RESULTS-BASED MONITORING AND EVALUATION OF THE BUILDING RESILIENCE TO CLIMATE-RELATED HAZARDS PROJECT: A GOOD PRACTICE TOWARDS CLIMATE HAZARD RESILIENCE

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ABSTRACT

Nepal is a small landlocked country with complex topography and fragile geology, which coupled with its lower-middle income economy, natural resource dependent population, and weak institutional capacity all combine to rank it as the 4th most climate-vulnerable country in the world (http://maplecroft.com). A climate risk assessment carried out specifically for the Strategic Program for Climate Resilience (SPCR) at the sector, district and community levels identified the following critical risks: i) water quantity and quality, ii) food security, iii) ecosystem health, iv) animal and human health, v) vulnerable groups, and vi) economic growth and sustainability. Realizing this potential, the Government of Nepal (GoN) with support from the World Bank (WB) launched the Building Resilience to Climate-related Hazards (BRCH) Project in June 2013 with the aim to minimize overall climate risks in Nepal under the global initiatives of Pilot Program for Climate Resilience (PPCR).

The results-based monitoring adopted by the project is proved to be effective and set as an exemplary good practice towards achieving the goal.

Keywords: *R*esilience, climate-related hazards, results-based monitoring, monitoring and evaluation, hydrometeorology

INTRODUCTION

The BRCH project is implemented through collaborative efforts between the Department of Hydrology and Meteorology (DHM) under the Ministry of Energy Water Resources and Irrigation (MoEWRI) and the Ministry of Agriculture and Livestock Development (MoALD). A range of hydrological and meteorological network for the entire country (Fig. 1) are desired due to ever increasing risks of climate induced disasters through which Hydrometeorological services of climate forecasting service round the clock at a range of time scale from Nowcasting up to multiple days, as well as weekly and seasonal outlooks. Other services include daily monitoring and reporting of real-time Hydrometeorological situations as well as climate change projection, historic data distribution with data coverage from mid-1960s to present day. All those people engaged in these sectors are considered the primary beneficiaries while general public are indirect beneficiaries of this project.

This paper intends to demonstrate how the results-based monitoring management tool help contribute to successful implementation of multifaceted projects towards achieving the goal despite inadequate experience of the implementing agency and other constraints. The paper is based on systematic implementation of the results-based monitoring through review of implementation progress reports (IPRs). The novelty of the paper is to provide insight to other Government organizations in its wider perspectives.

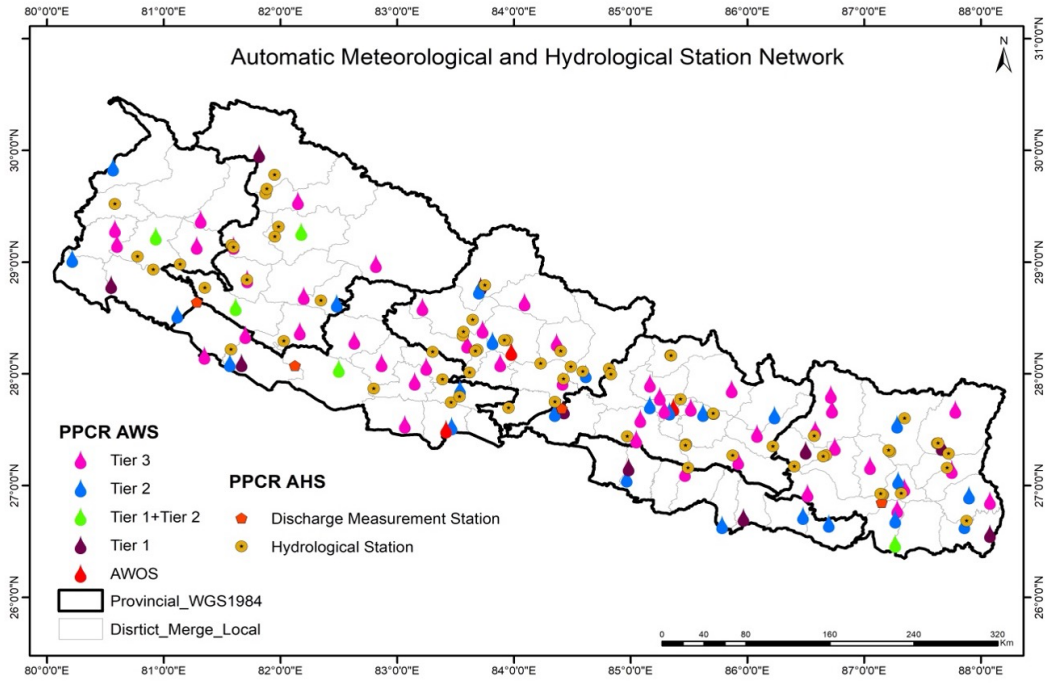

Fig. 1: Map of Nepal showing distribution of Hydrometeorological network across the country

The PPCR-BRCH PROJECT

The BRCH Project is one of the few projects identified as per Nepal's Strategic Program for Climate Resilience (SPCR). It aims to transform Nepal's national goal of Hydrometeorological services into a modern service-oriented system of international standard that will build resilience today as well as adaptive capacity at national, regional and international level, in future.

The inputs into the project are: i) Budget – 31.3 million US $, ii) Human resources – DHM staffs, Project Management Unit (PMU) consultants, System Integrator (SI) experts and iii) Hydrometeorological equipment. In principal, the project comprises Component A, B, C and D while the later is implemented by the MoLD. The implementation progress of all project activities of the first three components are regularly monitored by DHM to update the results framework of the project comprising eight Intermediate Results indicators (IRIs) and three Project Development Objectives (PDOs) indicators.

Theory of Change

The theory of change (Fig. 2) of the BRCH project aimed to reflect all outputs/outcomes of activities under Component A, B and C leading to Result 1, Result 2 and Result 3 respectively (The Road to Results, WB. 2009; SAOD/WB, 2014. Operational Services & Quality, Workshop Module 1-6,). Outcomes of all those completed activities would ultimately help consolidate the project goal - to enhance government capacity to mitigate climate-related hazards by improving the accuracy and timeliness of weather and flood forecasts including warnings for climate-vulnerable communities, as well as developing agricultural management information system services (AMIS) of Component D to help farmers mitigate climate-related production risks.

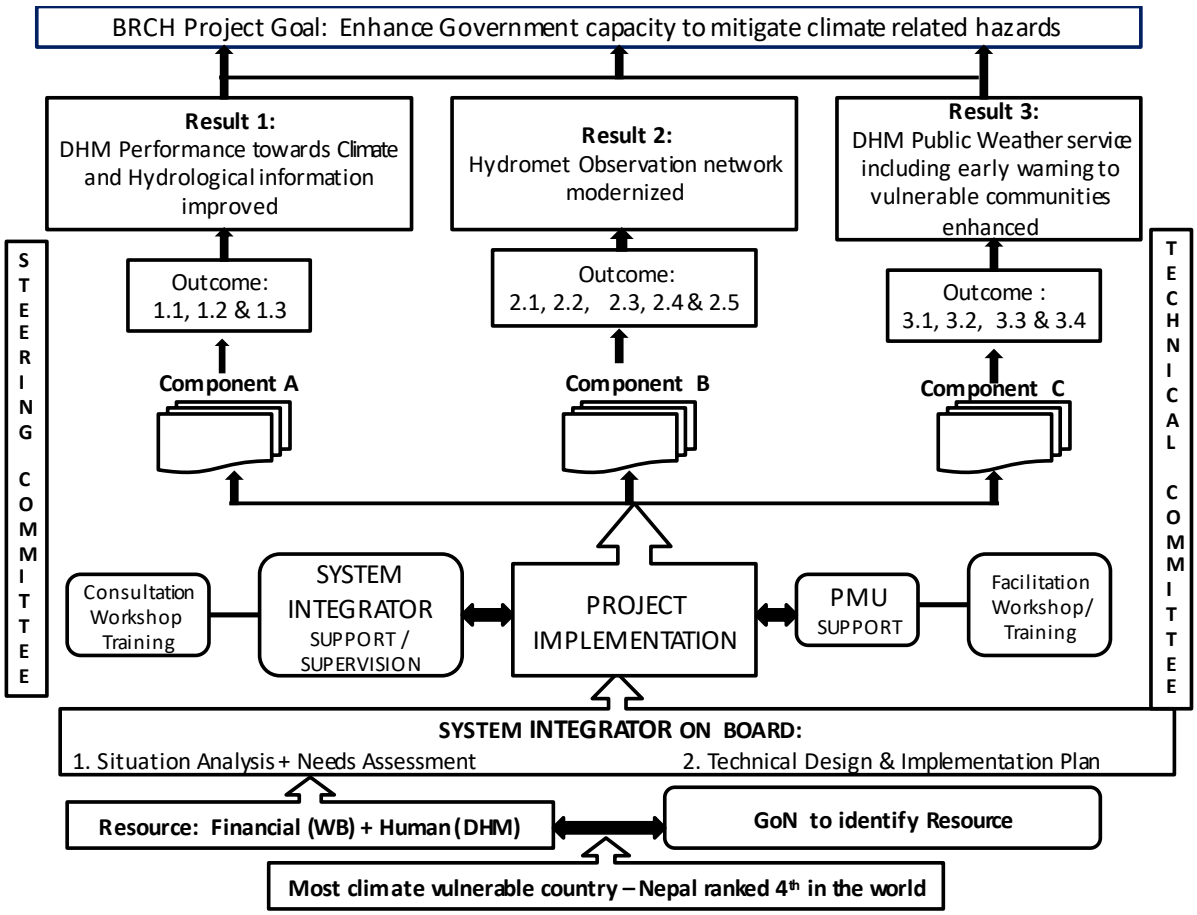

Fig. 2: Theory of Change for the BRCH Project.

Implementation Strategy

The project was designed to be implemented with the close technical support and supervision of a group of System Integrator (SI) in the backdrop of inadequate experience of DHM. For these reasons, it was envisioned that the detailed implementation plan of the BRCH Project being designed by SI, in consultation with the DHM and WB. The details of all the major technical activities aimed at achieving the project goal in two phases (SI, 2015. DHM/BRCH Phase-I & II, Summary Reports) namely:

- Phase I: Preparation of a detailed technical design and project implementation plan
- Phase II: Procurement and implementation support with close monitoring of implementation and performance activities throughout the project until completion.

Accordingly the procurement plan was prepared enlisting details of the activities and approval sought from the WB where desired. Thereafter, SI prepared desired technical specifications and provided support in evaluation of bids and supervision of implementation of all those packages. For each package, focal persons were also assigned from DHM side to carry out onsite monitoring and supervision of contract implementation and liaise with the supplier together with SI and other concerned officials in DHM as well as the PMU consultants where desired.

The PMU consists of a team of few high officials from DHM, to lead it as well as to coordinate all stakeholders while he PMU consultants held overall responsibility to support and facilitation of the project implementation that involves decision making, day to day operation of the project related activities including the procurement, finance, monitoring and evaluation, social and communication, environmental and technical aspects of the project implementation; liaise with DHM and other agencies in finalizing overall project activities. A technical Advisory

committee and Steering committee were also formed under the chairmanship of the line ministry to provide overall guidance on the project design and its implementation. The monitoring and evaluation specialist was tasked to closely monitor the progress.

Methodology and Approach

The BRCH project adopted results-based monitoring and evaluation protocol in line with international standard primarily guided by the PAD, PIM and training workshop respectively (WB. 2012, WB/GoN. 2013 and WB 2014.Workshop: Model 1-6 Operational Services & Quality, South Asia Region).

Towards beginning of each fiscal year the BRCH project's Annual Program is being approved by the GoN and subsequently in consultation with DHM desired annual monitoring & evaluation plan (MEP) are prepared for execution annually (National Monitoring and Evaluation Guidelines, NPC, GoN, July, 2013). The standard operating procedure for regular monitoring and evaluation of the project comprises four distinct episodes (DHM/BRCH, 2015.Project Monitoring & Operational Manual). The operational procedure is summarized below.

I. Trimester Monitoring – monitoring of project implementation progress every four months
   - Outcome – Implementation Progress Report (IPR) reported to National Project Director (NPD) within 45 days of trimester termination

II. Results Monitoring – update of IRIs and PDOs every six months
   - Outcome – update of BRCH results framework and reported to WB missions

III. III. Compliance Monitoring – monitoring of Environment and Social Management Framework (ESMF) every 6 months and reported to WB missions
   - Outcome - update of BRCH results framework and reported to WB missions

IV. Program Level (PPCR 3) Monitoring – Technical Working Group (TWG) meeting is being conducted by MoEWRI at least once a year (RMF, MoSTE. 2014)
   - Outcome – update Results Management Framework (RMF) including National Adaptation Program of Action (NAPA) indicators

Following this modus operandi a systematic monitoring and evaluation of the project was carried from Year 1 (Project start) through Year 7 (Project end). Mid-term review (MTR) of the project was conducted by the WB mission from 25 Jan – 05 Feb 2016. Later the WB and DHM jointly decided to continue the project as per original PAD without any change.

Implementation Progress Scenario

From Year 1 (Project start): FY 2013-14 to Year 7 (Project end): FY 2020-21, altogether 20 IPRs were prepared and reported to NPD (BRCH/DHM. FY 2013-14; FY 2014-15; FY 2015-16; FY 2016-17; FY 2017-18; FY 2018-19; FY 2019 -20 and FY 2020-21). The trimester-wise rolling average of physical progress is 60 % against 100 % annual target of the BRCH project approved by GoN (Fig 3). The progress remained low in initial phase but picked up onwards the Mid-term review demonstrating credibility of the overall project performance with noticeable improvement in Hydrometeorological services across the country evidenced by media reporting (DHM/BRCH, 2021. Implementation Completion Report, Media Coverage).

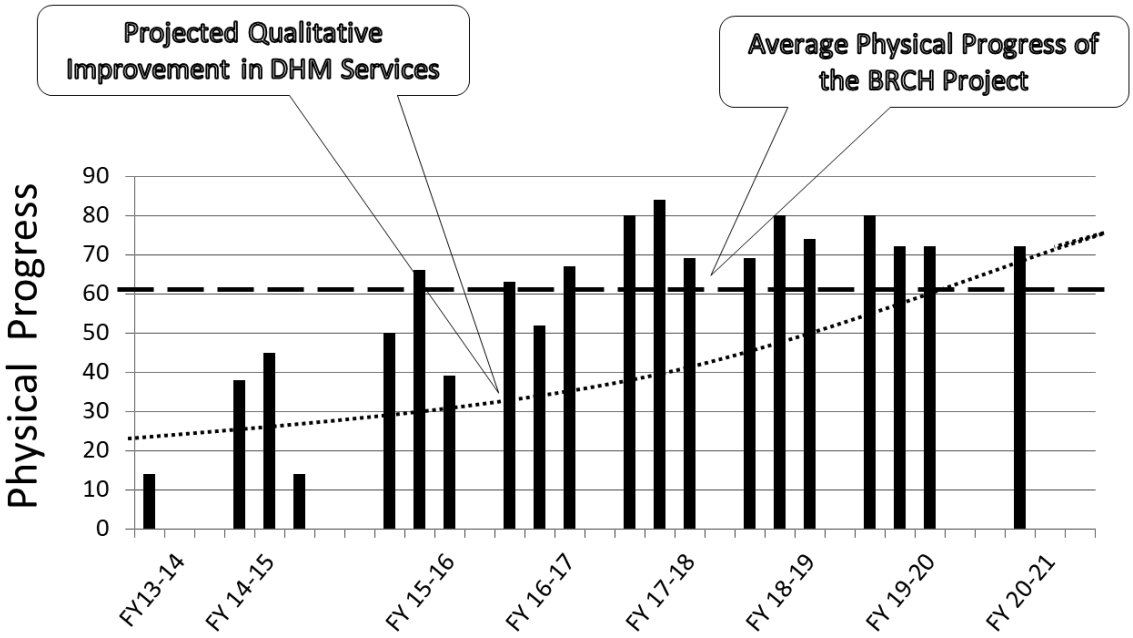

Fig. 3: BRCH Project Implementation Physical Progress Year 1-Year 7

RESULTS AND DISCUSSION

Implementation progress is monitored to update the score of PDOs indicators of the project each trimester. The updated results framework of the project shows satisfactory results - PDO 1 achieved the target while PDO 2 and PDO 3 are approaching the target value (Table 1). The activities of Component A, B and C, lead to Result 1, 2 and 3 respectively.

Results 1: DHM's performance towards climate and hydrological information are marginally improved towards institutional development and legal provisions (DHM/BRCH Project, 2021.Implementation Completion Report). Key concerns of general people i.e the forecasts on rainfall and temperature have increased by 6.8 % and 3.7 % respectively as compared to Baseline results (TMS JV with RECHAM, 2015. Consulting Services to Design, Conduct and Analyse Baseline Survey on Users Satisfaction). Moreover the Endline Users Satisfaction survey conducted by the project revealed that about 75% country's population is directly or indirectly benefited by the project considering two most useful climate parameters – rainfall and temperature (TMS JV RIMC, 2020. End-line Users Satisfaction Survey). However the Composite Users Satisfaction Index (CUSI) based on eight Hydrometeorological parameters (P1-P8) during the Baseline Users Satisfaction Survey and End-line Users Satisfaction Survey remained consistent at 51 % (Personal communications, Tuladhar. 2015) which is arguably due to dilution of data during the later (TMS JV with RIMC, 2020. End-line Users Satisfaction Survey Report).

Table 1: Results Framework of the BRCH Project (modified after DHM/BRCH, 2021. Implementation Completion Report)

PDO Indicator	Unit of Measure	Baseline	Cumulative Values				Frequency	Data Source/ Methodology	Responsibility of Data Collection	Remarks
			YR 1 - FY 2013-14 (Start of Project)		YR 7 - FY 2019 -20 (End of Project)					
			Target	Actual	Target	Actual				
1. Increased financial sustainability of DHM operations	Percentage of allocation of public funds in relation to essential operational needs	40 %	50 %	50%	100%	100%	Baseline Annually, End of project	DHM reports PMU	DHM/ PMU	- Allocated Total DHM Operational Budget[1] for FY 2019-20 = 2.7 m US $; - Annual Maintenance + Re-investment Cost calculated by SI = US$ **1.44** million (*Bi-annual Progress Report I, SI, September 2017 & Update on 27 August* 2020)
2. Increased accuracy and timeliness of weather forecasts (verified using standard methods for forecast verification - WMO WWRP/WCRP)	Skill (0-1) of weather forecasts of 24 hours lead time (1 is perfect score, verification measures)	No Skill (0)	Introduce Forecast Verification on DHM System	No Skill (0)	24 h: 0.75	24h: 0.47	Annually	DHM reports, PMU	DHM/ PMU	DHM has acquired as part of the BRCH project activities a high power computing system on which the consultant has installed a local area high resolution NWP model (WRF) to produce forecasts at up to 3 km resolution with maximum lead time of three days.
3. Increased satisfaction of users with DHM services	Composite satisfaction index (CUSI) expressed as a %, where 100% is completely satisfied	No Baseline	Establish Baselines prior to introduction of new services	No Baseline established	65%	51%	Assessed annually after Baseline	Public survey, disaggregated where possible for gender and vulnerable groups	External Consultant	More than 75 % respondents told that they are satisfied with DHM forecast of Rainfall and Temperature. However Composite Satisfaction index is 51 % (slightly lower due to other technical parameters unknown to general respondents (public).

[1] Allocated DHM Operational Budget for FY 2019-20 as per DHM O&M policy

Result 2: DHM's Hydrometeorological observation network has been significantly modernized, evidenced by installation and establishment of a number of new Hydrometeorological facilities such as Weather Radar, Upper Air Radiosonde, Calibration Lab, High-power Computers for Numerical Weather Prediction, automated Hydrological and Meteorological observation network, Lighting Detection Network (LINET) etc. enabling DHM to provide near realtime weather information/data to users including general public.

Result 3: DHM's Public Weather service including early warning to vulnerable communities enhanced, through utilization of establishments of Hydromet workstations and FEWS tools, Automatic product generation and delivery to websites and mobile devices. It means necessary realtime hydrological information such as rainfall, river discharge including desired flood warning is provided on regular basis - online https://www.hydrologygov.np and offline. If the level of water crosses the predefined warning or danger level then warning is issued. Flood bulletin is issued daily during monsoon. Besides, flood early warning is issued at community level also through SMS which is quite effective and gaining popularity among the vulnerable community.

Irrespective of components, the activities of the project are divided into three main contract packages namely: A) Goods, B) Consulting and C) Works. Altogether there are 88 agreed contract packages in the project. The final status of these contracts are labelled as - *'Completed, Dropped and Pending'* category (Table 2). In terms of contract performance 76 % has been turned out to under *'Completed'* category which is rated as significant. Moreover DHM is committed to completing all those pending works of technical significance in future (DHM/BRCHP, 2021 Implementation Completion Report). However, execution of all these agreed contracts could not be completed largely due to impact of COVID-19 towards end of the project.

Table 2: Status of procurement packages - Goods, Consulting and Works as per the Procurement Plan

Category	**Packages**	**Completed**		**Dropped**		**Pending**	
		No.	**%**	**No.**	**%**	**No.**	**%**
A. Goods	31	23	74	5	16	3	10
B. Consulting	37	25	67	10	27	2	5
C. Works	20	19	95	1	5	0	0
Total	**88**	**67**	**76**	**16**	**18**	**5**	**6**

Results Chain of the Project

The project implementation comprising three main activities which is divided into 9 sub-activities of Component A, 10 sub-activities of Component B and 15 sub-activities of Component C respectively. A series of results chains from short to medium to long term outcomes have been realized (Fig 4) ultimately leading to the project goal.

Project Achievements

Despite short-comings in the quantitative target, the project has made immense qualitative contributions to sectoral organizations as well as general public at national and local level through establishment of 70 telemetric (automatic) Hydrological and 88 Automatic Weather Stations (AWS) network delivering timely and reliable realtime climate scenario round the clock across the country. It means the information regarding climate, weather, Hydrological and Meteorological information including extreme climate events such as flood, cold/heat waves, tornado, drought etc. can be accessed and/or used by people living anywhere within 7 provinces, 77 districts, 6 metropolitan cities, 11 sub-metropolitan cities, 276 municipalities and 460 rural municipalities across the entire country (refer Fig. 2).

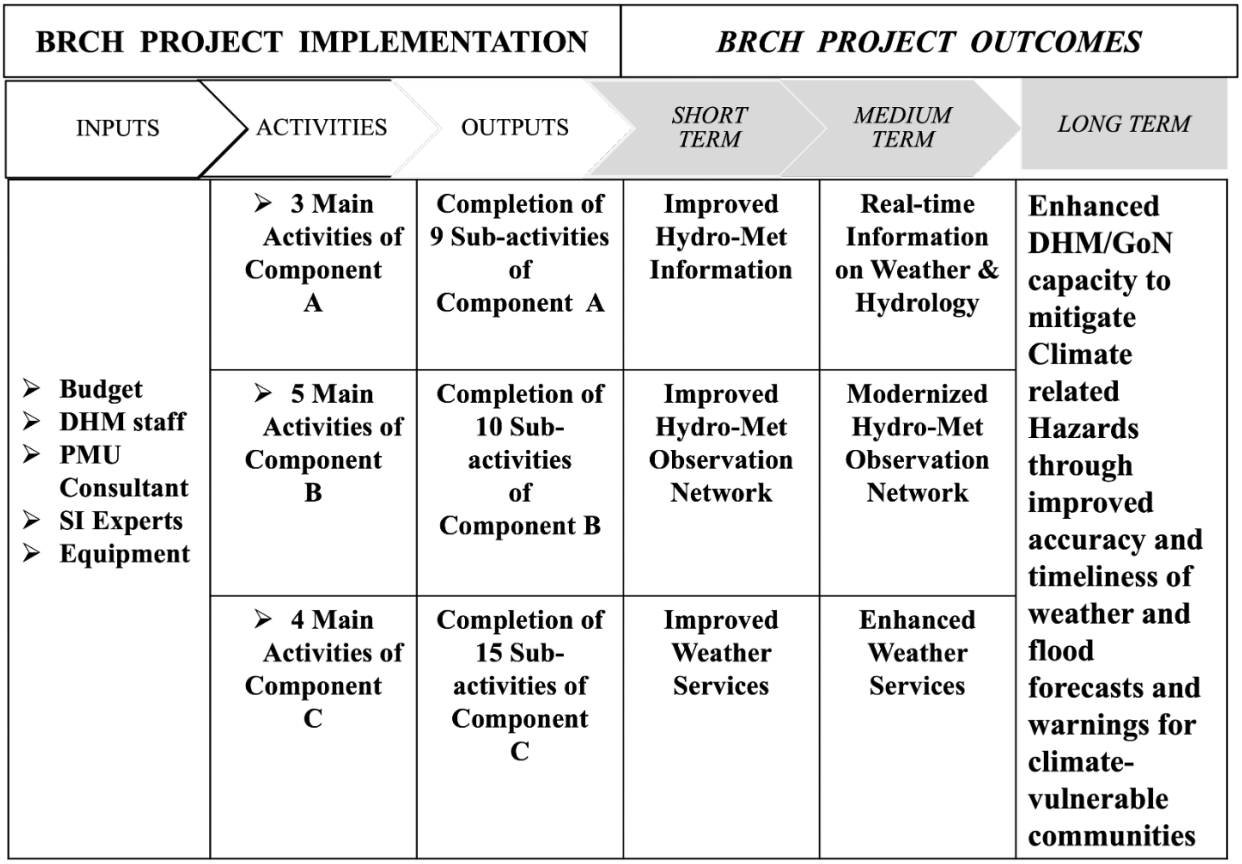

Fig. 4: Component-wise activities leading to short to medium to long term results chain.

Direct beneficiaries include a range of people through use of various media such as newspaper, mobile APP, TV/radio broadcasts. Farmers are the most important beneficiary while all citizens – labourers including employees and professionals of different sectors – aviation, hydropower, tourism, industry, transportation, construction etc. are other important beneficiaries. Indirect beneficiaries include even more range of people living in Nepal. Similarly capacity building is one of the most important achievement by building confidence of DHM technical staffs to operate newly established modernized Hydrometeorological system across the country through provisions to train or retrain majority of DHM staffs under the five different training categories with a total of 101 events (Table 2) in course of the project period. Accordingly about 72 % of DHM professional staffs (53 % Male and 17 % Female) are trained (DHM/BRCH Project, 2021.Implementation Completion Report).

Table 2: Capacity building training/workshops conducted through the BRCH Project

Capacity Building by Category	No. of Events
1. Training/Workshops by SI Experts	21
2. Training/Workshops by PMU Consultants	13
3. Training/Workshops by Hired External Consultants	10
4. Training/Workshop/Seminar/Visits Abroad	12
5. Training/Workshops under Equipment Supply Package	45
Total No. of Events	**101**

List of specific achievements of Hydrometeorological significance are:

- Establishment of the modern Weather Radar station at remote Surkhet district
- Upper Air Radiosonde station at TU compound, Kirtipur, Kathamndu
- Real-time Hydro-meteorological data acquisition system at DHM headquarter
- Enroute Aviation Weather service at TIA, Kathmandu
- Weekly Agromet Advisory service at DHM headquarter
- Lightning Detection network at eight national airports
- Telemetry-based real-time flood early warning services at Koshi and West Rapti basins
- Public Web portal at DHM headquarter

All these outcomes/results has added value to DHM's Hydrometeorological service at national, regional and international level in years to come.

CONCLUSION

The project has established 70 hydrological and 88 meteorological stations along with 3 AWOS, first weather RADAR and Lightning Detection System in Nepal, Upper Air Sounding, High Resolution Numerical Weather Prediction System with Data Assimilation, Hydrome Workstation, modernization of ICT and Database infrastructure and Flood Early Warning System among other achievements. In addition, the project has made a landmark in strengthening the institutional set up such as preparation of draft DHM Bill 2075, draft on Organizational restructuring, and refurbishment of infrastructure including DHM modern building. However, all the activities envisioned in the components A, B and C of the project could not be completed even though the project is extended by more than two years from the initial project period. Few activities are still ongoing even after the project closure. These shortcomings in the project implementation are partly attributed to the Gorkha earthquake 2015, economic blockage during the middle of the project and COVID-19 pandemic towards the end of the project. Meanwhile non-alignment of the project implementation plan with the Government procurement rule and regulations, policies and priorities of authorities at the helm also contributed to the delay. However, DHM management and specifically the PMU hold the ultimate responsibility for the completion the BRCH Project with 76 % completion of procurement contracts and 60 % physical progress against the target. All the achievement realized has been possible only because of the consolidated efforts of the focal persons and other staff in DHM as well as the support of the World Bank, SI, PMU consultants, concerned ministries as well as suppliers and consultants.

The practice of result-based monitoring and evaluation implemented by the project is effective as evidenced by the explicit use of IPRs by all the stakeholders including the donor, implementing agencies, the line Ministries and NPC for making decisions and record keeping. These facts strongly advocate to all those Government agencies for adopting the result-based monitoring and evaluation as an effective project management tool in line with National Monitoring and Evaluation Guidelines, July, 2013 and Monitoring and Evaluation Bill – 2076, in progress.

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