Combating sediment surge in Tibetan rivers

Rivers originating in the Tibetan Plateau supply water to almost 2 billion people (1). They have also historically contributed about one-third of global sediment inflows to the ocean (2). However, in the past 35 years, more than 60% of these rivers have experienced substantial increases in the sediment they carry downstream (3). This sediment surge threatens ecosystems, compromises landscape stability, and endangers infrastructure, especially dams. Urgent and strategic action is necessary to address sediment flow in the Tibetan region.

Over the past five decades, temperatures on the Tibetan Plateau have risen by 0.23°C per decade, double the global average (4). Ice and snow have melted, and permafrost has been degraded. These changes, coupled with rain-induced flood peaks, have accelerated soil erosion and increased riverine sediment loads (5, 6). Although increased vegetation cover can provide a stabilizing effect, challenges posed by de-glaciation and thaw-induced slope instability are formidable (7). Human activities, especially overgrazing and dam construction, exacerbate degradation processes (8), markedly increasing sediment loads in many rivers, including the Indus and Ganges (3).

Increased sediment flows affect water clarity as well as aquatic life and regional ecosystems (9). Sediment can disrupt aquatic photosynthesis, affect the synthesis of organic matter from inorganic substances by plants and algae, and trigger substantial changes in river courses and the wider landscape (10). In the “one river two streams” area of the Yarlung Tsangpo River, which is critical for Tibet’s economy, increased sediment has destroyed farmland and increased dry season wind-blown sand and dust (11).

Combating rising sediment loads on the Tibetan Plateau requires a comprehensive strategy and inter-national cooperation. This includes promoting effective watershed management, implementing climate change mitigation strategies, and improving sediment dynamics monitoring (12). Engaging communities in these efforts and adopting adaptive management practices will be crucial for protecting the Tibetan Plat-eau's ecosystems and the billions of people who depend on the services they provide.

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