ICIMOD

International Cryosphere Climate Initiative
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Global Stocktake Joint Submission (ICIMOD-ICCI)

Cryosphere Findings: Mitigation Action and Stocktaking

The scientific evidence on changes in the global cryosphere reveals that the current trajectory of anthropogenic emissions of GHG will lead to irreversible impacts on ecosystems and human communities worldwide. Consequences are especially far-reaching from long-term projected sea-level rise due to the melting of glaciers and ice sheets, and projected changes in water resources and hydrological extremes due to loss of snowpack, glaciers and permafrost for every increment temperatures peak above 1.5°C.

In addition to such projections, recent *observed* rates of ice and snow cover loss reveal alarming rates of change that exceed even IPCC AR6 and post AR6 projections. These implications go well beyond that reflected in the IPCC AR6 report cycle, including the SROCC, as accuracy, detail of observations and projections evolve ever more rapidly. The combination of AR6 and more recent projections show that:

- **Current mitigation efforts are not sufficient given the long-term scale and effective irreversibility of cryosphere processes.**
- In addition to loss of ice and snow, global warming has accelerated the sleeping giant of permafrost, which has for millennia bound large stores of GHGs. At current anthropogenic emission rates, yearly GHG emissions from permafrost thaw will soon equate the current yearly emissions of the largest emitters. Even if temperature rise from anthropogenic GHG emissions are halted at once, thawed permafrost will be the tenth largest emitter of CO_2 and CH4. **The longer we delay ambitious mitigation action to decrease GHG emissions, the more permafrost emissions will have to be offset by future generations to reach and secure net-zero.**

Cryosphere Findings: Adaptation / Loss and Damage

At current GHG emission rates, the efforts required to **adapt** to the above coastal and mountain losses will be unsustainable, and in some cases **beyond reversible adaptation limits.** Cryosphere changes will lead to catastrophic loss of significant land mass and water resources globally, affecting future generations, especially in mountainous and coastal areas including small island states; resulting in food and water insecurity, increased hazard risks, displacements, and conflicts.

Without urgent and ambitious climate action, cryosphere changes will therefore lead to extensive **loss and damage**, both in the short-term and long-term, especially beyond 2100.

- **Only sustained and increased levels of mitigation action can slow the rate of cryosphere change and resulting global impacts. Amplified adaptation action can allow Parties to adapt over an extended period of time, and minimize multi-generational loss and damage.**

Cryosphere Findings: Cross-cutting Implications

The implications of cryosphere science are clear:

- **Immediate, increased and sustained mitigation action and adaptation are needed at all levels to avert the most severe global consequences of cryosphere change.**

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