Alpine Ecosystem Education

This work is a sub-project of the main project to create digital immersive field experiences (augmented and virtual reality) of BC alpine and coastal forest ecosystems (Hewitt TLEF 2019). In 2020, we expanded the project to include study sites in the Central Karakoram-Himalaya. Data included species’ historical range limits (Dainelli 1928) and modern, 20th century, distribution and abundance data (Hewitt 2016) in the region as a means to assess species’ range changes (Fig 1).

The dilemma was how to make this complex biogeographical information accessible to undergraduate student audiences. To address that challenge, we employed a digital storytelling platform, ESRI Storymaps, to provide an interactive, procedural walk-throughs of varied topics.

Embedded Storymap Elements for Alpine Ecosystem Learning

- The 3D DEM map allows students to interact with data on the distribution and abundance of 10 focal species, and compare these to shifting elevation limits. Students can toggle controls to reveal different subsets of species and compare them (Fig. 2).
- Jupyter notebooks, an online coding and markup interface in HTML format (Fig. 3) enables students to compute similarity and diversity indexes by adjusting and running notebook code.
- Graphs of species abundances by elevation in Hewitt’s 2016 study sites facilitate visualization of alpine floral distributions, and is accompanied by spreadsheet data for further examination (Fig. 4).
- Google sheets and forms are integrated into the storymap, where students can enter and submit, via a linked online submission page, their answers to assessments (Fig 5).

Conclusion

With Storymaps, 3D DEM’s, Jupyter Notebooks and Google sheets or forms, students may explore and interact with complex information about species populations in an alpine area. They can compute diversity metrics and interact with data on species historical and current range limits to predict climate induced range shifts. This open education resource is available under a CC-BY-NC-SA licence.

References

Hewitt, N. 2016. Unpublished data

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