Mountain Peatlands

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FOREWORD

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In 2012, the biennial field symposium of the International Mire Conservation Group (IMCG) began in Quito (Ecuador) on 21 September and ended with the customary scientific programme and General Assembly at the Universidad de Los Andes in Bogota (Colombia) on 01–03 October. Between these dates, participants were guided through the peatlands of the tropical High Andes, reaching altitudes up to 4,000 m a.s.l. In Ecuador they visited nature reserves including the Yanacocha Reserve GLORIA (Global Observation Research Initiative In Alpine environments) site, the Papallacta-Oyacachi páramo water supply area for Quito, and mires near the Cotopaxi volcano. The itinerary through Colombia included *Sphagnum* mires, *Aragoa abietina* peatland, a classic *Oreobolus* and *Plantago* site and *Plantago* floating cushion bogs in dry and humid páramo between 3,600 and 3,700 m a.s.l. All of this reminded another wandering mire specialist that he had recorded peatland at even greater altitude (around 5,000 m a.s.l.) in the Indian Himalayas a couple of years earlier (Figure 1).

Mountain peatlands differ in both structure and function from those in the lowlands. Although typically much smaller with relatively small carbon storage, they occur in the headwaters of many rivers and are, therefore, of primary importance in the context of water supply. As islands of wet habitat in often steeply sloping and well-drained surroundings, they are important water sources for local biodiversity and migrating species as well as for people; and in the world's arid zones, mountains may be the only locations where the climate can support peat formation. Yet only two of the 100 articles published in *Mires and Peat* up to the end of 2013 have focused on mountain peatlands. Both of these report research that was carried out in the Americas, specifically in Ecuador, South America (Article 3.04, published in 2008) and Colorado, USA (Article 8.07, published in 2011). To redress the balance, and inspired by the experiences of the Andes and the Himalayas, for this 2014/15 special volume of the journal the editors aimed to collect together examples of research on peatlands in mountains across the five non-frozen continents of the world.

As might be expected, there is emphasis on the Andes (South America). From altitudes around 4,500 m a.s.l in the puna ecoregion of north-west Bolivia, **Hribljan *et al.*** report peatland carbon stores of 572–1,040 Mg C ha^{-1} accumulated over less than 4,000 years. Moving north, **Salvador *et al.*** describe the current condition of Peruvian puna peatlands in terms of their vegetation, physical and chemical characteristics and disturbance status. Also working in Peru, **Maldonado Fonkén** introduces the concept of bofedales, a local term for high-altitude wetlands which may or may not accumulate peat; reviews their value for biodiversity and other ecosystem services; examines the role of traditional management in their maintenance; and identifies the main conservation threats. **Oyague Passuni & Maldonado Fonkén** then relate the assemblages of aquatic invertebrates found in example bofedal systems to their physical structure, plant communities and water quality. On the other side of the Equator but still in South America, **Benavides** reports how drainage for traditional agricultural irrigation has affected the development of plant communities and recent carbon accumulation in protected páramo peatlands in the Colombian 'Cordillera Oriental'.

Moving to North America, **Wolf & Cooper** characterise the flora, vegetation, soils, geochemistry, physical settings and landforms of fens in the Sierra Nevada and parts of the neighbouring mountain ranges in California, on the basis of a comprehensive dataset for 79 example peatlands.

From the highly populated western end of Eurasia **López-Sáez *et al.*** report that, although we still have only limited ecological understanding of mires in the Toledo Mountains and other lower-altitude mountain ranges in central Spain, their conservation status is already substantially threatened - primarily by overgrazing, fire, and expansion of cereal crops, drying-out and erosion. Observations of the growth of bog pine by

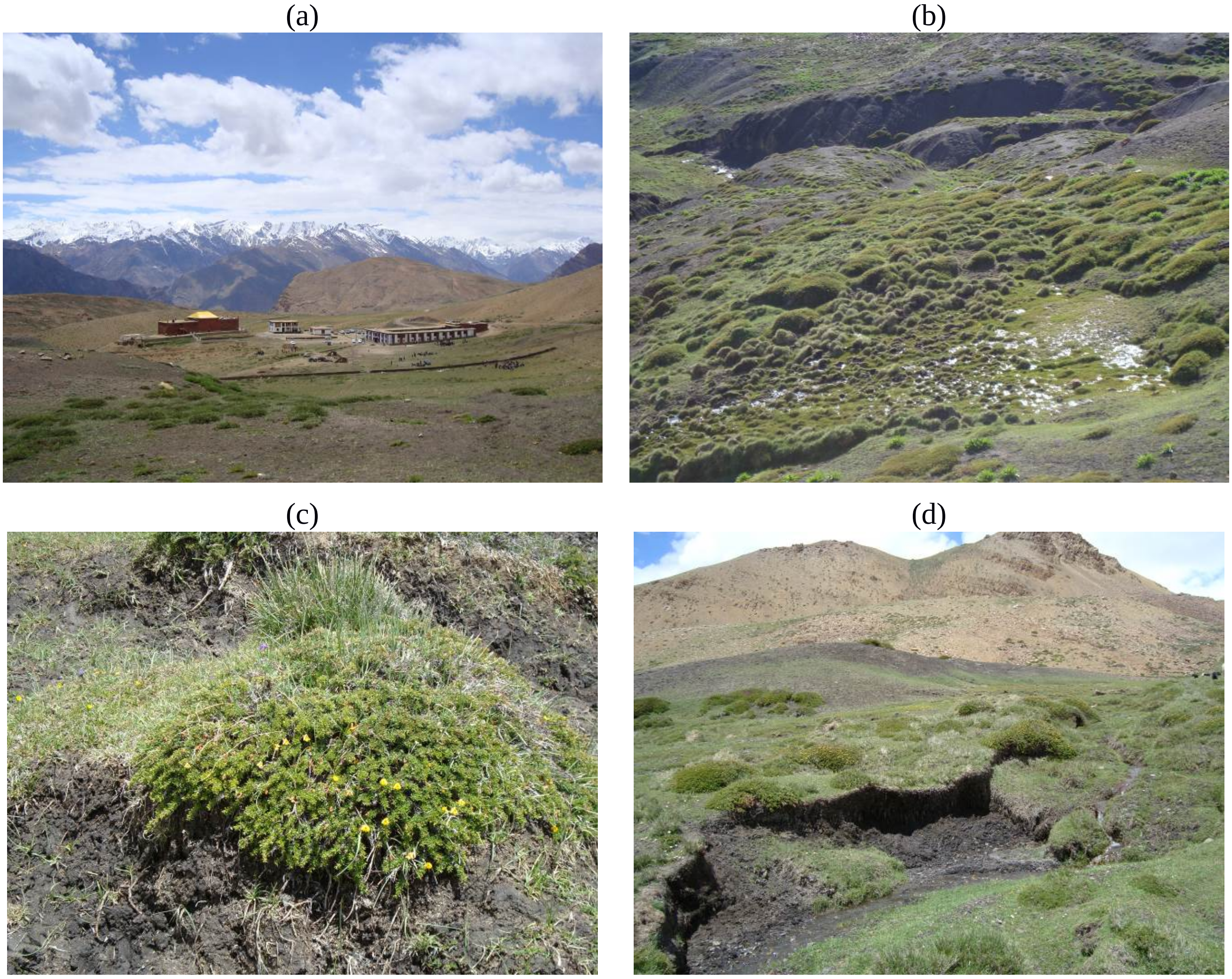

Figure 1. Observations of a peatland located at around 5,000 m a.s.l. above the Spiti Valley in northern India. The location is near the Tangyud Monastery (32˚ 13’ 12” N, 78˚ 0’ 0” E) above the village of Komic in the Kaza area of Spiti region, Himachal Pradesh, and commands impressive views of snow-covered Himalayan peaks (Photo a). Water from a spring emerging from otherwise well-drained dry ground (Photo b) cuts through a layer of highly organic soil (Photo d). The vegetation comprises unidentified species that appear to be a grass, a small sedge, and a dwarf shrub (Photo c) that forms cushion-shaped clumps in the flush, on the peatland and on the dry surrounding slopes. Information and photographs: Russell Anderson, July 2010.

von Sengbusch, supported by ancillary data and GIS analysis, lead to the conclusion that the hydrological effect of an upslope road has increased the sensitivity to climate change of the otherwise pristine Ennersbacher Moor in the Black Forest mountains (Germany). Also in Europe, **Cubizolle & Thebaud** present a geographical model for the altitudinal zonation of mire types in the mountain range known as Les Monts du Forez in eastern France, which identifies significant changes with altitude in the ways that historical human activities have influenced the evolution of peatland systems.

Historical records for Namibia (Africa), which is famous for its drylands and deserts, led **Grootjans *et al*.** to infer that there were once spring mires associated with the so-called ‘water mountain’ (Waterberg), and searching on the ground revealed some evidence of their remnants. Also from Africa, **Dullo *et al*.** report mires with cushion plants belonging to the genus *Eriocaulon* in the Bale Mountains of Ethiopia that are reminiscent of the *Astelia pumila* peatlands of the southern tip of South America. **Grundling *et al*.** highlight the importance of mires in the enclaved mountainous country of Lesotho for water supply to the industrial heartland of South Africa, and identify an urgent need for land management changes and peatland rehabilitation to avert the adverse effects of erosion exacerbated by overgrazing and diamond mining activities.

From Australasia, **Hope & Nanson** assess peatland carbon and carbon fluxes in the Snowy Mountains of New South Wales (Australia) and conclude that active management is needed to promote the recovery of these peatlands from damage caused by grazing and fires and thus secure the conservation of a significant carbon store. Finally, **Hope** reviews what is known about the extensive and little-studied montane and subalpine peatlands of New Guinea - the largest, highest and wettest tropical island in the world.

This special volume on mountain peatlands is just a beginning. It is clear from the interest it has attracted that there is much more information already captured, and to come, about mires and other peatlands in the mountains of the world. We look forward to publishing at least some of this in future volumes of *Mires and Peat*.

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