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# Development of a Hydropower Forecasting System Framework and Implementation of a Pilot Project for Chukka Hydropower Optimisation in Bhutan

Filed Visit and Project Inception Meeting  
Bhutan

7-12 April 2024

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**USAID**  
**South Asia Regional Energy**  
**Partnership (SAREP) Program**



## List of the Participants

Consultant	USAID-SAREP	Client
Mr A K Saxena (TERI) Ms Suruchi Bhadwal (TERI) Mr Prasoon Singh (TERI) Mr Ben Caddis (WWE) Mr Vijay Dubey (JOMISO)	Mr Ajit Kumar Mr Yeshe Wangdi	Representatives of DGPC Representatives of NCHM

**Day – 1: 07-04-2024: Departure from Delhi to Bhutan**

**Day—2: 08-04-2024: Meeting at DGPC Office**

### Summary of the discussion:

- Opening Remarks by Mr Yeshe Tenzin, Director O&M, DGPC
- Opening Remark by Mr Yeshe Wangdi
- Project Introduction and Background by Mr Ajit Kumar, SAREP
- The consultant team presented macro overview of the project along with the Data requirement for the project to DGPC and NCHM representative.
- A presentation is made by Mr Yamyang Zangpo, NCHM on current state of Hydro-met station and observation sites in Bhutan and Wangchu basin in particular. He also gave an overview of current flood forecasting, Data acquisition system, GLOF and Glacier monitoring system in place.
- This was followed by the visit to NCHM weather and flood forecasting centre. The consultant team was shown the current WRF and GCF forecast based meteorological forecasting. NCHM team has also showed the observation based and stream flow measurement based flow forecasting which was developed in collaboration with JICA, FMI and ICIMOD.
- The team moved from Thimphu to CHP site in the afternoon.



## Day—3: 09-04-2024

### Schedule of the day

- Meeting at CHP head office
- Visit Tala hydro plant dam and catchment in the morning hours
- Visit to Diversion channels of Tala and Chukha
- Visit to Surge Chamber
- Stay back at Chukha guest house

The following outlines a series of activities undertaken during a visit to various locations associated with hydropower generation, particularly focusing on the Chukha Hydropower Plant (CHP) and its surrounding infrastructure.

#### 1. Meeting at CHP Head Office:

- A meeting consist of TERI consortium, as well as representatives from the DGPC and NCHM, convened at the CHP head office in the morning.
- CHP officials delivered a comprehensive presentation covering essential aspects of the dam, including its infrastructure, hydrological features, and operation and maintenance (O&M) manuals.



- Detailed information was provided on power generation potential, capacity, and the existing system for forecasting generation.
- Additionally, details regarding ongoing renovation activities were shared, followed by a visit to the power house to observe the work firsthand.



## 2. Visit to Tala Hydropower Dam Site and Diversion Channel:

- The team proceeded to the Tala hydropower dam for an excursion, engaging with officials present at the site.

- They also toured the diversion inlet point, which is accessed through a tunnel located approximately 2 kilometers upstream of the dam. This diversion channel likely plays a crucial role in regulating water flow for the hydropower plant. This additional water diversion helps to generate additional around 93 MUs annually for Tala hydro plant. .

### 3. Visit to Surge Chamber:

- The team visited the surge chamber of the Chukha dam. This chamber also serves as an outlet for one of the diversion channels, with a specific discharge capacity of 3 cubic meters per second (cumec).
- DGPC representatives provided insights of the construction and operational history of the hydropower plant, expressing their commitment to offering necessary support for the successful completion of the pilot study.



### 4. Return to CHP Guest House:

- Following the day's activities, the team returned to the CHP guest house, concluding their engagements for the day at approximately 5:30 PM local time.





Overall, the visit encompassed a range of activities aimed at familiarizing the team with the infrastructure, operations, and potential of the hydropower facilities, while also facilitating interactions with key stakeholders and officials of NCHM, DGPC, and CHP.

## Day—4: 10-04-2024

### Schedule of the day

- Visit to Chukha Dam
- Field inspection at Haa and Wangchu confluence
- Visit to NCHM principal Gauging Station at Damchu
- Visit to Paro Gauge site and Class A met station at Seed institute
- Back to Thimphu
  - The team proceeded to the Chukha hydropower dam for an excursion, engaging with officials present at the site.
  - They also toured the diversion inlet point of Chukha Dam
  - The team has visited all the above mentioned site as planned and inspected the status of monitoring sites, identification of potential new sites for installation of new observation stations.
  - The diversion of two streams to Chukka's dam upstream helps to generate additionally approx. ...MUs annually.





## Day—5: 11-04-2024

### Schedule of the day

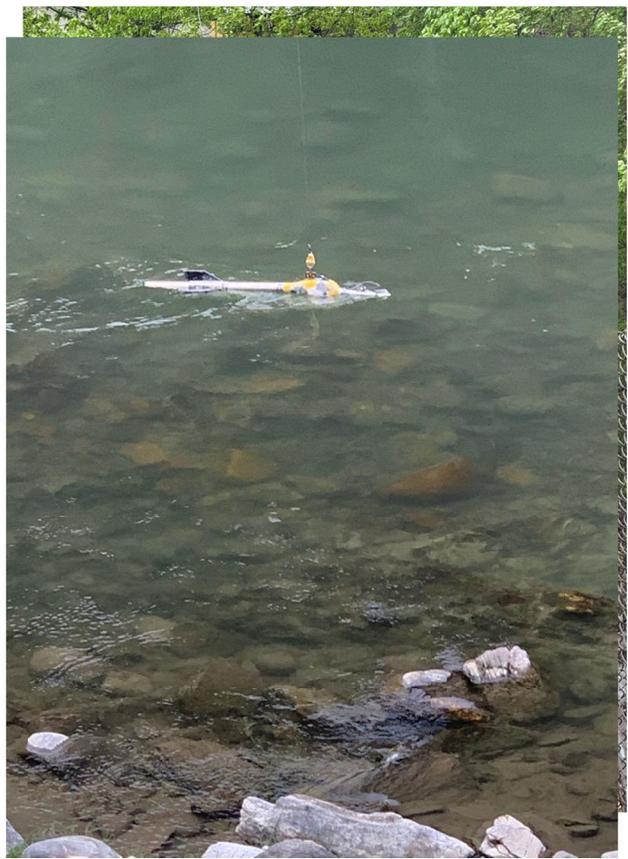
- Debriefing meeting at DGPC office in Thimphu.
- Visit to NCHM principal Gauging Station in Thimphu
  - Following the completion of the field visit, a debriefing meeting was held at DGPC office to discuss the insights gathered from the field and next steps in the project.
  - TERI team has made a debriefing presentation and shared the initial findings and approach they are going to take for the pilot study.
  - Data and other requirements has been discussed with NCHM and DGPC.
  - For the data collection and facilitation PoCs has been appointed by the Client and they have started sharing the data using Google Drive specifically created for this study.
  - The team has visited all the above mentioned site as planned and inspected the status of monitoring sites, identification of potential new sites for installation of new observation stations.
  - Post Lunch, the team has visited to rest of the weather and river monitoring sites of NCHM situated in Thimphu valley.
  - Pl add pictures of the meeting and visit.

The Senior Management team of DGPC and NCHM acknowledged the gaps in the existing hydro-met observation network and expressed their desire to have a robust hydro-met observation network which will inform the inflow forecasting system to be developed for improved decision making for power generation at Chukka Hydro Power Dam. It is critical for Chukka Dam to get accurate information on water inflow particularly in the lean flow season to plan their power generation. It was also discussed that there are some ungauged stream and contribution from small catchments which are not currently monitored. It was emphasised that the consultant team will consider these factors while design the additional hydro-met observation network.

As a next step, consultant team will submit an inception report based on the review and analysis of the data captured during the visit and data shared by the team from NCMH and DGPC.

Day 6: 12-04-2024: Departure from Bhutan to Delhi

Annexure 1: Snapshots of the Field Visit



# Thank You

*Disclaimer:*

*The data, information and assumptions (hereinafter 'data-set') used in this document are in good faith and from the source to the best of SAREP (the program) knowledge. The program does not represent or warrant that any data-set used will be error-free or provide specific results. The results and the findings are delivered on "as-is" and "as-available" data-set. All data-set provided are subject to change without notice and vary the outcomes, recommendations, and results. The program disclaims any responsibility for the accuracy or correctness of the dataset. The burden of fitness of the data-set lies completely with the user. In using the data-set data source, timelines, the users and the readers of the report further agree to indemnify, defend, and hold harmless the program and the entities involved for all liability of any nature.*