

# Protectors of diversity and life as we know it.

Bevarare av mångfald och livet som vi har. / Los protectores de la diversidad y la vida tal como la conocemos.

---

Vasilisa Forsgren

vasilisaforsgren@gmail.com

Biological diversity, or biodiversity, is the variety within and between species; plants, animals and everything in between that constitute the natural environment.

Biodiversity comprise the basis for our ecosystems and all of its functional traits. (Cardinale et al., 2012). Modern life, and societies' continuously growing demand for material well-being, is dependent upon the biosphere's natural capacity to provide resources and services (Galli et al., 2014). This means that biodiversity is a fundamental aspect to our present-day life on earth, or as one group of scientists put it; “[b]iodiversity is the variety of life” (Cardinale et al., 2012:60). However, there is a growing concern regarding the industrial agricultural expansion, driven by present day per capita consumption levels, and the direct correlation to the loss of biodiversity (Boron et al., 2016).

On the spectrum of local to global, human created land change and overuse of ecosystems is the main factor for degradation of biodiversity (Armenteras et al., 2011; Boron et al., 2016; Etter et al, 2006). The globalization of the agricultural sector, specifically the industrial expansion, driven by export-oriented policies, is a phenomenon with serious environmental and socio-economic consequences (Boron et al., 2016). The inconvenient truth is that the consequences are distributed unevenly, and the negative impacts are felt most severely by those who had least to do with the cause (Armenteras et al., 2011; Etter et al, 2006; Galli et al., 2014). Some studies have revealed alarming findings in relation to the impacts of biodiversity loss, showing that the effects could be sufficiently large to be of comparable magnitude to the impacts of, for instance,

climate warming, ultraviolet radiation, acidification and certain forms of nutrient pollution (Cardinale et al., 2012). These are distressing facts, but human activities have not always been overexploiting natural capital stocks. In 1961 most countries consumption demand did not strain their own ecosystems, nor others. (Galli et al., 2014). This means that ecological overshoot (i.e. overuse of ecosystems on a global scale) is not an inherent condition of human life on earth. Yet, most recent available data estimates that 86% of the world's total population, currently, live in a country that demands more from nature than the local ecosystem can regenerate, thus creating an ecological deficit (Global Footprint Network, 2018).

Coupled with this, is the upsetting reality that the regions that have experienced the most rapid loss and severe degradation of their natural environments due to this land use transition, are the tropical ecosystem areas, where most of the world's concentration of biodiversity is found (Armenteras et al., 2011; Etter et al, 2006). One of which is the Tropical Andes (TA) region in Colombia, Latin America (Bax & Francesconi, 2019; Boron et al., 2016; Etter et al., 2006), home to essential tropical forests that constitute key systems for a large share of life on earth, being both environmental, social, cultural and economic aspects (Armenteras et al., 2011). Colombia is a mega-hub of diversity, both biological and social (Etter et al., 2006; Nemogá, 2014), of which both are threatened by extinction. Historical processes marked by foreign economical interests, policy injustice, and armed conflicts<sup>1</sup>, are some of the

---

<sup>1</sup> In reference to Colombia's current post-conflict transition after about 60 years of armed conflict with several parties involved, e.g. the national

factors that have contributed to natural and human degradation (Parraguez-Vergara, 2018; Rodríguez et al., 2020). By the twenty first century, only 39,5% of the natural cover in the Colombian TA region remained (Armenteras et al., 2011), and of Colombia's 102 native groups, 35 are on the verge of disappearing (Parraguez-Vergara, 2018). These figures should make us question the current global system and our participation in it. Recognizing the human induced environmental impacts, the earth's ecological limits and the essence of the natural ecosystem for human life, acknowledges the need to conserve our diversity, both biological and socio-cultural. (Galli et al., 2014).

### **BIOLOGICAL DIVERSITY AND OUR BEING**

The importance of biodiversity, and conservation of this diversity, was internationally recognized already 30 years ago, along with the negotiation, adaptation and formation of the Convention on Biological Diversity (CBD) (Cardinale et al., 2012; Nemogá, 2014). The CBD is in intergovernmental agreement between 193 countries to support conservation of biodiversity, sustainable use of resources and fair share of benefits derived from nature (Cardinale et al., 2012). Subsequently, international law acknowledged the contribution of indigenous peoples and local communities' in conserving biodiversity, and called for states to ensure their protection. Unfortunately, in Colombia and other megadiverse countries, the normative standards of human rights practice established to protect the cultural richness and safeguard the life of indigeneous and local communities', living in harmony with the natural environment, remained largely undervalued. (Nemogá. 2014). The Colombian context is representative of the situation and dominant trends in countries, with similar degree of rich biological and socio-cultural diversity, that have tried to protect their sovereign rights, but where national policies have fallen short in relation to the bargaining power of transnational capital (Nemogá, 2014). One part of the problem is that national policy frameworks and agenda is, while controlled by the national government, influenced by international

trends. One of which has been the globalisation and industrialisation of the agricultural sector. (Boron et al., 2016). A telling example of the effects of external pressures is the European growth in global trade fair and displacement of land use. Over the past few decades, in part because of technological advancements, various countries across the European continent have experienced an accelerated international trade flow. While local ecosystems have experienced the impacts positively in reduced pressure on natural resources, ecosystems outside the European borders have suffered loss in biodiversity. (Galli et al., 2014).

Loss of biodiversity (i.e. reduction of variety and number of genes, species and functional groups of organisms) affects ecosystem functions and services negatively<sup>2</sup>. It weakens natural resilience, diminishes functional traits, efficiency and productivity. One example is the effects of a large variety of trees in a forest, in which such plant diversity increases above ground carbon sequestration, or simply put carbon storage. This is because of a forest, then greater, service capacity to generate higher levels of biomass production. The capacity of a forest to store carbon is thus not only based on the amount of trees, but more importantly on the diversity and variety among trees. (Cardinale et al., 2012). In effect, when humans extract more wood than forests can regrow, deforestation is advanced and CO<sub>2</sub> accumulates in the atmosphere, contributing to global warming (Galli et al., 2014). Besides effects on a global scale, destruction of forests can lead to issues of e.g. soil erosion, landslides and habitat destruction, that has regional and local impacts, damaging natural and human livelihoods. (Armenteras et al., 2011; Etter et al., 2006).

Since the 1990s, empirical evidence has consistently raised concern about the growing decline of biodiversity (Cardinale et al., 2012; Galli et al., 2014), with anthropogenically<sup>3</sup> driven changes constituting the leading

<sup>2</sup> Ecosystem functions are ecological processes (e.g. decomposition) and ecosystem services are provisioning or regulating (e.g. pollination by bees, or carbon sequestration by trees). (Cardinale et al., 2012)

<sup>3</sup> Anthropogenic change is defined as change driven by human demand on the biosphere. For instance over extraction of natural resources (e.g. food, fiber, energy or materials) for human consumption, disposal of toxic waste

government, the Revolutionary Armed Forces of Colombia (FARC), paramilitary groups and the National Liberation Army. For an elaborative and descriptive account, see Rodríguez et al., 2020.

cause of global biodiversity loss (Armenteras et al., 2011; Bax & Francesconi, 2019; Boron et al., 2016; Etter et al., 2006; Galli et al., 2014). Some conservative estimates indicate that the current rate in which species are forced to extinction are about a hundred times higher than in the absence of humans. Additionally, between the years of 1990-2010, 1,6 million km<sup>2</sup> tropical cover was lost due to deforestation (Bax & Francesconi, 2019). That is about the size of Sweden, **multiplied by 3,5**. In much of Latin America, deforestation and loss of biodiversity has been exacerbated as a result of globalisation processes and intensive industrial agriculture (Etter et al., 2006). While the industrial agricultural expansion has increased global food production and economic development, it has also aggravated habitat fragmentation and social inequalities (Boron et al., 2016; Galli et al., 2014). Besides being a main cause of biodiversity loss worldwide, industrial agriculture is also a villain in other aspects of environmental degradation. For instance in terms of a) global greenhouse gas emissions (estimated to account for one third of all emissions); b) being the most intensive user of freshwater; and c) having extensive impact on global nutrient cycles, water quality and ecosystems due to extensive use of toxic chemicals. (Boron et al., 2016). The uncomfortable truth is that the most devastating effects, both natural and social, are not felt by those that make up the largest share of the consumption bulk (i.e. consumers of importing countries in the western hemisphere), but the ecosystems and peoples of the tropical regions. (Armenteras et al., 2011; Etter et al., 2006; Galli et al., 2014).

#### THE CLOUD FOREST IN THE TROPICAL ANDES - A BIOLOGICAL AND CULTURAL HOTSPOT

Rigorous measurements of biodiversity are difficult to ensure, however richness, evenness and heterogeneity<sup>4</sup> are three commonly used measures of biodiversity (Cardinale et al., 2012). There are 25 areas in the world referred to as the world's biodiversity hotspots. These hotspots are

---

or disruption of natural ecosystems by urbanisation and human infrastructure. (Galli et al., 2014).

<sup>4</sup> Richness is a measure of the number of unique life forms; evenness is a measure of the equitability among life forms; and heterogeneity is the dissimilarity among life forms (Cardinale et al., 2012).

characterized by their extraordinary richness of endemic<sup>5</sup> plants and animals, while simultaneously being exposed to severe loss of biodiversity. The leading hotspot in terms of endemic species is the Tropical Andes (TA) region, that covers areas of land from the north of Chile and Argentina, through Bolivia, Peru, Ecuador, Colombia and Venezuela. The TA ecosystem is estimated to be home to around 45,000 plants and 3400 animal species, of which nearly half of these species are endemic to the region. (Bax & Francesconi, 2019). Beyond the rich biodiversity, the region's cultural diversity is remarkable. The TA region is home to more than 40 different indigenous groups, in addition to numerous campesino communities<sup>6</sup>. (Corporacion Serraniagua, 2019). Across Latin America, and notably in the rural setting of Colombia, the indigenous and campesino communities (*hereafter referred to as the local peoples*) constitute a crucial part of the food production and dynamism of local and regional markets, contributing between 30% and 40% to the regional GDP in Colombia (Parraguez-Vergara, 2018). In addition to making use of traditional knowledge of agriculture, which recognises nature and culture, the local peoples of the land are of great importance in biodiversity conservation (Corporacion Serraniagua, 2019).

The cloud forest along the pacific slopes of Colombia is one of the epicentrum of endemism of the TA region. By virtue of the topographical alterations of the andean slopes, the cloud forest with its isolated patches (e.g. valleys and mountain tops), hosts a biological diversity that is recognized as one of the most vulnerable against anthropogenic threats in the region (Armenteras et al., 2011; Bax & Francesconi, 2019). Located within the cloud forest, one of the most biodiverse regions in the world, is the **Serranía de los Paraguas**; a biodiversity conservation priority of global importance. It is a mountainous area with a

---

<sup>5</sup> Species endemism is often used as a measure of irreplaceability, as endemic species are found in areas for which no corresponding replacement exists elsewhere. Vulnerability reflects the likelihood that a species will be extinct in the future as a result of human made impact. (Bax & Francesconi, 2019).

<sup>6</sup> Campesinos and campesinas as non-indigenous people who live and work regularly in the field (Parraguez-Vergara, 2018).

rich network of essential river systems, forming the natural boundary between Valle del Cauca and Chocó. (Corporacion Serraniagua, 2020a). The tropical forest surrounding the Serranía de los Paraguas is an important source of ecosystem services that provides key aspects of social, cultural and economical components of life. The mountainous area is a substantial influence to the hydrological cycle, providing essential flows of water to populations and settlements at both high and low altitudes. (Armenteras et al., 2011). Due to the exceptional biological diversity and burdened vulnerability, some areas have been established as protected lands (Corporacion Serraniagua, 2020b), however only about a tenth of all land is nationally protected, and more need to be in order to guarantee effective protection (Armenteras et al., 2011)

The quintessence of conserving biodiversity and recognizing current unsustainable means of consumption can be summarised by that: *“our well-being depends on the well-being of our natural capital. As long as humanity’s metabolism of the earth’s resources continues to outstrip the rate at which nature can regenerate the resources, biodiversity – and the entire human enterprise – will come increasingly and ever more perilously under threat.”* (Galli et al., 2014:130). While there are several systematic and underlying causes that contribute to the difficulty in reconciling socio-economic development and biodiversity conservation (Boron et al., 2016), a large share relates to the growth of industrial agriculture, that has formed the current global food production (Parraguez-Vergara, 2018).

#### **AGRICULTURE AND MECHANISMS OF CONTROL**

Today, two main food production systems coexist, the ‘modern’ agricultural system (i.e. industrial agriculture) and traditional agricultural systems (i.e. family based customary farming). (Parraguez-Vergara, 2018). The former favors transnational capital interests and fuels the exploitation of biological resources and traditional knowledge, while continues to disregard ethnic and cultural diversity (Nemogá, 2014; Parraguez-Vergara, 2018). Whereas the latter is based on traditional knowledge and practices that have been developed in harmony with the natural

environment. Regrettably, it is the former that controls global food production while damaging the natural and social diversity across many regions, not the least in Colombia (Boron et al., 2016). A very evident way in which industrial agriculture practices and principles have crusaded over local ecosystems and peoples is that 60% of agricultural land across the globe is in the twenty first century cultivated for only five monocultures<sup>7</sup>. Additionally, a large share of the industrial agro-production is either exported, fed to cattle or used as biofuel, which further reduces peoples’ access to food produced locally. (Parraguez-Vergara, 2018). This undermines the rights of local communities and renounces the interaction between culture and environment as central to conservation of biodiversity, sustainability and integrity of humans and nature alike (Nemoga, 2014).

The globalisation of the food systems have also resulted in higher degree of dependency amongst countries on the global market, and more specifically on the import of foods that they previously produced for themselves. (Galli et al., 2014; López et al., 2019). Colombia was actually a relatively self-sufficient food nation before the 1990s, but is, like a majority of other countries, today a net importer of many foods. There are several factors that have contributed to this development, one of which is the introduction of rigorous neoliberal policies and an foreign ‘business as usual’ attitude. (López et al., 2019). More specifically, the Colombian socio-environmental diversity has been pushed to the margins of existence, in part, due to international enforcement of intellectual property rights (IPRs) and the national implementation of such frames under the Free Trade Agreement (FTA) with the United States. (López et al., 2019; Nemogá, 2014). To elaborate, during the twentieth century, the United states together with some countries from the European continent, collected seeds and plants for scientific purposes. Much of the scientific ‘progress’ made in transforming these plants followed by patent taking, which further imposed monopolistic ownership rights over plants that was strengthened by legal frames; in essence the

<sup>7</sup> These five monocultures consist of; wheat 22%, maize 13%, rice 11%, barley 9% and soy 5% (Parraguez-Vergara, 2018).

fundamental basis of the intellectual property regime. (López et al., 2019; Nemogá, 2014). Within this system, access to plant varieties was restricted due to the fact that patent holders had monopoly on use, transfer, commercialisation and production. The result was that by the end of the twentieth century, the seed and food market was controlled not by the countries of origin, but by top agribusiness companies that were from countries that had developed a technological and legal platform (i.e. IPRs) to control them. (Nemogá, 2014). By and large, the main aim of producers under the industrial agricultural system has been to secure high economic gains (Nemogá, 2014; Parraguez-Vergara, 2018), and the mechanism of control for the purpose; industrial seeds, monoculture and agrochemicals (López et al., 2019). In effect, the industrial agricultural economy began already in the previous century, its path towards becoming one of the main causes of biodiversity loss (Parraguez-Vergara, 2018).

The industrial agricultural sector, with commodification and monopolization of seeds<sup>8</sup>, continues to constrain and compromise conservation goals, but there are those who represent the other side of the coin, the side that embodies idealism and possibility. It is the local peoples' continuous effort to protect, preserve and cultivate land in harmony with nature.

#### **THE LOCAL PEOPLES - PROTECTORS OF DIVERSITY**

Local peoples have a long history of creating and living in dynamic ecological-economic equilibrium between community and nature (Corporacion Serraniagua, 2020b; Rodríguez et al., 2020). In contrast to industrial agriculture, traditional agricultural systems do not use genetically modified varieties that are dependent on agrochemicals. Its aim is self-sufficiency, with any surplus to be sold or exchanged with others, thus it is neither driven by monetary richness nor is it exploitative of biodiversity. (Parraguez-Vergara, 2018). Not only does traditional agriculture symbolize respect and gratefulness to the natural environment, much empirical evidence highlighting the link

between local peoples and their contribution to biodiversity conservation, in which women play a fundamental role (Corporacion Serraniagua, 2020b; López et al., 2019; Nemogá, 2014; Rodríguez et al., 2020).

Local peoples are the primary keepers of knowledge about the particularities and needs of megadiverse countries such as Colombia (Nemogá, 2014; Rodríguez et al., 2020). The hereditary practices of local peoples are grounded in an understanding of the natural environment through experience (Corporacion Serraniagua, 2020b; Nemogá, 2014; Parraguez-Vergara, 2018). It is the experience nested in the local natural environment that forms the traditional ecological knowledge, practical skills and techniques about how to make use of the various components of nature for food, medicine and as material for construction. With knowledge passed from one generation to another, local peoples have developed innovative technologies to underpin traditional practices with respect to the natural capital, e.g. making use of earthworm compost or organic liquid fertilizers to fertilize the soil. (Parraguez-Vergara, 2018). Besides generating prosperous yields, such innovations can also result in stabilizing soils, regulating water flows, providing habitat for pollinators and other essential ecosystem services (Rodríguez et al., 2020). This knowledge can be of great value to resolving the global issues of today, such as how to achieve food sovereignty, approaches for sustainable water and ecosystem management, or soil conservation (Parraguez-Vergara, 2018). That is why they are key players in transforming the economical, social as well as cultural determinants of the current exploitation of biodiversity. (Nemogá, 2014).

Still, the rich biocultural heritage of local peoples are challenged by the pressures of 'modernity'. National programmes and subsidies continue to incentivize commercial monocultures<sup>9</sup>, which in part explained why some decide to shift towards industrialised agricultural practices with the usage of genetically modified seeds and

<sup>8</sup> For an excellent account on the importance on native and creole seeds see López et al., 2019.

<sup>9</sup> In the whole of Latin America, government programmes and subsidies promote the same 10 different monocultures. They are avocado, rice, banana, coffee, sugar cane, beans, maize, mangoes, potatoes and wheat. (Parraguez-Vergara, 2018).

synthetic agrochemicals. (Parraguez-Vergara, 2018). Sadly, this shift often makes local peoples dependent on the industrialised agricultural system with continuous demand for accompanying infrastructure, and ultimately highly vulnerable to global market fluctuations in prices. (López et al., 2019; Parraguez-Vergara, 2018). Acknowledging the importance of preserving traditional agricultural systems, and the fundamental role women have in the practices, is synonymous with understanding their importance to conservation of biological and socio-cultural diversity. Acting on that recognition is, hopefully, taking a step towards a change that supports the capacity of the biosphere to provide for humanity today and for time to come.

### Disclaimer

As an intern this is not a research article nor does the text aim to be a scientific contribution. It is a descriptive account and personal comprehension of a current issue based on a selection of other authors' findings and opinions.

### Acknowledgement

Serraniagua was created in 1996 as a civil society organization to conserve the Serranía de Los Paraguas. Today they bring together more than 30 community nature reserves, and a constantly growing number of local peoples through several cultural collectives, associations of agroecological producers and networks of women. As an intern I am grateful for the opportunity to learn from them, and their valuable perspectives and knowledge. This is made possible because of a learning exchange programme between Serraniagua in Colombia and Future Earth in Sweden.

Future Earth is an international network that supports development initiatives that are socially and environmentally just. Without the continuous effort of its members and the people who constitute the organisation, I would not have had this opportunity, and for that, and much more, I am thankful.

### References

- Armenteras, D., Rodríguez, N., Retana, J. & Morales, M. (2011). Understanding deforestation in montane and lowland forests of the Colombian Andes. *Regional Environmental Change*, 11(3), pp. 693–705.
- Bax, V. & Francesconi, W. (2019). Conservation gaps and priorities in the Tropical Andes biodiversity hotspot: Implications for the expansion of protected areas. *Journal Of Environmental Management*, 232, pp. 387–396.
- Boron, V., Payán, E., MacMillian, D. & Tzanopoulos, J. (2016). Achieving sustainable development in rural areas in Colombia: Future scenarios for biodiversity conservation under land use change. *Land Use Policy*, 59, pp. 27-37.
- Cardinale, B. J., Duffy, E., Gonzalez, A., Hooper, D. U., Perrings, C., Venail, P., Narwani, A., Mace, G. M., Tilman, D., Wardle, D. A., Kinzig, A. P., Faily, G. C. Loreau, M., Grace, J. B., Larigauderie, A., Srivastava, D. S. & Naeem, S. (2012). Biodiversity loss and its impact on humanity. *Nature*, 486, pp. 59-67.
- Corporacion Serraniagua, 2018 Bulletin N 30 year 2018.
- Corporacion Serraniagua, 2019. Bulletin N 31 year 2019. [pdf] Available at: [https://c24f7ec1-9f3a-429d-9b08-159cb4743c91.filesusr.com/ugd/688985\\_3bfd447084e74deb955cf9e3a49c6c37.pdf](https://c24f7ec1-9f3a-429d-9b08-159cb4743c91.filesusr.com/ugd/688985_3bfd447084e74deb955cf9e3a49c6c37.pdf)
- Corporacion Serraniagua, 2020a. Serranía de los Paraguas: entre los Andes Tropicales y el Chocó biogeográfico. (online) <https://www.serraniagua.org/serrania-paraguas>
- Corporacion Serraniagua, 2020b. Declaratoria de la Serranía de los Paraguas. (online) [Accessed ] Available at: <https://www.serraniagua.org/declaratoria>
- Etter, A., McAlpine, C., Pullar, D. & Possingham, H. (2006), Modelling the conversion of Colombian lowland

ecosystems since 1940: Drivers, patterns and rates. *Journal of Environmental Management*, 79(1), pp. 74–87.

Galli, A. Wackernagel, M., Iha, K. & Lazarus, E. (2014). Ecological Footprint: Implications for biodiversity. *Biological Conservation*, 173, pp. 121–132.

Global Footprint Network, 2018. Has humanity's Ecological Footprint reached its peak? 9 April 2018. [Online] 24 February 2020. Available at:  
<[https://www.footprintnetwork.org/2018/04/09/has\\_humanitys\\_ecological\\_footprint\\_reached\\_its\\_peak/](https://www.footprintnetwork.org/2018/04/09/has_humanitys_ecological_footprint_reached_its_peak/)>

Nemogá, G. R. (2014). Biodiversity research and conservation in Colombia (1990-2010): the marginalization of indigenous peoples' rights. *Canadian Journal of Latin American & Caribbean Studies*, 39(1), pp. 93–111.

Rodríguez, A. C. T., Binda, E., Quintero, J. M. O., Garcia, H., Gómez, B., Soto, C., Martínez, S. & Clerici, N. (2020). Answering the right questions. Addressing biodiversity conservation in post-conflict Colombia. *Environmental Science & Policy*, 104, pp. 82–87.