"Distribution of tree species in the Brazilian Amazon and studies on the origin of wood for the prevention of illegal deforestation"

The reduction of forest areas poses a risk of losses of biodiversity on the planet for a number of individuals within each species. Moreover, losses in genetic variability within and between populations of numerous species are also capable of contributing to climate change. In addition to deforestation, global climate change also threatens species' survival. As environmental impacts caused by climate change become apparent, the need increases to have more reliable predictions regarding how these phenomena will continue to affect ecosystems along with having proposals for measures to reduce climate risks and detrimental consequences. Therefore, the main technical relevance of this project is to generate scientific indicators that can provide the justification of grants for public policy makers to formulate laws aimed at the protection and conservation of timber species in critical areas. More specifically, areas at greater risk of extinction of populations are in the Amazon biome. Furthermore, regions located in the peripheral and climatic transition zones of the species distribution areas should be considered as being at the highest risk. Proper forest maintenance can contribute to the quality of the planet's climate, water and food security and increase indicators of the SDGs (Sustainable Development Goals), mainly for objectives 13 ("Action against Global Climate Change") and 15 (Aspects of preserving life on Earth). In this context, the project will contribute to the development of climate risk indices, indicators and paradigms to validate methodologies that may assist in the fight against illegal deforestation, both nationally and internationally. Our specific objectives are: 1) generate maps of current occurrence and potential distribution for the most exploited timber species in Amazonas for the base period and for future scenarios considering global climate change; 2) dimensioning the climatic risks on natural populations of the most exploited timber species in Amazonas; 3) characterize the reduction of forest cover in the area of advancing deforestation in Amazonas, in the vicinity of roadways BR230, BR174 and BR319; 4) to characterize the edaphic conditions in the places of occurrence of the most exploited timber species in Amazonas near BR230, BR174 and BR319; 5) identify areas with the lowest climatic risk for the establishment of in situ conservation areas, protecting the most exploited timber species in Amazonas; 6) create banks of origin of populations of arboreal species with isotope analyses facilitating crime prevention and enforcement methods against unauthorized deforestation for six more intensively exploited species in the Amazon biome (Manilkara huberi, Dinizia excelsa, Goupia glabra, Hymenolobíum excelsum, Qualia parensi and Handroanthus serratifolius); 7) characterize the genetic diversity of maçaranduba (Manilkara huberi) based on genetic parameters using SNPS markers and identify markers that may be related to the geographical origin of the populations; 8) estimate the correlation between the SNP and isotopic marker data obtained for the maçaranduba (Manilkara huberi) populations; 9) train new professionals to work in the Amazon rainforest to assess indices and indicators related to climate threats, ecological modeling and isotopic analyses. Consequently, they will significantly make positive contributions to influence the regulation of the timber market, thus possibly avoiding deforestation in illegal areas, especially on indigenous lands, national parks and other conservation units. The project will generate essential knowledge in forensic sciences in an effort to combat illegal deforestation in the Amazon and reduce impacts on the climate. Additionally, conservation strategies in conjunction with sustainable use of tree species of high economic value can be defined by modeling and ecological niches. Through isotopic analysis, the origin of the wood can be identified, making inspection and control measures more efficient, providing incentives to Brazil regarding the development of adequate forest management, targeting sustainable development of forests. And finally, the project through interaction and exchange of knowledge among professionals from multidisciplinary teams, efforts to generate allocation of funds for police investigations, to provide control strategies for environmental management bodies, establish deforestation controls and the implementation of public policies to be channeled for use in conjunction with conservation of forest genetic resources. We are seeking international funding and partners for our research.

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