

## ICTS Seminar

**Title** : Resource diversity begets stability in complex ecosystems

**Speaker** : Akshit Goyal (ICTS-TIFR, Bengaluru)

**Date** : Friday, 23 January 2026

**Time** : 2:00 PM (IST)

**Abstract** : A fundamental paradox in ecology is the relationship between species diversity and ecosystem stability: May's stability condition predicts that species diversity destabilises communities, yet many diverse ecosystems in nature are stable. Here, we resolve this paradox by explicitly modelling the resource dynamics that control species diversity, which May neglects. Since resource diversity generally promotes species diversity (the competitive exclusion principle), May's framework predicts that resource diversity should destabilise communities. However, we find the opposite: resource diversity consistently generates stable, species-rich communities. This stabilising effect disappears when we eliminate resource dynamics --- reducing the consumer-resource model to an effective Lotka-Volterra model with resource-mediated competition --- demonstrating that resource dynamics are crucial to drive this positive stability relationship. We also show that, contrary to the prevailing belief that interaction heterogeneity is always destabilising, different biological sources of heterogeneity have opposing effects on stability. Analytically deriving the stability condition showed that, consistent with previous work, stability is induced when the correlation between growth and consumption exceeds the square root of the species packing ratio (the ratio of the number of surviving species to surviving resources). Our work overturns longstanding views in theoretical ecology and demonstrates that resource dynamics are not just negligible background but are central drivers of ecosystem stability.

**Venue** : Emmy Noether Seminar Room

Zoom Link: <https://icts-res-in.zoom.us/j/91032007113?pwd=aRE3p4YaxU4HgF92W8eK3IQd6ZrCVH.1>

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