

A photograph of a mountain valley with large, blue-tinted ice stupas in the foreground. The stupas are rounded, dome-like structures of ice, some with intricate patterns. In the background, there are rugged, brown mountains under a blue sky with white clouds. The overall scene is a high-altitude, cold environment.

ICE STUPAS

ADAPTING TO WATER SCARCITY
IN PAKISTAN



Gilgit Baltistan is a region of magnificent mountains, glistening glaciers, and diverse ecosystems. Part of Kharmang district, engulfed by the Karakoram range, is a small village named Paari, which is famous for its Saspolo apples.

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Receiving an annual rainfall of less than 50 millimeters, this village relies exclusively on water from snow and glacial melt and survives on small-scale agriculture and livestock rearing. The village of Paari faces a challenge of water accessibility, placing these mountain ecosystems and communities at risk. Climate change and its impacts such as glacial lake outburst floods (GLOFs) result in water scarcity that further hamper food security. The valley receives water from the melts in late June every year, which is quite late for crop growth.

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To ensure a sustainable water supply and adapt to the climate realities, the locals here have adopted an indigenous adaptation technique in the form of Ice Stupas. These stupas are an excellent example of nature-based solutions, demonstrating indigenous best practices for reducing climate change impacts and associated risk.

Ice Stupas is an offshoot of glacier grafting technique that harnesses underground water to create artificial glaciers in the form of conical-shaped ice heaps. To prevent the wastage of huge volume of water in the streams and rivers in winters, these stupas act as water reservoirs to fulfill the drinking and cultivation requirements of the locals.

■ The glacier water is passed through underground pipes. Due to the height difference, the water flows upwards through the attached sprinklers, loses its heat, and freezes when exposed to sub-zero air temperatures



The vertical, cone-shaped structure of the ice stupas enables the ice to remain frozen for longer periods of time by reducing the surface area exposed to weathering agents like heat and wind. These structures can achieve heights of 50 feet or more. With the change in season, the melt from these stupas results in increased water supply in early spring and summers, March to June, when water is scarce but required for agriculture.



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For the past two years, the residents of Paari have been creating Ice Stupas to reduce water scarcity and irrigate the otherwise barren land. The formation of Ice Stupas is a process that involves extensive hard labour. Women have been instrumental in the success of these Ice Stupas.

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Amid the climate crisis, nature-based solutions such as Ice stupas ensure evidence-based and transformative changes to build the climate resilience of these mountain ecosystems. An Initiative by Ministry of Climate Change and UNDP Pakistan with support from Green Climate Fund, the GLOF-II project aims to promote such indigenous best practices and help reduce the risks and vulnerabilities from the glacial lake outburst floods in Northern Pakistan. ■







GLOF II

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Scaling-up of Glacial Lake Outburst Flood Risk Reduction in Northern Pakistan (**GLOF-II PROJECT**)

A Project by
***Ministry of Climate Change and
UNDP Pakistan***
with support from Green Climate Fund



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**GLOF II
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SCALING-UP OF GLACIAL
LAKE OUTBURST FLOOD
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