From Scientists Concerned for Reserva Los Cedros and the Cordillera de la Plata

On March 6, 2017 the Canadian mining company Cornerstone Capital Resources Inc. entered into mining concession with Ecuador's State Mining Company, ENAMI[1] that affects a large area of primary forest of the Tropical Andes in the Ecuadorian Chocó. Much of this forest is protected by the Ecuadorian State, including the Reserva Los Cedros[2] and the entire Cordillera de la Plata. **Because these forests are protected, this mining concession is illegal.**

Together, these include some of the last major unlogged watersheds in all of Western Ecuador, in one of the most biodiverse regions on earth[3]. We, the undersigned scientists, contend that the value of this intact watershed is far greater than that of any possible mineral wealth that lies beneath it. This area should not have been placed in a mining concession and should remain a protected area.

Rio Los Cedros. Photo by Michael Wherley

Cloud forests harbor exceptional biodiversity[3]. The Reserva Los Cedros is well known for its critically endangered brown-headed spider monkeys (*Ateles fuscicepes*)[4,5], but there are many other rare large mammals there too, including: the neotropical otter (near threatened, NT), margay (NT), puma (NT), jaguar (NT), and spectacled bear (vulnerable, V)[6,7]. Smaller animals[8,9], and insects abound[10-17] as well as fantastic frogs, almost all rare and found only in the local cloud forests[18-20]. For example, the recently described rainfrog, *Prisimantis mutabilis,* is only known from two streams, one of which is in Reserva Los Cedros[19]. This remarkable frog is able to change its skin texture, a feature never before seen in frogs[19].

Reserva Los Cedros is a bird hotspot[21]. At least 298 bird species have been seen[21] on the difficult to get to and deliberately short (to maintain unbroken forest) trail system, including numerous species found only in the cloud forests of the Chocó region[6,22], secretive species like the lanceolated monklet [23], and very recently described species such as the cloud forest pygmy owl[24]. In addition, these forests harbor a number of neotropical migrants that summer in Canada and the US, such as Swainson's thrush and many warblers, whose populations depend on having winter habitat. Of the birds seen at the Reserve, at least 10 are endangered, threatened, vulnerable, or near threatened due to habitat loss[6].

Research from Reserva Los Cedros shows that the forest is extraordinarily rich in plant species. A field study estimated that there are 299 tree species per hectare[5], and many plants in the forest are local endemics with small ranges[25-36]. Because of the clouds and rainfall, there are numerous epiphytic plants growing on the trees at all levels of the canopy [37,38], including an estimated 400 orchid species[6], many of which were described for the first time from the Reserve[39-42]. This plant diversity in turn supports diversity of other organisms. Fungi abound in the forest as decomposers of the trees and other plants, or

symbiotic mycorrhizal associates [43,44]. The fly pollinators of *Dracula* orchid species, most of which are themselves new species [12,45,46], spend part of their lives in mushrooms. The complexity of plant interactions and yet-to-be discovered life in these forests is staggering.

In 2000, it was estimated that more than 96% of the forests in western Ecuador had been deforested[3], more has been lost since then, and now the few remaining protected areas are being threatened. The biodiversity in this last intact watershed is remarkable, yet most of it remains to be discovered and understood. Mining represents a short-term investment with great long-term costs to the people of Ecuador. We cannot maintain the illusion that mining can be done without grave ecological and human health consequences, consequences that are well documented in scientific literature[47-54]. As water resources throughout the world come increasingly under pressure, unlogged watersheds such as that of the Los Cedros river are accordingly precious.

The value of the biodiversity of Reserva Los Cedros and surrounding region to the people of Ecuador and the world is extraordinary. Ethical, ecologically-minded bioprospecting by Ecuadorian researchers of the vast diversity of primary forests like those of Reserva Los Cedros could bring long-term economic returns to the people of Ecuador and scientific and medical rewards for all of humanity. For example, a recently described species found at the Reserve, *Cuatresia physalana*[34], is related to tomatoes and potatoes and thus may contain genetic materials valuable for agriculture. Furthermore, *Cuatresia* are known to contain anti-malarial compounds[55,56].

Responsible development of the region's infrastructure, with an eye for long-term sustainability, education, ecotourism, and research represents a more sustainable way forward for Ecuador's last uncut cloud forests, and the people who call them home. This is a model of development at which Ecuador has excelled in the past: the country today reaps benefits both for its own economy and the international community at large with its careful management of the Galapagos Islands. In 2008 Ecuador set a new moral standard for the world, when the National Assembly included the rights of Nature in the Constitution of Ecuador[57,58], articles 72–74. We, the undersigned, hope that Ecuador understands and seizes this opportunity to honor their commitment to the natural world, and to future generations of Ecuadorians.

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