PROGRAMA DE PÓS-GRADUAÇÃO EM CIÊNCIAS AMBIENTAIS
PROVA DE INGLÊS - Seleção do Mestrado PPGCA – 2017

Nome (letra de FORMA): _____

INSTRUÇÕES

1. A prova de inglês é de caráter classificatório.
2. Esta prova de inglês deverá ser desenvolvida em no máximo em 2 (duas) horas;
3. A prova deverá ser respondida com caneta esferográfica preta ou azul;
4. A prova poderá ser desenvolvida com consulta a dicionário de inglês;
5. Não é permitido o empréstimo de dicionário durante e após a finalização da prova;
6. Não é permitido acrescentar folhas em branco que não tenham sido fornecidas pela Coordenação do Processo;
7. Não é permitido o diálogo com os demais candidatos no momento da realização da prova;
8. Não é permitida a utilização de equipamentos eletrônicos como Palm-tops, calculadoras ou equivalentes, incluindo aparelhos de telefonia celular, durante a realização das provas.

Texto base - Nobre et al. *Land-use and climate change risks in the Amazon and the need of a novel sustainable development paradigm*. PNAS - National Academy of Sciences, vol. 113, n. 39, p. 10759–10768, 2016.

Abstract. For half a century, the process of economic integration of the Amazon has been based on intensive use of renewable and nonrenewable natural resources, which has brought significant basin-wide environmental alterations. The rural development in the Amazonia pushed the agricultural frontier swiftly, resulting in widespread land-cover change, but agriculture in the Amazon has been of low productivity and unsustainable. The loss of biodiversity and continued deforestation will lead to high risks of irreversible change of its tropical forests. It has been established by modeling studies that the Amazon may have two “tipping points,” namely, temperature increase of 4 °C or deforestation exceeding 40% of the forest area. If transgressed, large-scale “savannization” of mostly southern and eastern Amazon may take place. The region has warmed about 1 °C over the last 60 y, and total deforestation is reaching 20% of the forested area. The recent significant reductions in deforestation - 80% reduction in the Brazilian Amazon in the last decade - opens up opportunities for a novel sustainable development paradigm for the future of the Amazon. We argue for a new development paradigm - away from only attempting to reconcile maximizing conservation versus intensification of traditional agriculture and expansion of hydropower capacity - in which we research, develop, and scale a high-tech innovation approach that sees the Amazon as a global public good of biological assets that can enable the creation of innovative high-value products, services, and platforms through combining advanced digital, biological, and material technologies of the Fourth Industrial Revolution in progress.

Impacts of Anthropogenic Drivers of Change in the Amazon

Despite coming from different anthropogenic drivers, which act upon different scales, deforestation and extreme drought events may damage tropical forest ecosystems in an analogous way: Both have the potential to enhance mortality selectively, creating degraded areas in which the equilibrium state of the humid forest can be disrupted. A great number of studies and advances were made in recent decades, to better understand the impacts of drought extreme events on tropical forests. However, important questions still remain. In fact, the ability of some areas of the Amazon rainforest to maintain high ET (evapotranspiration) rates and, eventually, keep growing or begin leaf flushing during the dry season does not guarantee that humid forest could be resilient to extreme and prolonged droughts. In situ observations of the impact of “natural” extreme droughts and artificially induced droughts for several years showed that forest responds with interruption of growth and mortality of some species during a prolonged drought period. The results of artificially induced and natural droughts have shown that the larger trees [diameter at breast height (dbh) > 30 cm], together with lianas, are the most vulnerable ones. This behavior is contrary to the hypothesis, previously assumed, that the larger trees would be more resilient to droughts as a result of a deeper root system, allowing them to capture water from the deeper soil layers as a drought survival strategy. It was observed, however, that these large trees could be under water stress due to a significant exposure to solar radiation, eventually dying by cavitation and embolism during extreme droughts.

The vulnerability of the larger trees is a critical aspect of forest functioning and maintenance. It implies that droughts can act selectively, changing species composition and endangering local biodiversity (109). In addition, mortality of the highest species reduces the shading over lower canopy, litterfall, and soil. The increasing incident radiation in these areas enhances temperature and dryness, increasing vulnerability to subsequent droughts as well as to ignition sources and fire. Although the drought effects on stem growth could cease as soon as the drought finishes, this is not the case for tree mortality. In addition, the increase of dead biomass can result in a number of negative aspects: loss of habitat of endemic species, changes in the composition and biome structure, and changes in carbon budget and energy fluxes between the land surface and the atmosphere, besides potentially acting as a positive feedback to climate change. Extreme events and deforestation can act synergistically in a two-way mode. Deforested areas can affect regional climate, and the regional climate, in its turn, can amplify the impact of deforestation, by increasing tree mortality far beyond the limits of the deforestation edges. In both situations, fire occurrence and spreading is greatly amplified. It has been observed that the forest fire scars in the Amazon increased substantially during extreme droughts years, particularly in the edges between intact forest and deforested areas. The association between a dry forest environment (soil and litterfall) and ignition sources from the anthropic activities (mainly the agricultural practices of slash and burn) promotes the leakage of fires toward the intact forest areas. The absence of rainfall, typical of the drought years, facilitates its propagation.

Under normal conditions of high precipitation amounts and high atmospheric moisture, spontaneous occurrence of fire in the Amazon rainforest is quite rare. As a result, most of the local species are not adapted to fire, which hampers their recovery after recurrent burns. Forest areas submitted to successive fires over the years experience a change in the prevalence of secondary vegetation. Huge and successive fires have substantially increased tree mortality and favored the occurrence of short-life-cycle pioneer species. Invasive grasses observed in the burned areas act as a potential source of ignition during subsequent events of droughts, potentially indicating a change in the biome composition. This transition is more likely to occur in fragmented forest areas where disturbances are frequent and the dry season is longer (>4 mo to 5 mo), or, in other words, at the southern region of the Amazon forest.

Concluding Remarks

Overcoming the risks to the integrity and functionality of Amazon ecosystems does not depend exclusively on a new local, standing forests sustainable development paradigm such as the one put forth in Third Way as Paradigm of Sustainable Development for the Amazon. Reducing tropical deforestation to nearly zero is necessary for biodiversity conservation, provision of ecosystems services, and, to some extent, climate mitigation by reducing land-cover change emissions, but it is not sufficient at all to avert the risk of global climate change. Unchecked climate change poses a great danger of exceeding tipping points for the forests. Therefore, a gargantuan global effort of decarbonizing the world economy is called for to avoid transgressing these boundaries and to meet the safeguards of maximum 2 °C global warming as set by the recent Paris Agreement during the 21st Conference of the Parties of the United Nations Framework Convention on Climate Change.

Responda com base no texto de Nobre et al (2016).

1) Que ideia inovadora é apresentada pelos autores, no resumo, a ser defendida no artigo?

2) Quais os impactos comuns entre "*deforestation"* e *"extreme drought*"?

3) O que significa a sinergia entre os eventos extremos e o desmatamento?

4) No texto como é descrita a relação de resiliência das espécies e a ocorrência de queimadas?