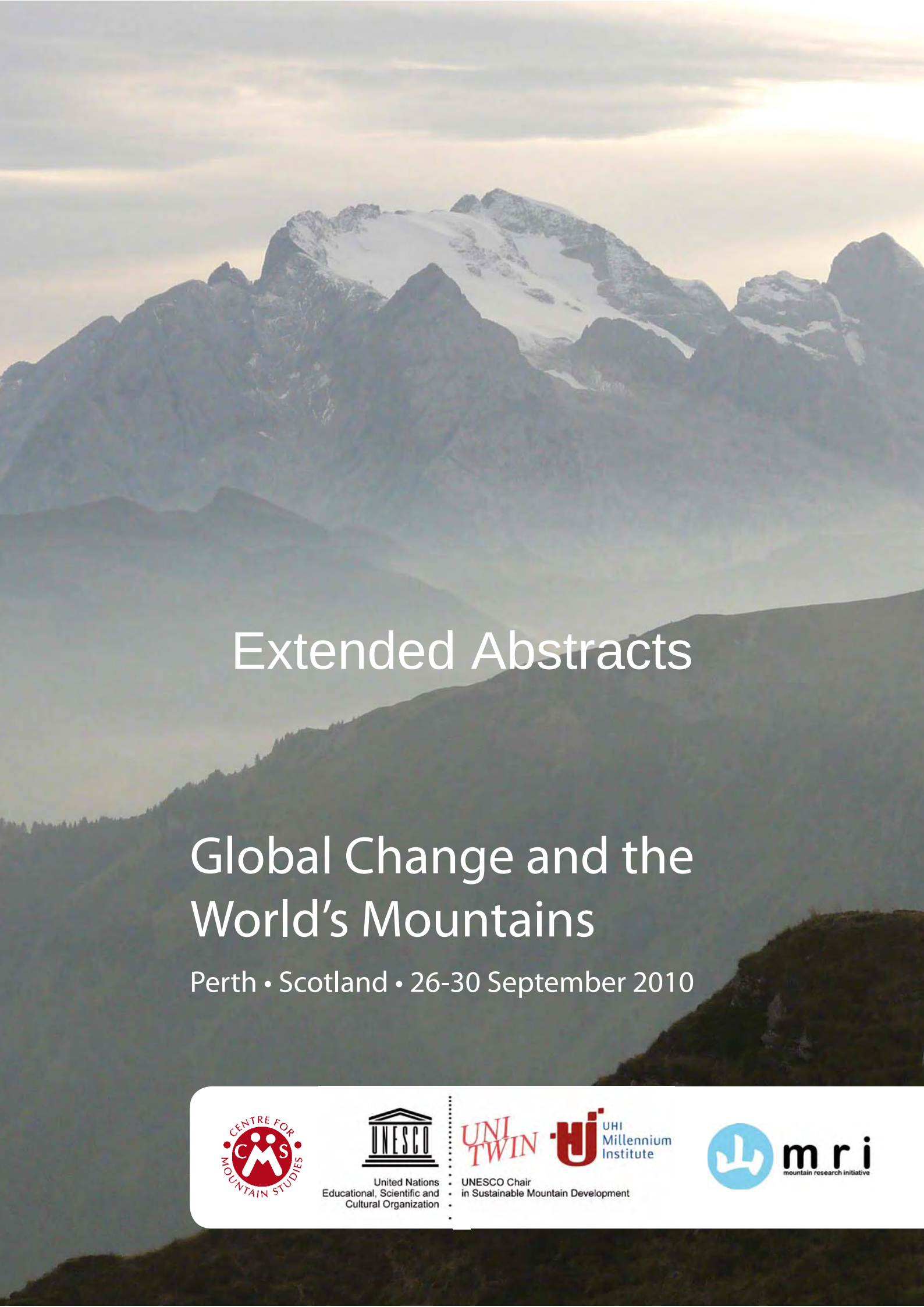

Extended Abstracts

Global Change and the World's Mountains

Perth • Scotland • 26-30 September 2010

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Global Change and the World's Mountains
Perth, Scotland, UK
27-30 September 2010

Extended Abstracts

Plenary Sessions

A characterization of the woody vegetation at the treeline in the Venezuelan Andes

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The mountain treeline in the northern Andes is a complex transition zone between mountain forests (*prepáramo*) and open *páramo* grasslands, and is considered a key environment for monitoring the effects of global climate change. Thermal limitations have been suggested as the main cause for the altitudinal position of the treeline at a global scale, with biotic and abiotic modulating factors that may vary in importance depending on the planet's region (Koerner, 1998). In the northern Andes, the treeline is fairly abrupt and seems to be below its climatical potential as a result of burning of the *páramo* vegetation or due to cattle grazing. In the Venezuelan Andes, structure of the vegetation in the treeline ecotone is also abrupt with forest tongues and islands, however, cattle grazing is variable and burning is almost absent.

The aim of this study was to characterize the structure and composition of the woody vegetation in forest islands and forest tongues, as well as in the edges between *páramo* vegetation and forest vegetation. We also explore the relationship between canopy closure and forest species at a gradient from the exterior to the interior of forest tongues. We analyzed the woody vegetation of the ecotone in the upper limit of continuous forests between 3260 to 3550 m a.s.l. at two sites in the Sierra Nevada de Mérida. At both sites cattle grazing, if present, is very low and no burning evidence was found.

Results show that tree density decreases with altitude as a result of decrease in forest cover, although it does not change with altitude within the *páramo* or the forest. Diversity and density of the woody species decreased with altitude, and, composition and abundance changed along the altitudinal gradient. Species richness decreased from 5-8 species per plot in the forest, to five in the borders, to 1-4 in the open *páramos*. Tree species richness and diversity within forests show no differences at

different altitudes, however, significant differences were observed when forests and *páramos* were compared. In continuous forests bellow 3300 m cloud forest and *prepáramo* species were dominant, while they were completely absent in forest islands and open *páramos* at higher altitudes. This suggests that these forest islands are not relicts of a descending forest vegetation.

In the forest islands and *páramo*-forest borders the dominant woody species was *Diplostephium venezuelense.* Puentes (2010) has shown that this species did not experience chronic photoinhibition after exposure to direct radiation in the *páramo*. Bader *et al.* (2007) reached to similar results in Ecuador where another species of the same genus grows in the open *páramo*, while other woody species did not survive the higher radiation outside the forest. They suggest that the higher radiation levels in the open *páramo* limits the advance of the treeline. Forest tongues were studied in more detail, since woody species reach their highest elevations there. Canopy structure was analyzed along woody species composition on an exterior-interior transect crossing forest tongues. Results indicate that the lowest optimum leaf area index of the above canopy corresponds to *D. venezuelense* juveniles with a value of 1, while for the remaining species this value is around 2. Also, more shaded edges (as a result of differential topographic exposure to light) are colonized by the other species, as opposed to *D. venezuelense*, which grows especially at the edges and exterior of the forest tongues.

Results suggest that *D. venezuelense* could act as pioneer species in scenarios of altitudinal advance of the treeline induced by climate change. However, the possible role of this species as a facilitator of the advance of other forest species needs to be evaluated since in the less shaded forest edges, where *D. venezuelense* is also present, regeneration of other woody species is scarcer.

We conclude that the advance of the forest toward higher elevations in the Sierra Nevada de Mérida is limited in the first place by radiation and that topographic factors modifying the radiation impact determine the local advance of species other than *D. venezuelense*.

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