

Critical Biogeography of Neotropical Mountains: A Panoptic Approach for Biocultural Microrefugia Conservation

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Abstract

The development of Montology as the convergent science of mountains requires paradigm shifts. One such about-face of ecological theory relates to terminology usage in biodiversity conservation; the trend is identified with new understandings about biocultural diversity, driven by both intangible heritage maintained in the tropical Andes, and the remains of monumental architecture recently discovered as tangible heritage of mountain cultures that lived in the Andean Amazonian flank. My position is to allow noetic science and critical toponymy to influence our understanding of biocultural diversity conservation needs, and to respond to new decolonial scholarship that puts critical biogeography and political ecology as explanatory of the ecological legacy shown in contemporary, sentient mountainscapes.

Introduction

The use of a unified theory of Neotropical mountains conservation mirrors current practice observed in the Amazon rainforest, the African savannah or the South Asian coves, based mainly in concepts of island biogeography and paradigms of nature pristine [1], where the emphasis on species-based priorities have now been replaced by ecosystem-based drivers, particularly those related to the utilization of ecosystem services [2].

There is growing evidence from allied fields pointing to the need of having a comprehensive approach emphasizing situated knowledge and site specificities to design conservation scenarios for the Neotropical mountains [3], particularly related to the use of appropriate terminology including toponymy to understand the essence of place. One important advance is the realization that these mountains, often shrouded in clouds harboring massive biota at every layer of the forest including the epiphytic garden and the canopy, are indeed hybrid mountainscapes, where the human impact has prompted a fused configuration of “natural” and “cultural” landscapes; these areas have been “manufactured” since ancient times as to generate a socioecological system that reflects important ecological legacies from millennia [4-6].

The use of the old terms to guide conservation initiatives relies in the affirmation that ecology is a natural science [7]. However, convergent scholarship has emphasized that ecology is the science that bridges science and society [8], hence it is a social science; just like economics, sharing the same etymology of Oikos, it generated a revised emphasis on the role of humans and the power relations to define the mountain socioecological system and decide whether a species or ecosystem should be conserved [9]. I argue that the wrong use of terminology has often misled our understanding of biodiversity and the priorities to set up the conservation toolbox when dealing with Neotropical landscapes.

Onomastics for biological inventories

The geographical and ecological misunderstanding of Neotropical mountains could be located in the mistaken epistemologies generated by colonial and neocolonial ontologies generated by the application of European concepts and taxonomies aligned to fit religious cannons and to satisfy the narrative of empires. After the ‘encounter’ of the Spaniards with the New World, the “mediterraneanization” of Neotropical mountains started with the introduction of exotic crops and cattle, along with practices for devastating mining for about two centuries before the first descriptions of the biodiversity of the region became known. When

Humboldtian views replicated the “alpine” structure and function of mountains in 1802, the Chimborazo landscape has been already changed significantly [10]. The manufactured “Andean” identity was misinterpreted as pristine ever since. At present, school children are taught about forests pointing at examples nearby in the forest plantations of *Eucalyptus globulus* and *Pinus radiata*; both are deemed as exotic invasive “green deserts” in current biogeographical literature [11]. Because of the biotic potential to sprout by stolons and rhizomes in the abandoned cropland and urban lots, the presence of the African Kikuyo grass (*Panicum clandestinum*) gives a false sense of “naturalness” to the different hues of green visible on tropical mountains sloped terrains.

Vernacular classifications

The loss of rich linguistic forms to describe nature has been the main casualty of the colonization of the Tropandean landscapes. Just like in Alaska the Inuit had many names to describe snow, so did the local Quixu yumbu to describe clouds, rain, and other phenomena of the Andean Amazonian flank in Ecuador. The Sachapuyu or “people of the clouds” in northeastern Peru likewise had a variety of practices developing cultivars and other material culture that was traded from the Amazon lowlands to the Pacific coast. The Kogi or “guardians of the earth” in the Sierra Nevada de Santa Marta, Colombia, continue traditional shifting terrace cultivation promoting local agrobiodiversity in ancestral ways. Also, in Eastern Bolivia and Northwestern Argentina, the people of the yungas still maintain their old ways to understand and use biodiversity [12]. This is why scholars now refer to biocultural diversity [13].

The imprint of humans is present even in the use of the name “Andes” to refer to the general cordillera of South America that in the vernacular Kichwa language, or runa simi, is referred to as *ritisuyu*. It has been demonstrated that by graphiosis, the Castilian shorthand for “Cordillera de los Andenes (o las Andenerías)” was written as *Cord. Andes* in the first chroniclers, that later motivated to explain the use of the word *anti* describing the people who lived in the *Antisuyu*, the eastern edge of the Inka Empire or *Tawantinsuyu* [14]. So, the name *Andes* itself, is denoting the essence of the cultural landscape of terraced topography.

With the mapping of the mountainous territory, Christian names were assigned to the different geographical attributes, which further confused the Andean identity. The local understanding of the communal relation of animals and plants with the Earth goddess or *pachamama* was lost due to the implantation of foreign names; the subjugated animistic understanding disappeared under the pressure of the Roman *Sanctorum* and the hegemony of German, French, British and Spanish scholarship, with little room for syncretism [15].

There is a revival of indigenous influences, as the popular acceptance of renaming geographic features with vernacular names; for instance, “lago San Pablo” is now known as *Imbakucha* lake. There is also a correction made in describing ethnic groups; for instance: the “colorados” are now known as *Tsachila*, the “aucas” as *Waorani*, or the “jibaros” as *Ashwar*. No longer the taxonomists can submit recently discovered new species to be named with their own last-name, or with the name of spouses or children, as in herpetological discoveries, not to mention insects, fungi or bacteria that are still being described by the dozens. Also, naming species in acknowledgement of the rich donor or the patron of the expedition that discovered the animal or plant is no longer appropriate. In most cases those individual were not even there or had never visited the site for which their names are honored for posterity. A recent example is the official change of the name *Mount McKinley* for the vernacular *Denali* in the United States of America, or the changing of the name of *Angel Falls* for *Karepakupay Meru* in the *Ayantepuy* of the Venezuelan *Guiana Shield*. Also, in Venezuela, *Christopher Columbus Day*, or *Day of Hispanic Heritage*, has been officially changed to *Day of the Indigenous Resistance*. Throughout the Neotropics, indigenous revival is witnessed also in the popularization of their ways, such as cultivation of organic crops, tendering the newborns or even giving birth, and treating the elements of the home range with homeopathic medicine and animistic rituals [16]. A clue of this new conservation imperative result in the integration of Andean cosmology, fusing mental, corporal and spiritual domains with conservation value, which for the Japanese is called *Suitogaku*, and for the Quechua people is *Ayni*, the reciprocity between the body, mind and spirit, exemplified with the trilemma of Andean identity (Figure 1).

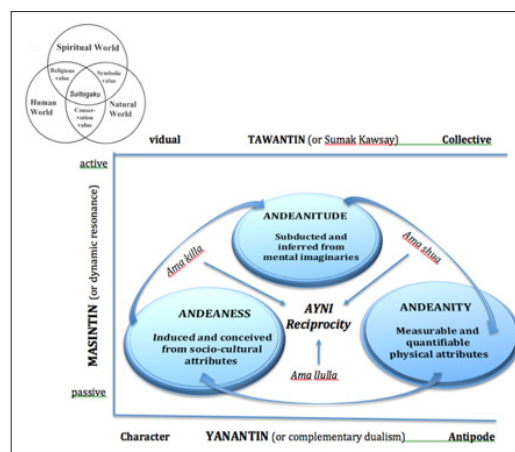


Figure 1:

A matter of convergent lingo

In the new era of landscape ecology and political ecology, there is a need to have a convergent approach to conserve biodiversity, one that includes the need of a holistic instead of a reductionist trend [14], with the panoptic approach of biocultural diversity conservation. One of the easy transitions in this pathway is to

substitute the prefix eco-(as in ecosystem, for the term is dead or zombie [17]) for the more comprehensive suffix-scape (as in landscape, for the term is popularized [18]) to allow the panoptic angle. Defining "scape" is challenging, as it is a complex, adaptive notion that could be best described as an sphere, due to the many variables that encircle the argot, both from tangible and intangible factors (Table 1).

Table 1:

| TERM -SUFIX | Explanation of Spheres |
|---------------|---|
| Aidscape | The sphere of institutions that provide help in case of disaster relief or poverty alleviation. |
| Bankscape | The sphere of financial institutes and banks that provide financial support to conservation programs as investment, profit seeking |
| Beachscape | The sphere of material elements and imaginaries that create the sense of place in a seashore flat surface |
| Carescape | The sphere of institutions that provide health and related wellbeing support to people or other than people in ravaged landscapes |
| Circuitscape | The sphere of connections, nodes, transistors that made the cybernetics operate successfully in the system |
| Cityscape | The sphere of material elements and imaginaries that create the urban space and appropriate city like behaviors |
| Culturescape | The ethnosphere of diverse groups of people and their tangible and intangible heritage |
| Disasterscape | The sphere of factors and processes that create risk and generate catastrophic outputs |
| Dunescape | The sphere of desert elements and imaginaries that create the sense of place of dunes as moving mountains |
| Farmscape | The sphere of rural elements and imaginaries that create the sense of place of agricultural production and livestock rearing lifestyle |
| Fearscape | The sphere of emotions and imaginaries that generate fear and dark outlooks in dangerous situations |
| Filmscape | The sphere of material elements and imaginaries that create de visual categories of video production |
| Firescape | The sphere created by burning the physical elements of the system and the consequences of pyromaniac or wildfire behaviors |
| Foodscape | The sphere of material elements and imaginaries that create food hubs, food deserts and food supply to humans |
| Forestscape | The sphere of material elements and imaginaries that create the sense of place of forests including the biota and particularly trees |
| Fundscape | The sphere of donors and funding sources that exist to support applied research for conservation and development |
| Greenscape | The sphere of material elements and imaginaries that create the sense of place of intelligent design and environmentally friendly buildings and structures that minimize negative impacts |

| | |
|----------------|---|
| Hardscape | The sphere of material elements and imaginaries that compose the sense of difficult situations or risky and dangerous processes |
| Hazardscape | The sphere created by situations conducive to high risk of disaster, including institutions, construction materials, building design and educational level of the people |
| Heartscape | The sphere of emotions and imaginaries that generate love and bright positive outlooks in romantic situations |
| Hellscape | The sphere of material elements and imaginaries that create a sense of place of chaotic behaviors with negative consequences |
| Historyscape | The sphere of material elements, artifacts and imaginaries that create a sense of place of congruent historicities |
| Humanscape | The sphere of material elements and imaginaries that create the sense of place of artificial, often manicured spaces |
| Ideascape | The sphere of thoughts, emotions and imaginaries that create a sense of place of innovation, comfort and discoveries |
| Inscape | The sphere of mental capacities to integrate the information captured from the exterior by the senses that allow for the creation of a particular and individual image of reality |
| Knowledgescape | The sphere of material elements and imaginaries that create a sense of place where different ways to learn converge to generate new ontologies and epistemologies |
| Landscape | The sphere of material elements and imaginaries that create a sense of place where you can grasp in a gaze the phenotypic and cryptotypic manifestations of reality |
| Langscape | The sphere of material elements, diverse practices and vocabularies that create a sense of place of common corpus for communication |
| Legalscape | The sphere of formal procedures, institutes and coded articles that create a sense of justice and security |
| Linkscape | The sphere of material elements and imaginaries that created a sense of connectivity and connectance of the system |
| Literaryscapes | The spheres generated by writing about real or imaginary places and epochs, including the tools of the trade and the resulting publications |
| Mindscape | The sphere of material elements and imaginaries that create a sense of self with unique psyche and ways to interpret reality |
| Modernscape | The sphere of material elements and imaginaries that create a sense of place of progress and state-of-the-art tools and environs |
| Moonscape | The sphere of material elements and imaginaries that create a sense of place of death, desolation and often derelict spaces |
| Mountainscape | The sphere of material elements and imaginaries that create a sense of place of vertical space and altitudinal adaptations |
| Mudscape | The sphere of material elements and imaginaries that create a sense of place of dilapidated, melted muddy situations |
| Musicscape | The sphere of material elements and imaginaries that create a sense of place of melodic and rhythmic productions generating specific types of identities or genera |
| Officescape | The sphere of material elements and imaginaries that create a sense of place where jobs require a desk and tools of the trade |

| | |
|---------------|--|
| Playscape | The sphere of material elements and imaginaries that create a sense of place of joyful entertainment and amusement |
| Politicscape | The sphere of public approaches for the common good generating the identification of special tendencies in relation of governance and social management |
| Religiouscape | The sphere of material elements and imaginaries that create a sense of place of spirituality, rituals and dogmatic understanding of realities |
| Riskscape | The sphere of material elements and imaginaries that create a sense of place of insecure and dangerous situations |
| Riverscape | The sphere of material elements and imaginaries that create a sense of place of riparian and riverine environs with flowing water |
| Ruinscape | The sphere of material elements and imaginaries that create a sense of place of abandoned structures or forgotten buildings |
| Skyscape | The sphere of material elements and imaginaries that create a sense of place of contemplation of celestial and ethereal situations |
| Seascape | The sphere of material elements and imaginaries that create a sense of place of marine environments with salt water |
| Soundscape | The sphere of material elements and imaginaries that create a sense of place of audible and communicative situations |
| Southscape | The sphere of material elements and imaginaries that create a sense of place of poverty and underdevelopment situations |
| Terracescape | The sphere of material elements and imaginaries that create a sense of place of slope terrains with echelon-like adaptations |
| Viewscape | The sphere of material elements and imaginaries that create a sense of place of concordant points of view or ways of seeing |
| Worldscape | The sphere of material elements and imaginaries that create a sense of place of global interconnectedness and immediacy mediated by international flows of hegemonic power relations |
| Xeroscape | The sphere of material elements and imaginaries that create a sense of place of desertic, water deprived situations |

When dealing with biodiversity, the traditional approach is to look at an individual ecosystem or even an individual taxon for in-situ conservation. The use of zoos, botanical gardens, and eco-museums has favored ex-situ conservation protecting the most endangered exemplars. Furthermore, the traditional debate of SLOSS (Single Large Or Several Small) has often favored the establishment of huge tracks of “untouched wilderness” in massive National Parks or equivalent protected areas reserved for “nature alone”. Moreover, the tendency of joining those big spans of land with biological corridors to increase the protection area has prompted Connectivity Conservation to become a hot specialty in the business. However, I argue for the need to incorporate biocultural diversity that has been maintained within microrefugia as the last nursery of potential regenerative development options [19]. The remnant forest

patches of the once-continual Andean forest slopes are evidence of the need to manage them with priority given that they also house specific cultural traits, such as domesticated cultivars, heirloom practices, intangible heritage of food preparation or other cultural manifestations, and other quality of the rural lifescape. Within the matrix of hybrid culture-nature spaces, the use of microrefugia to prioritize biocultural diversity becomes imperative [20]. There must be ways to incorporate microrefugia in the national systems of protected areas, such as using the classification of Category V of IUCN for Protected Cultural Landscapes, or similar attempts aimed to incorporate the biocultural heritage conservation as in certain local or country-level conditions. Here, I am suggesting an innovative classification taking into consideration the trilemma of Andean identity applied to the case of Ecuador (Table 2).

Table 2:

| Andes | Ecuador | Description | Subcategories |
|-------------|------------------------------------|---|--|
| Andeanity | Fundamental Ecuador: Ecuatorianity | Physical characteristics of the environ, with tangible elements linked to visual attributes of morphological detail and aesthetic value | Geocological corridor Natural monument Production landscape Civic reservation Urban landscape SocioEcological System |
| Andeaness | Constructed Ecuador: Ecuatorianess | Mental characteristics of the ambiance, with intellectual elements linked to rational attributes of psychologic and logic construction | Routes and Expeditions Literary landscape Recreational area Culinary landscape Musical landscape Industrial landscape |
| Andeanitude | Deep Ecuador: Ecuatorianitude | Metaphysical characteristics of the environment, with intangible essence linked to spiritual attributes of religious symbolism, myth and sacred ethic | Memory landscape Sacred site Spiritual park Religious reservation Cultural monument Ancestral landscape |

As a fade of scientific communication outlets, the use of the prefix eco-had filled pages of newspapers and technical reports in relation to everything related to the Neotropical mountain environment. In the same token, it is expected that the stories told about climate change and global environmental decline will assume the use of the suffix-scape to give the idea of a panoptic approach of montology, filling the pages of mass media, specially online social media outlets and blogs about the Tropandean landscapes.

Conclusion: Transdisciplinarity in Biodiversity

The new wave of conservation, based in poverty alleviation and environmental justice, has superseded the previous waves of conservation based in sustainable development, ecosystems and species targets. The fusion of the nature-culture hybrid category represents a realization that the biocultural diversity of manufactured Tropandean landscapes should be preserved with the people, instead of away from people; for the locals instead of for the tourists; for the autonomous administration instead of centralized government; and, for the microrefugia instead of large tracts of protected areas. Incorporating the remnant patches as private reserves, municipal parks, communal forests, or heritage sites is a sound alternative to include the panoptic approach in conserving biocultural diversity in sentient mountainscapes.

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