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ENVIRA

UESM Newsletter

Spring Edition 2022

Reflecting on the First Three Quarters

A Naturalist's Dream Come True: Seeing southern Africa through plants, lichens, wildlife, and the people who call this spectacular land their home

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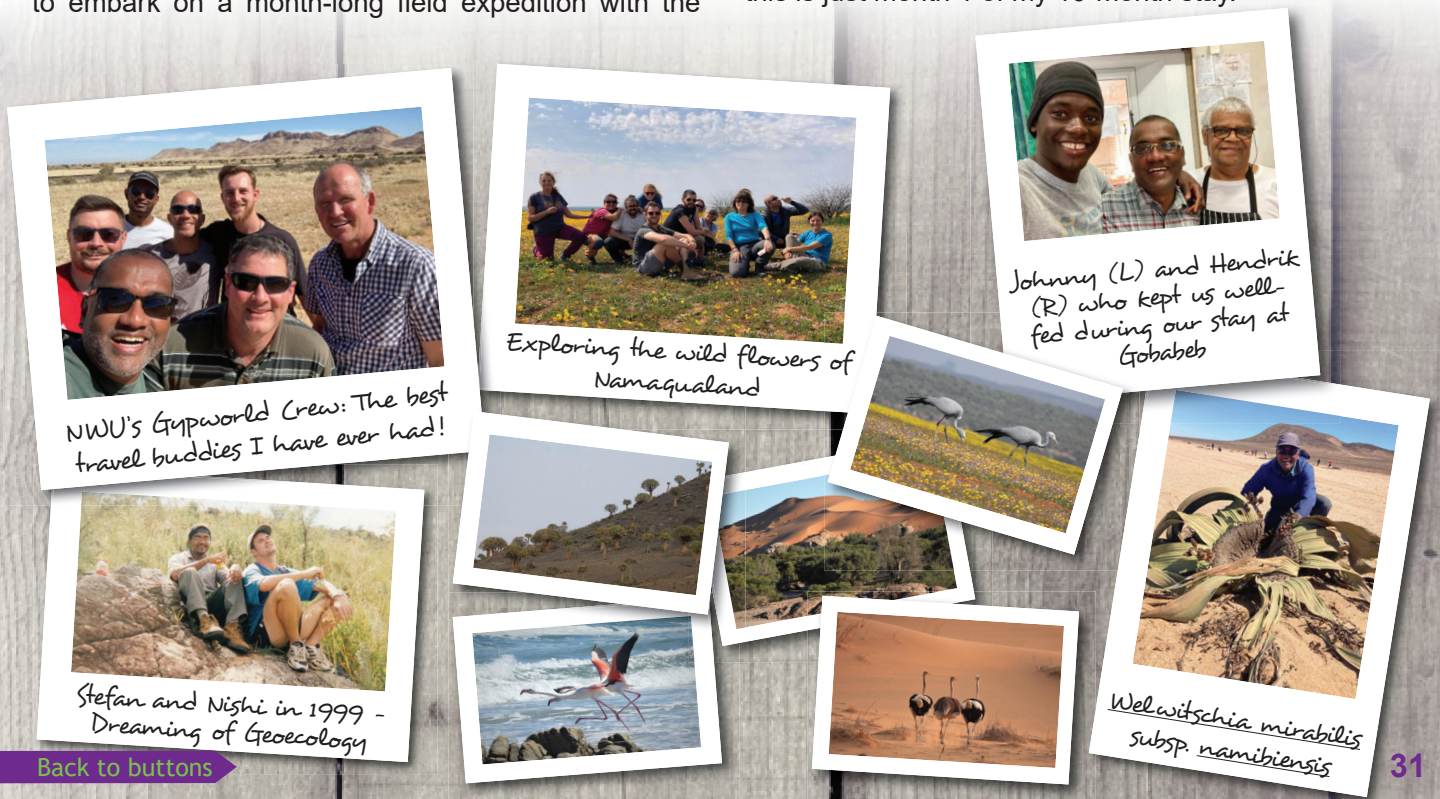
I first visited South Africa in 1999 to attend my first International Serpentine Ecology Conference. Within hours of landing, I experienced something I have yet to anywhere else in the world: The Zulu taxi driver who dropped me off at the motel said, when I realized I did not have enough rand to pay, that he would return after the weekend to get paid. How he trusted a total stranger amazes me to this day. This is the South Africa I first got to know, have come to love, and want to get to know more. My first South African friend was Stefan Siebert. As conference roommates, we quickly realized that we shared a passion for sport as well as serpentine ecology. Stefan introduced me to my favorite South African pastimes: delicious braai over red wine and Amarula and Rooibos tea to top it off! 22 Years later, thanks to a Fulbright US Scholar Award, I now have the pleasure of spending 10 months with Stefan and his colleagues, teaching and mentoring students and advancing our collaborative research on geoecology.

I arrived in South Africa in early August just in time to embark on a month-long field expedition with the Gypworld team consisting of Spanish, Turkish, and South African scientists and students. We travelled 8500 km through northern Cape to the Namib Desert and then back down to the western Cape to present papers in the session on 'Plant Life on Atypical Soils' at the MEDECOS conference. The plants, lichens, landscapes, and wildlife I encountered not only gave me a solid introduction to the fascinating natural history of southern Africa but also to the many people who call this land their home. During our visit to the Gobabeb Namib Research Institute, I saw my first *Welwitschia mirabilis* – an ancient lineage of plants endemic to coastal deserts from central Namibia to southern Angola. Having first heard of this plant as an undergraduate, I couldn't believe I had the good fortune of being in its presence. From witnessing Blue Cranes on a superbloom, ostriches on the sand dunes, Greater flamingos taking flight, and an ancient Quiver Tree forest, I now have a sense of how wondrous this country is and how blessed I am to be its visitor. And, this is just month 1 of my 10-month stay.



Serpentine Geoecology: Thinking beyond the Mediterranean Biome

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Ultramafic rocks (e.g., peridotite, serpentinite) are found along continental margins, faults, and shear zones on almost all continents and island arcs on the planet (Rajakaruna and Boyd, 2014). Serpentine soils weathered from such rocks are generally deficient in essential plant nutrients (e.g., Ca, N, P) and have elevated levels of Ni and Cr. Although the physical features of serpentine soils can vary considerably, they are generally found in open, steep landscapes, are often shallow and rocky, and may have reduced water retention capacity. Due to intense selective pressures generated by such stressful conditions, serpentine soils promote speciation and the evolution of serpentine endemism, contributing to unique biotas worldwide, including floras with high rates of endemism and species with disjunct distributions. Research on serpentine soil biota has contributed greatly to the development of ecological and evolutionary theory and to the study of the genetics of adaptation and speciation (Harrison and Rajakaruna, 2011). Plants growing on serpentine soils also provide genetic material for phytoremediation and phytomining: green technologies used to reclaim metal-contaminated sites and extract valuable metals from metal-enriched soils, respectively (van der Ent *et al.* 2015). However, most of our understanding of ultramafic plant ecology comes from Mediterranean and temperate biomes, raising questions about the generality of plant responses to ultramafic soils. This is especially the case in tropical ultramafic ecosystems which exhibit a wide range of endemism and differentiation between ultramafic and adjacent non-ultramafic soils. A team of 17 researchers from 11 countries, including the Geoecology Labs of the North-West University and the California Polytechnic State University, synthesized what is known about the ecology of tropical and sub-tropical ultramafic ecosystems in The Americas (Puerto Rico, Dominican Republic, Cuba, Guatemala, Costa Rica, Colombia, Venezuela, Brazil, Mexico, Nicaragua, Jamaica, Guiana Shield), Southern Africa (Zimbabwe, South Africa, Eswatini, Botswana, Cameroon, Angola, and Zambia), South and Southeast Asia (Sri Lanka, India, Malaysia, Indonesia, The Philippines), and New Caledonia, and highlight areas for future research in a comprehensive treatment in *The Botanical Review*, a leading international journal noted for its in-depth articles on a broad spectrum of botanical fields. The review illustrates how tropical and sub-tropical ultramafic floras are diverse and variable in plant form and function due to the interactive effects of biogeography, climate, and soil properties. It further stresses that the variability in patterns of endemism, specialization, and stress tolerance traits across tropical ultramafic ecosystems have implications for their management and conservation. Additionally, many tropical/subtropical ultramafic ecosystems that remain understudied are noted, including in Madagascar, Angola, Cameroon, and Zambia. While floristic diversity of outcrops in New Caledonia, Malaysia,

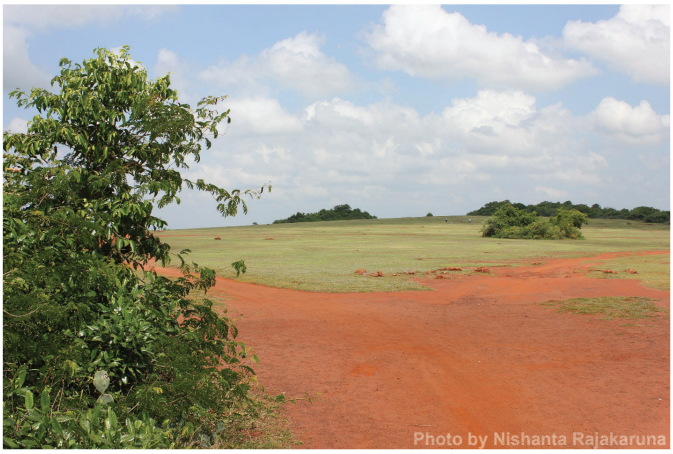

Figure 1a. Ussangoda Serpentinite Outcrop on the Southern Coast of Sri Lanka.

Figure 1b. Nickel hyperaccumulating *Evolvulus alsinoides* from Ussangoda Serpentinite Outcrop, Sri Lanka.

Figure 2a. Sassenheim Serpentinite Outcrop near Barberton, South Africa.

Figure 2b. Nickel hyperaccumulating *Berkheya nivea* from Nelshoogte Serpentinite Outcrop, South Africa.

Sri Lanka (Figure 1a, b), and South Africa (Figure 2a, b) are fairly well documented, there is limited research in experimental ecology or in evolutionary studies, compared to the Mediterranean. The authors hope to inspire collaboration among plant community ecologists, physiologists, geologists, and soil biologists to address novel tests of macroecological and macroevolutionary theories in topical ultramafic systems as has been done extensively in the Mediterranean and temperate climes.