ROW Efforts on Climate Resiliency and Reversal Initiative – Khatling

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1.0 Introduction and Background

The Rivers of the World (ROW) Foundation is seriously concerned about the recent disasters due to the weather pattern changes and calamities all across the globe. It underscores the need to focus on this issue. A few major findings by the EC[1] and the National Aeronautics and Space Administration (NASA[2]) on tracking greenhouse gas emissions and the lower earth temperature increases are listed below:

- Human activities are increasingly adding an enormous amount of greenhouse gases to those naturally occurring in the atmosphere, which is causing the greenhouse effect and global warming (EC, 2020).

[1] European Commission (EC). (2020) *Causes of climate change* [Online] Available from: https://ec.europa.eu/clima/change/causes_en .

[2] NASA. (2020) Global Climate Change, Vital Signs of the planet, [Online] Available from: https://climate.nasa.gov/causes/ .

- It is evident from the data that greenhouse gases are trapping heat in the lower parts of the atmosphere causing the temperature rise.
- This global warming are not caused by a more active Sun, as that would have caused warmer temperatures in all layers of the atmosphere.
- Instead, scientists have observed a cooling in the upper atmosphere, and a warming at the surface and in the lower parts of the atmosphere. (NASA, 2020)
- Many of the gases causing global warming occur naturally, but human activity is increasing the concentrations of some of them in the atmosphere, in particular (EC, 2020):
    - ♦ carbon dioxide (CO_2),
    - ♦ methane,
    - ♦ nitrous oxide, and
    - ♦ fluorinated gases.

The resulting climatic disasters during the past few years causing unprecedented –

♦ floods, ♦landslides, ♦ mudslides, ♦ tornadoes, ♦ hurricanes, ♦ forest fires, ♦ drought, and ♦ evolving viral outbreaks.

These intense climatic events are causing huge loss of lives, damages to properties, and businesses supporting current agricultural, and industrial infrastructure.

This effort by the ROW Foundation is looking into two specific outcomes –

- develop steps to prevent the loss/damage of lives and properties due to unprecedented weather events (***Climate Resiliency)*** and
- remedial steps involving ***Climate Reversal -***

The remedial step involving climate reversal is a long-term effort to begin the reversal of the increasing trend of global temperature rise for the past six decades (NASA, 2020).

The glacier split last year in Rishiganga Uttarakhand caused wash-away of a small village. A picture below shows a part of the disaster and rescue.

This incident caused an alarm about the Himalayan English School in Ghansali which is sitting right on the south bank of the Bhilangana River, originating from the Khatling Glacier at a point less than 100 kms away.

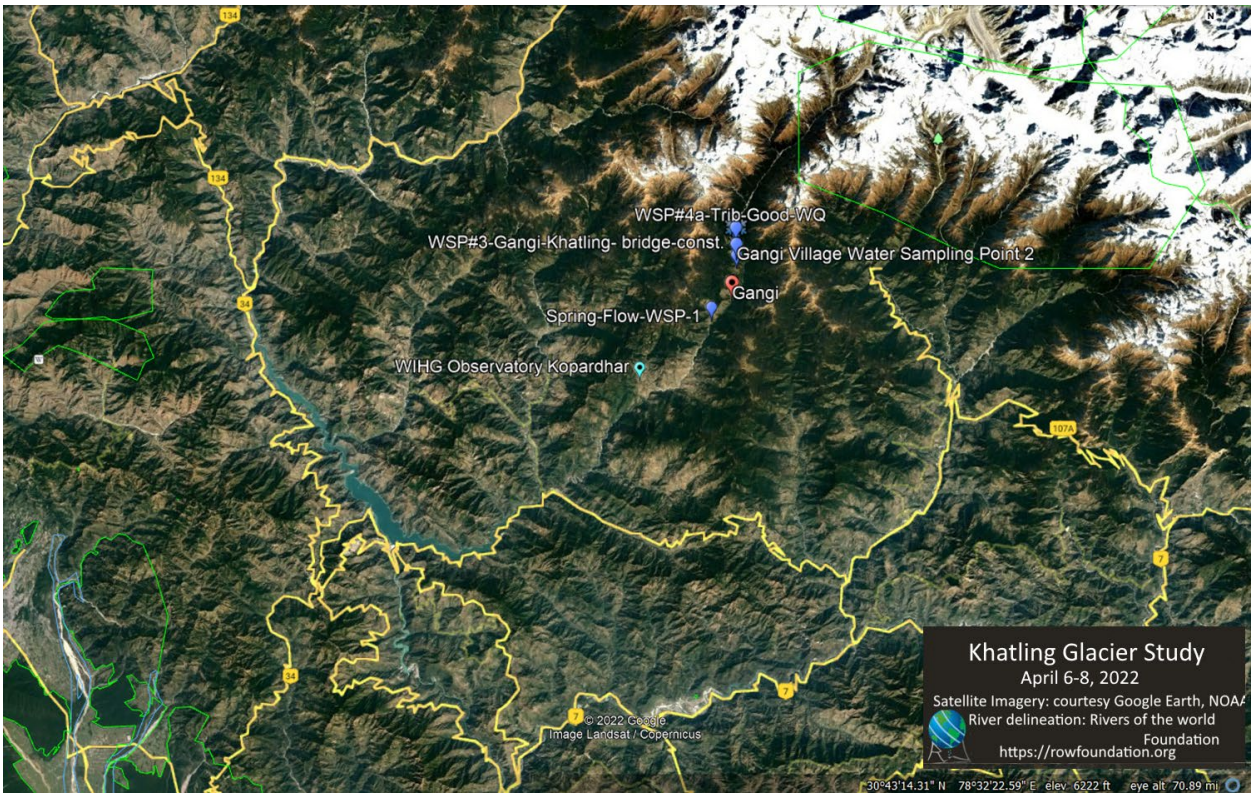
2.0 Study Details

The ROW team planned to conduct a study to visit the Khatling glacier and identify possible areas along the Bhilangana river where some temporary structures could be built to hold an unanticipated high-volume of flow due to intense climatic or glacial event.

To that end a site visit was conducted by ROW and S&M Engineering, USA (SNM www.snmengineering.com) team – Subijoy Dutta (Maryland), Sudhir Nautiyal (Ghansali), and local collaborators. Great support was provided by the Wadia Institute of Himalayan Geology (WIHG) by connecting us with their observatory in Kopardhar, who arranged for our overnight stay in their facility and provided tracking/hiking guidance and accompaniment by Harish Bangkoti from the observatory.

A Water quality testing and correlation of the pure glacial water and its degradation was observed and tabulated by the ROW team. The total dissolved solids (TDS) contents were increasing as the spring water from the glacier was flowing downstream and picking up more solids as the Bhilangana River flowed further downstream and reached the highest value of 37 ppm at the first sampling site WSP#1 before reaching Gangi among the four sample locations shown below. Needless to say the natural spring/glacial water in the area are quite clear and drinkable. The TDS value was lowest for WSP#4a in a spring flowing below the glacier area.

A pictorial story below will provide the details.



The Khatling glacier study trail is sown on a satellite Map with satellite-based GPS ground locations gathered during the site visit.

The ROW Team traveled by a SUV to Gangi, and a couple team members hiked 3.5 hrs one way thereafter to the bottom of the Khatling glacier – origin of the Bhilangana River

Spring water was flowing out of the melting glacier as they revealed low TDS values

Peace Temple at Kopardhar – 800 meters away from the WIHG observatory

Bhilangana River – flowing downhill towards Ghansali, UK (April 6, 2022)

Close to Dhopardhar, Uttarakhand at Sunset, April 6, 2022

ROW team (Sudhir Nautiyal) Walking towards the Observatory - Wadia Institute of Himalayan Geology(WIHG) Kopardhar, selfie by SubijoyDutta

Amit Nautiyal – Pilot of our rented SUV, with Trepan, and Rakesh of WIHG observatory.

Mostly local produce at a shop in Guttu, Uttarakhand.

Drive from Guttu to Gangi, April 7, 2022

Arrived at the Gangi Village 8,608 ft. Harish Bankoti (WIHG) hiked with Subijoy Dutta along with a local guide to the Khatling Glacier

Glacial water coming through Spring – used by villagers in Gangi.

Beginning point of our hike to the Khatling Glacier - origin of the Bhilangana River

Potato Cultivation at the village – the village primary school in the background.

Gangi village School April 7, 2022

Following the Trail to the Khatling Glacier – nice wild flowers along the trail

As we continued the hike - the snow-capped peaks and the retreating glaciers were clearly visible

Khatling Glacier (11,810 ft) viewed from a nearby hill at 8,900 ft. elevation.

A few Erosions and landslides were visible along the trail

Huge pieces of rocks were common in the area. April 7, 2022

Bhilangana River at the source – bottom of Khatling glacier flowing high with glacier and melting snow only, no rains or precipitation

Harish, local guide from Gangi, and Subijoy at the Bhilangana River 7,798 ft - bottom of the Khatling Glacier

Glacial water flowing through a spring to the Bhilangana River

Hiking back to the Gangi village from the bottom of the Khatling Glacier, April 7, 2022

Bhilangana River valley, one of the few possible sites to study further - Returning back to Ghansali, from the area, April 8, 2022.

3.0 Concluding Remarks

The exemplary spirit and enthusiasm of the ROW-SNM team made this effort possible within a very short time. The findings from the study include a number of valuable data which we plan to use in developing and building a robust protection for the people living in villages and towns along the Bhilangana River, the pathway for major destruction if climatic adversity hits the Khatling glacier area. To that end, ROW Foundation/S&M Engineering plan to –

- Approach a number of organizations who are active on climate change issues.
- Develop a climate resiliency plan in collaboration with local authorities for the Bhilangana River watershed.
- Make collaborative efforts to create Climate Change Centers for educating people towards reducing greenhouse gas emissions.
- Arrange for Schools/colleges and other organizational day visits to the centers.

We look forward to receiving your Questions and/or Comments either through comment box at the bottom of our webpage or by sending an email to rowfoundation@gmail.com .