial lakes.
- The evacuation centers, especially in Component 1, differed widely in terms of convenience of access, area of open space, and facilities. Standardization of safe evacuation shelters is needed along with a proper shelter management plan.

Component 2:

- In any future design of flood risk management projects, the Integrated Watershed management approach should be adopted. A livelihood component and pro-poor recovery should also be an integral part of the design.
- Flood risk mapping and increased lead time using NWP models for EWS should be done. Rapid damage mapping for response could enhance flood response and recovery in the Terai area.
- The river systems in the Terai provide a source of irrigation for the local communities. In some areas, construction of embankments has obstructed the irrigation system. Embankments should be integrated with the drainage and irrigation infrastructure.
- The 'Build back better' culture could be adopted in flood prone areas following the Sendai framework of disaster risk reduction.
- In order to ensure sustainability of the project effects and to strengthen its institutional base, exit workshops should be conducted with relevant stakeholders for documenting and sharing project achievements, its institutional basis, and the works to be done.
- Asset management and ownership of resources is important in this type of inter-agency programs. An inter-agency Letter of Agreement for resource handover and maintenance would ensure sustainability of the project.

Appendix A: ToR

Appendix B: Itinerary

Date	Venue	Time	Activities
Nov 14, 2017	Kathmandu, Auckland	16:30	Kick off meeting over Skype
Nov 14 to 16,	Kathmandu, Auckland		Inception Report
Nov 17 to 19	Kathmandu		Desk review, field planning
Nov 20, 2017	Kathmandu	12:00	Meeting with the NPD
		15:00	Meeting with DDG, DWIDM
		16:00	Meeting with NPM
Nov 21, 2017	Kathmandu	9:30	Meeting with ICIMOD TAG member
		10:30	Meeting with water and Adaptation Specialist, ICIMOD
Nov 22, 2017	Kathmandu-Biratnagar	9:00	en route
	Dighwa, Saptari	15:00	Meeting with ward level officials, observation of ETW
	Gaighat, Udaypur		Night stay
Nov 23, 2017	Jogidaha, Udapypur	9:00	Meeting with Task force, CDMC, Community members observation of embankment
		11:00	Meeting with ward chairperson
	Lahan, Siraha	13:00	Meeting with the In-Charge DWIDM
	Tulsipur Siraha	15:00	Meeting with CDMC, gauge readers, community members, observation of embankment
Nov. 24, 2017	Siraha, Siraha	12:00	Meeting with LDO, UN Habitat
	Lahan, Siraha	15:00	Meeting with DSCO, Siraha
		16:00	Travel to Bardibas

Date	Venue	Time	Activities
Nov 25, 2017	Tulsi, Mahottari	9:00	Meeting with community members, observation of sediment traps, gauges
	Bardibas, mahottari	11:30	Observation of telemetry and EWS at Ratu, interaction with caretaker
	Sarpallo, Mahottari	14:00	Meeting with Ward Chairperson, CDMCs, LDRMC, taskforce; observation of embankment, emergency shelter
	Nainhi, Mahottari	16:00	Meeting with community members, ETW management; observation of flood proof drainage, ETW, emergency shelter
Nov 26, 2017	Janakpur, Dhanusa	7:00	Meeting with District Project Officers Udaypur and Mahottarai
		8:00	Meeting with DSCO Mahottari
		9:00	Meeting with then District Project Coordinator
Nov 27 to 29	Kathmandu		Document review
Nov 30, 2015	Kathmandu	16:00	Meeting at UNDP
Dec 1, 2015	Kathmandu	11:00	Meeting with NPM
		13:00	Meeting with NPD, Focal person DHM
		14:00	Meeting with Sr. Technical Advisor, Component 1
Dec 2, 2015	Kathmandu-Lukla	6:00	en route to Solukhumbu
	Lukla, Solukhumbu	9:00	Meeting with Taskforce member, Surke, Chaurikharka
	Ghat, Chaurikharka, Solukhumbu	13:00	Meeting with Task Force Chair, Ghat; observation of siren
	Phakding, Chaurikharka, Solukhumbu	16:00	Group meeting with task force; observation of emergency shelter

Date	Venue	Time	Activities
Dec 3, 2017	Tok Tok, Chaurikharka, Solukhumbu	10:00	Meeting with community member
	Benkar, Chaurikharka, Solukhumbu	11:00	Group Meeting with task force and community members, observation of equipment support
	Chumuwa, Solukhumbu	12:00	Meeting with LRP
	Monjo, Chaurikharka, Solukhumbu	13:00	Meeting with taskforce Chair
	Namche		Night stay
Dec 4, 2017	Namche, Solukhumbu	9:00	Meeting with In-charge a.i. SNP
	Phakding	13:00	Meeting with LRP
	Lukla, Solukhumbu		Night stay
Dec 5, 2017	Lukla-Kathmandu	7:00	Travel to Kathmandu
	Kathmandu	13:00	Meeting with Chief Conservation Officer, SNP
	Kathmandu	15:00	Meeting with Lt. Col. Nepalese Army
Dec 6, 2017	Kathmandu	10:30	Meeting with then Secretary MOPE
		12:00	Meeting with Joint Secretary, MOPE
		13:00	Meeting with DG and DDGs of DNPWC
		14:30	Meeting with Technical Advisor Component 2
Dec 7, 2017	Kathmandu		Preparation for Debriefing meeting
Dec 8, 2017	Kathmandu	10:30	De Brief Meeting

Appendix C: List of Persons interviewed

National Stakeholders

SN	Name	Institution
1	Dr. Rishi Ram Sharma	Director General, Department of Hydrology and Meteorology
2	Mr. Top Bahadur Khatri	National Project Manager, CFGORRP
3	Mr. Pradeep Thapa	Deputy Director General, DWIDM
4	Dr Arun Bhakta Shrestha	Regional Programme Manager, River Basins, ICIMOD
5	Dr. Neera Shreshtha Pradhan	Water and Adaptation Specialist, ICIMOD
6	Mr. Deepak KC	Energy, Environment, Climate and DRM Unit, UNDP
7	Ms. Shanti Karanjit	Climate Change Programme Analyst, UNDP
8	Dr. B N Oli	Then Secretary, MOPE
9	Dr. Ram Prasad Lamsal	Joint Secretary, MOPE
10	Mr. Man Bahadur Khadka	Director General, DNPWC
11	Mr. Sher Singh Thagunna	Deputy DG, DNPWC
12	Mr. Gopal BhatTerai	Deputy DG, DNPWC
13	Lt. Col. Bharat Lal Shrestha	Engineering Department, Nepalese Army
14	Mr. Ganesh Pant	Chief Conservation Officer, Sagarmatha National Park
15	Mr. Rajendra Sharma	Focal Point, DHM, CFGORRP
16	Ms. Anita Adhikari	M&E Officer, CFGORRP
17	Mr Pravin Raj Maskey	Senior Technical Adviser/ CFGORRP
18	Dr Govinda Achrya	Technical Adviser/ CFGORRP

Focused Group Discussions

SN	Name	Position/Representation
Nov. 22, 2017, Dighwa, Saptari		
1	Sushil Kumar Das	Ward Chairperson
2	Raj Kumar Mandal	LGCDP mobilisor
3	Muhammad Wakil	Ward secretary
4	Deependra Prasad Yadav	
5	Inar Khan	Ward Member
Nov 23, 2017; Jogidaha, (Triyuga -1) Udayapur		
6	Bhupendra Chaudhary	Member, CDMC
7	Krishna Bhakta Chaudhary	Vice Chair, CDMC
8	Raj Kumari Chaudhary	Member, embankment construction committee
9	Mangal Chaudhary	
10	Bhanubhakta Chaudhary	
11	Mina Chaudhary	Secretary, CDMC
12	Usha Devi Chaudhary	
13	Janaki Kumari Chaudhary	
14	Rameshori Devi Chaudhary	
Nov 23, 2017; Tulsipur, Siraha		
15	Rajendra Prasad Shah	Gauge reader
16	Dev Narayan Shah	
17	Sanjit Kumar Shah	
18	Pravin Kumar Shah	

19	Jay Kumar Shah	
Nov 24, 2017; Tulsi -6 (Mithila 11), Mahottari		
20	Tekendra Bahadur Karki	
21	Janak Prasad Poudel	
22	Deepak Shrestha	
23	Madan Ale	
24	Suresh Koirala	
Nov 24, 2017; Sarpallo, Mahottari		
25	Suni Lal Shah	Ward Chairperson
26	Ram Chandra Mahato	CDMC Chair
27	Kamlesh Rahut	
28	Rajesh Kumar Shah	CDMC Chair
29	Binod Mahato	
30	Sunil Mahato	CDMC member
31	Raj Kumar Mahato	Gauge Reader
32	Laxman Kumar Shah	
Dec 2, 2017; Phakding, Cahurikharka, Solukhumbu		
33	Rajan Sundas	Taskforce member
34	Nawang Theme Sherpa	Task Force Chair
35	Nawang Sherpa	
Dec 3, 2017; Benkar, Cahurikharka, Solukhumbu		
36	Lhakpa Temba Sherpa	Task force member
37	Pemba Tendi Sherpa	Task force member
38	Pasang Phuti Sherpa	Task force member

Field Key Informant Interview

SN	Name	Position
1	Manoj Kumar Chaudhary	Ward Chairperson, Triyuga 1
2	Manohar Kumar Shah	WIDM In-charge Lahan, Siraha
3	Vijaya Kumar Yadav	District Coordinator, Siraha, UN Habitat
4	Suresh Raut	LDO, Siraha
5	Hari Yonjon	DSCO, Siraha
6	Pradeep Karki	EWS Telemetry Caretaker; Ratu
7	Lakhindar Mandal	Chair Elevated Tube Well Management, Nainhi, Mahottari
8	Dinesh Kumar Shah	District Project Officer, CFGORRP, Mahottari
9	Sanjaya Shah	District Project Officer, CFGORRP, Udayapur, Saptari
10	Bechan Mahato	DSCO, Mahottari
11	Rup Nararayn	District Project Coordinator, CFGORRP, Siraha
12	Raju Puri	Task force member, Surke, Cahurikharka 4, Solukhumbu
13	Chhewang Sherpa	Task Force Chair, Ghat Cahurikhara 6, Solukhumbu
14	Karma Gyaljen Sherpa	Community member, Tok Tok, Chaurikharka, Solukhumbu
15	Pasang Rai	LRP, Chumuwa, Chaurikharka, Solukhumbu
16	Nawang Gele Sherpa	Task Force Chair, Monjo, Chaurikharka, Solukhumbu
17	Jay Ram Neupane	In charge a.i., SNP, Namche, Solukhumbu
18	Nawang Sherpa	LRP, CFGORRP, Toktok, Solukhumbu

Appendix D: Evaluation Questions Matrix

The logical framework will closely be linked with its intervention logic linked to operationally significant and testable assumptions. The extreme risks of glacial lake outburst events and downstream flooding of communities associated with climate change have been recognized as national priorities. The project seeks to address two distinct problems: high risk of catastrophic flooding at Imja Lake within Sagarmatha National Park, and a series of flooding hazards on high energy streams emanating from the Terai and Churia Range.

The preliminary and tentative theory of change in simple language is given below.

The DHM can deliver GLOF early warning to the most vulnerable and specific structural mitigation in place to reduce human and material losses in a way that shows verifiable improvement (VI) by the end of the project.

This can be achieved by obtaining only three results:

1. Better forecasts and warnings and risk assessment
2. Structural mitigation in place to control drainage and safe evacuation facilities
3. Improved understanding of needs in clearly delineated circumstances

Achievement of the project purpose will significantly contribute to reduced vulnerability of the villager's livelihoods in relation to the effects of climate change.

Testable and verifiable assumptions (valuable for learning) formulated by the project are few in number but include

- Revised hazard maps combined with field verification
- Existing Imja GLOF risk model used to estimate change in GLOF risk
- Increased lead time early warning system
- District and Village Disaster Management and Development Plans
- Political endorsement for DRR activities received from national government (budget could be a proxy here)
- Gender balance in capability building

The project is not comparing the situation with a counterfactual and the evaluation team will not have the resources to carry this out professionally.

An alternative strategy would be to increase appropriate income levels and or infrastructure.

The evaluation team will use this theory of change for discussion purposes.

The core questions are given below in Table 4-1: Detailed Data Collection Approach.

Table 4-1: Detailed Data Collection Approach

Criteria/ Sub-Criteria	Main questions to be addressed by the evaluation	Indicator	Data sources	Data collection methods
Relevance				
	Is the project relevant to National priorities and commitment under international conventions? Is the project relevant to the local communities? Is the CFGORRP relevant intervention? Is it relevant to bring benefits to poor women and people from vulnerable community? Has it responded to real needs and priorities of the targeted community in the context of the project district/VDCs? Has it adapted to changing conditions? Does CFGORRP contribute to GoN national objectives? To what extent has the project contributed to fulfilling the objectives of international, regional and national policies and strategies? How satisfied are the relevant do the beneficiaries feel are the results, both at levels of meteorological services and the end users of their meteorological services in pilot areas? Any conclusions of what added value did the individual islands gain from working together?	Relationships established, level of coherence between project design and implementation approach, specific activities conducted, quality of risk mitigation strategies, etc. Achievement on targeted outputs and delivery of inputs and activities Level of stakeholder participation in project design and ownership in project	Relevant documents especially Project development planning documents, MTR, interview of project proponents (DHM) Regional and Country strategies, interviews with stakeholders	Documents review. Interview with stakeholders.

	Local Impact (effects within the project system boundaries) Will the clarified project purpose be achieved? How have ultimate beneficiaries benefited from the project How well has the project succeeded in reducing the vulnerability to the effects of climate change? How has the project contributed to the accessibility of various groups to meteorological information and weather services? How well has the project embedded itself into national development strategies and plans? Global impact (effects spreading to outside of the project system boundaries) To what extent has the clarified project purpose contributed to the clarified overall objective What are the current and future global impact pathways? Was there any leverage by other projects? To what extent is the project coherent with Agenda 2030 strategies (including Paris Agreement) of the region? (The coherence question)			
Effectiveness				

	Achievements of expected outcomes and objectives measured in progress of indicators What were the major factors influencing the achievement or non-achievement of the objectives? How can the results be transformed into outcomes to facilitate effectiveness analysis? What are the most effective outcomes in terms of contribution to the clarified project purpose and why? To what extent has the project contributed to measures taken in GOLF risk reduction and increasing resilience? In other words has clarified results been achieved? To what extent has the project improved the capacity of local and national authorities to utilise the available risk and early warning information? How could the effectiveness of project direction and management be improved and are there any lessons on this that could be useful for UNDP?	Identification of risks and challenges and management to have no or less impacts on project Management response prepared and updated by the project Lessons from the project to replicate in other projects in future	Relevant documents especially Project development planning documents, MTR, interview of project proponents (DHM), other stakeholders and beneficiaries.	As above, final report, annual report, progress reports.
Efficiency				
	Were objectives achieved on time? Was the programme or project implemented in the most efficient way compared to alternatives? Which outputs have been efficient (technical and financial) in achieving outcomes and how?	Management system of the project including admin finance system, monitoring system as per the norms and standard Project Implementation and Adaptive Management	Relevant documents especially Project development planning documents, MTR, interview of project proponents (DHM), other stakeholders and beneficiaries.	Interview of project stakeholders, DHM office visits (operational system in place and course

	Considering the resources used and results achieved to what extent has the project provided value for money?	Changes in logical model and work plans made Use of resources to meet the project targets Collaboration among organizations to meet the project objectives Technical support from partners		participants), project reporting, interviewing partners/funders.
Sustainability	Conditions necessary for results and outcomes being sustained after the project:			
	To what extent did the benefits of a programme or project continue after donor funding ceased? What were the major factors which influenced the achievement or non-achievement of sustainability of the programme or project? How sustainable (or likely to be sustainable) are the outputs and outcomes of the CFGORRP interventions? Are CFGORRP interventions well designed and exit strategy well planned? What could be done to strengthen exit strategies and ensure sustainability of interventions made? To what extent has the capacity in sustainability (financial and institutional) of providing meteorological information and weather services improved? What are the main risks that are likely to affect sustainability of the results after the project completion,	Capacity development to sustain results Policy or institutional measures are required to sustain the outputs Stakeholders ownership	Relevant documents especially Project development planning documents, MTR, interview of project proponents (DHM), other stakeholders and beneficiaries.	Interview of project stakeholders, DHM office visits (operational system in place and course participants), project reporting, interviewing partners/funders.

	especially regarding the technical components of the project?			
Impact	Project impacts			
	Impacts created or likely to create by project execution based on logical model of project What works better for attaining the broader results If there are any unintended and negative impacts due to the project What real difference has the activity made to the beneficiaries?	As above	As above	As above
Lesson Learned				
	How the lessons learning process could be improved in the project? What are the top 10 lessons learned by the project management? What are the top 10 lessons learned by the Evaluation? Are there any insight in respect of commercial opportunities that would be of interest to UNDP?	As above	As above	As above
Cross Cutting				

	Has gender synergy been achieved and how could it be improved in a project of this type. Are there any human rights issues that are of concern and how could these have been handled better Issues arising from the above How to do a participatory clarification of design given geography and the work plan? To what extent has training programme been successful in (i) sharing knowledge among researchers, media and (ii) engaging and communicating with influential users?	As above	As above	As above

The performance of the project for each of the UNDP-GEF evaluation criteria will be graded based on maximum six scale proposed in Table 4-2 and .

Table 4-2 Evaluation criteria and rating

Evaluation Ratings:			
1. Monitoring and Evaluation	**rating**	**3. IA& EA Execution**	**rating**
M&E design at entry	6 point scale	Quality of UNDP Implementation	6 point scale
M&E Plan Implementation	6 point scale	Quality of Execution - Executing Agency	6 point scale
Overall quality of M&E	6 point scale	Overall quality of Implementation / Execution	6 point scale
3. Assessment of Outcomes	**rating**	**4. Sustainability**	**rating**
Relevance	2 point scale	Financial resources	4 point scale
Effectiveness	6 point scale	Socio-political	4 point scale
Efficiency	6 point scale	Institutional framework and governance:	4 point scale
Overall Project Outcome Rating	6 point scale	Environmental	4 point scale
		Overall likelihood of sustainability:	4 point scale

Ratings Scales		
Ratings for Outcomes, Effectiveness, Efficiency, M&E, I&E Execution	**Sustainability ratings:**	**Relevance ratings**
6: Highly Satisfactory (HS): The project had no shortcomings in the achievement of its objectives in terms of relevance, effectiveness, or efficiency **5: Satisfactory (S): There were only minor shortcomings** **4: Moderately Satisfactory (MS): there were moderate shortcomings**	4. Likely (L): negligible risks to sustainability 3. Moderately Likely (ML): moderate risks 2. Moderately Unlikely (MU): significant risks 1. Unlikely (U): severe risks	2. Relevant (R) 1.. Not relevant (NR) Impact Ratings: 3. Significant (S) 2. Minimal (M) 1. Negligible (N)

3. Moderately Unsatisfactory (MU): the project had significant shortcomings **2. Unsatisfactory (U): there were major shortcomings in the achievement of project objectives in terms of relevance, effectiveness, or efficiency** **1. Highly Unsatisfactory (HU): The project had severe shortcomings**		
Additional ratings where relevant: **Not Applicable (N/A)** **Unable to Assess (U/A**		

Appendix E: CFGORRP/DHM monitoring Framework

CFGORRP/DHM Monitoring Framework for 2013-2017 (PMU provided)

Results (Outcomes, Outputs and Activity Results)	Indicators	Baseline(s)	Target(s)	Projected Timeline	Progess Status	Risks and Assumptions	Remarks
Outcome 1 Risks of human and material losses from Glacial Lake Outburst Flooding (GLOF) events from Imja Lake reduced	Average depth of Imja lake (refer to AMAT 1.2.1.2)	Water level is 5010 m above sea level	Average depth of lake kept below danger level by ensuring average water depth during spring and summer months is at least 3 meters or more below the baseline level prior to the construction of the channel.	2013-2014	**Completed**	The artificial drainage channel constructed by the project is stable and continues to be maintained regularly by DHM Local communities perceive value and support in developing and maintaining a community based EWS for the Imja GLOF Impact Zone Climate change induced glacier melt at Imja remains at or below the level indicated by current climate change projections The rate of glacier melt at Imja does not accelerate due to other non-climatic change related factors	

	Percentage of high risk settlements of Imja GLOF Impact Zone residents (including women, children and elderly people) with a clear understand of how the EWS works and what to do in the event of a GLOF (refer to AMAT 2.1.2.1/3.1.1.1)	90% of the community have heard about GLOF about GLOF risk but are not prepared for it (Source: Regional GLOF Risk Reduction Project) X number of female and Y number of male are aware of the potential risk of GLOF and benefits of EWS. GOVIND SIR???	100% residents from Solukhumbu district of the high risk settlements of the GLOF Impact Zone (within 50 km of outlet) understand how the EWS works and know what to do during the event of a GLOF, including men and women and elder residents.		**On Track**	Communities participate in project awareness generation and training activities on GLOF risk reduction, learn how to operate and maintain the CBEWS and see value in maintaining it beyond the life of the project	

	Number of targeted institutions with increased capacity to minimize exposure to GLOF risks (refer to AMAT 2.2.1.1/2.2.2.1/2.2.3.1/3.2.1.1)	No local institution to address or understand the GLOF risk which is creating unnecessary havoc of outburst. Limited access to information as well as Government level institution in the Khumbu region (Imja lake and surrounding) to address or disseminate GLOF risks.	Number of representatives from Solukhumbu DDRC, Sagarmatha National Park, the Imja GLOF Risk Management Committee, and CBEWS Taskforces trained to manage and minimize GLOF risks. No. & type of information materials disseminated to local and non-local people (i.e. tourists) by different agencies on GLOF risks, risk reduction measures and what to do in the event of a GLOF. By the end of the project, DHM is operating a GLOF Risk Monitoring System and has a mechanism in place to communicate GLOF risk warnings to MoHA and NEOC.		**On Track**	Political stability and security situation is favorable to implement planned activities. There will be no limited transfers of trained technical staff in other ministries /departments or in other non-government organizations. Institutions established at the community and district level are functional and supportive to implement the project activities.	

Output 1.1 Water Level of Imja Lake lowered through Controlled drainage	Lake level for Imja lowering	Tabular baseline on lake level/depth etc. to be produced by December end.	Imja lake lowered by at least 3 meters as per the approved Implementation Management Plan	2015-2016	**Completed**	Assumptions: 1. The artificial drainage channel constructed by the project is stable and continues to be maintained regularly by DHM 2. Climate change induced glacier melt at Imja remains at or below the level indicated by current climate change projections 3. No extreme weather climate conditions prevail. Risk: 1. Scarcity of workforce to work in high altitude and their health conditions to work in climate conditions	
Output 1.2 Protocols for GLOF risk monitoring and maintenance of artificial drainage system	Installation of Hydro met stations and Automatic GLOF Warning System equipment, Monitoring Protocols/ System	Design studies generating preliminary information	System for regular monitoring of lake level changes developed and the system installed.	2014-2017	**On Track**	Assumptions: 1. GLOF automated EWS and communication system functions in adverse climatic conditions 2. The systems regularly maintains by the DHM 3. DHM has abundant resources to operate (communication) and maintain the system	

Output 1.3 Community-based GLOF Early Warning System developed and implemented	Installation of CBEWS equipment and training to community and institutional representatives on its operation & maintenance	Findings from the report on automatic Imja GLOF EWS.	CBEWS equipment procured and installed and training on its operation and maintenance conducted.	2015-2017	**Completed**	Assumption: 1. Local communities perceive value and support in developing and maintaining a community based EWS for the Imja GLOF Impact Zone Risk: Lack of fund for the maintenance in community level may questions the sustainability of systems	

Output 1.4 GLOF Risk Management Skills and Knowledge Institutionalized at Local and National Levels	Training Manuals in GLOF risk management, Training Reports, TOT materials, LRP, IEC materials	No baseline exists; Capacity Need Assessments will be undertaken;	Increased capacity of i) SNP and ii) DHM in GLOF risk management	2014-2017	**Completed**	Assumptions: DDRC linked with GLOF warning system. DNPWC launches and operates the Smart card in SNP DHM continues the operation of mobile apps	

Outcome 2 Human and material losses from recurrent flooding events in 4 flood-prone districts of the Terai and Churia Range reduced	Number of additional people provided with access to safe water supply and basic sanitation services (refer to AMAT 1.2.3)	Existing tube wells in 8 VDCs get flooded during the flooding season hindering the access to safe drinking water for 59,062 population residing in the villages. Water supply/drainage system in 8 VDCs gets flooded making it difficult for 59,062 population.	At least 70% population in 3 districts/6 VDCs have access to 24 elevated tube wells and/or a flood proofing drainage system.	2013-2017	**Completed**	If concentrated rainfall occurs for 24 hours currently the districts are not equipped to deal with floods like 1993 flood disaster in central and eastern Nepal. In such a scenario the activities and modalities of the current project will be affected. Political stability and security situation in Terai is favorable to implement planned activities. Less/no extreme climate events occur that can accelerate intensive rainfall by triggering floods, debris flow and landslides in the targeted locations. Tube well and drainage system remain functional through the year (during monsoon) Local community/authorities value and support the interventions undertaken by project Land to install tube-wells made available by local people and government authorities	

	Number of people and value of their material assets covered by a CBEWS in the four target project districts (refer to AMAT 2.2.2.1/3.1.1.1/3.2.1.1)	There are no EWS in the 4 project target districts; 3 VDCs ((Mahisthan, Hattilet and Aurahi) communities in Mahottari district – Janagha River) have been trained in CBEWS UNDP/CDRMP –programme The total population of the most flood-prone VDCs is 59,062. Value of material assets vulnerable to flood impacts in these VDCS will be established at the start of project	100% of the population covered by CBEWS in all target flood prone river basins		**Completed**	Local community/authorities value and support the interventions undertaken by the project including CBEWS Linkage among community, DEOC and NEOC should be intact…thereby establishing a last mile connectivity Local community/authorities value and support the interventions undertaken by the project	

	Number of targeted institutions with increased capacity to minimize exposure to flood risks in the Terai & Churia Range (refer to AMAT 2.2.1.1/3.2.1.1)	Weak system for flood risk management. DWIDP currently focuses only on construction works. Limited trained staffs in DWIDP on flood risk management. DDRC is mostly involved in rescue and relief for post disaster work and their activity in the targeted districts is limited.	By the end of the project, at least 8 gender sensitive Village Disaster Management Plans prepared by the Village Disaster Risk Management Committees in the Terai & Churia Range. By the end of the project, at least two vulnerable VDCs of four districts will have CBEWSs and which are being effectively maintained by local communities (including women) under the leadership of the Village Management Committees.		**Completed**	Political stability and security situation is favorable to implement planned activities. There will be no limited transfers of trained technical staff in other ministries /departments or in other non government organizations. Institution established at the community and district level are functional and supportive to implement the project activities	

Outputs 2.1 Sediment control and stabilization of hazard-prone slopes & river banks through structural and non-structural mechanisms	Implementation and Management Plan for sediment control and stabilization	Prioritized measures on sediment control and stabilization	Sediment control and stabilization achieved;	2013-2016	**258 % (5 km embankment planned in PD)**		

Outputs 2.2 Flood proofing of Water and Sanitation systems in selected VDCs in target river basins	Implementation plans of Elevated tube wells (ETWs) and Flood Proofing Drainage System (FPDS)	Contracts agreements with CDMCs for ETWs and Sites identified for Flood proofing	Construction of 30 ETWs and implementation of FPDS	2013-2016	**145% (24 ETWs planned in PD)**		

Outputs 2.3 Institutionalization of flood risk management skills and knowledge	Sediment monitoring system and Assessed Capacities of partner institutions	Sediment Monitoring Protocols and Capacity Need Assessment (CNA) Report	Increased capacity of DHM, DSCWM, DWIDP in Flood Risk Management	2013-2017	**Completed**		

Outputs 2.4 Flood preparedness training for district and VDC representatives, NGOs, CBOs and local communities in 4 flood-prone districts	**X number of people trained on flood risk management in four flood-prone districts**	No baseline exists	CBEWS installed and training in Flood Preparedness conducted	2013-2017	**Completed**	Assumption: Beneficiaries use the acquired knowledge and skills for preparedness activities	

Appendix F: Evaluation Consultant Agreement Form

Evaluators:

1. Must present information that is complete and fair in its assessment of strengths and weaknesses so that decisions or actions taken are well founded.
2. Must disclose the full set of evaluation findings along with information on their limitations and have this accessible to all affected by the evaluation with expressed legal rights to receive results.
3. Should protect the anonymity and confidentiality of individual informants. They should provide maximum notice, minimize demands on time, and respect people's right not to engage.
4. Evaluators must respect people's right to provide information in confidence, and must ensure that sensitive information cannot be traced to its source. Evaluators are not expected to evaluate individuals, and must balance an evaluation of management functions with this general principle.
5. Sometimes uncover evidence of wrongdoing while conducting evaluations. Such cases must be reported discreetly to the appropriate investigative body. Evaluators should consult with other relevant oversight entities when there is any doubt about if and how issues should be reported.
6. Should be sensitive to beliefs, manners and customs and act with integrity and honesty in their relations with all stakeholders. In line with the UN Universal Declaration of Human Rights, evaluators must be sensitive to and address issues of discrimination and gender equality. They should avoid offending the dignity and self-respect of those persons with whom they come in contact in the course of the evaluation. Knowing that evaluation might negatively affect the interests of some stakeholders, evaluators should conduct the evaluation and communicate its purpose and results in a way that clearly respects the stakeholders' dignity and self-worth.
7. Are responsible for their performance and their product(s). They are responsible for the clear, accurate and fair written and/or oral presentation of study imitations, findings and recommendations.
8. Should reflect sound accounting procedures and be prudent in using the resources of the evaluation.

Evaluation Consultant Agreement Form[17]

Agreement to abide by the Code of Conduct for Evaluation in the UN System

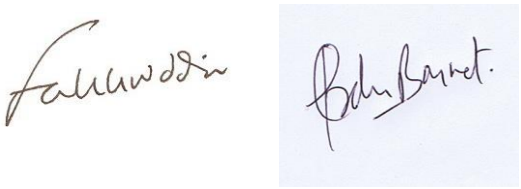
Name of Consultant: Bapon Fakhruddin & Govinda Basnet

Name of Consultancy Organization (where relevant): NA

We confirm that I have received and understood and will abide by the United Nations Code of Conduct for Evaluation.

Signed at place on date, Auckland, 19 March 2018

Signature:



[17] www.unevaluation.org/unegcodeofconduct

Appendix G: Report Clearance Form

Evaluation Report Reviewed and Cleared by

UNDP Country Office

Name: _____

Signature: _____Date:_____

UNDP GEF RTA

Name: _____

Signature: _____ Date: _____

Appendix H: Documents Reviewed

1. Annual Progress Report 2013
2. Annual Progress Report 2014
3. Annual Progress Report 2015
4. Annual Progress Report 2016
5. Proceedings of Inception Report
6. Mid Term Review Report 2016
7. Audit Report 2013
8. Audit Report 2014
9. Audit Report 2015
10. Audit Report 2016
11. The Project Document - Community Based Flood and Glacial Lake Outburst Risk Reduction Project
12. Project Completion Report 2017
13. Quarterly Progress Reports
14. CFGORRP Data Book 2013-2017
15. Country Programme Action Plan between the Government of Nepal and the UNDP 2013 to 2017
16. 2015 Project Implementation Review (PIR)
17. Annual M&E Plan- CFGORRP- 2015
18. Annual M&E Plan- CFGORRP- 2016
19. Exit Strategy and Plan 2016
20. CFGORRP/DHM Monitoring Framework for 2014-2017
21. Detailed Technical Studies for Cost Effective Watershed Management To Control Sediment In The Terai Rivers (Ratu, Khando, Gagan, Hadiya, Kong)
22. President Chure-Terai Madhesh Conservation Development Board, Gully Control and Slope Stabilization Techniques, 2015
23. ICIMOD 2011. Glacial Lakes and Glacial Lake Outburst Floods in Nepal. Kathmandu Nepal
24. Government of Nepal 2010. National Adaptation Programme of Action
25. Government of Nepal 2016. Sagarmatha National Park and Its Buffer Zone Management Plan 2016-2020
26. Carey, M., Huggel, C., Bury, J., Portocarrero, C., Haeberli, W., 2012. An integrated socio-environmental framework for glacial hazard management and climate change adaptation: lessons from Lake 513, Cordillera Blanca, Peru. Clim. Chang. 112, 733–767.