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Unravelling biotemporal signals: Traditional ecological knowledge and local adaptive responses to climate change in the tropical rainforests

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ABSTRACT

Impacts of climate change on tropical rainforests are lesser known than impacts on other biomes. Firstly, amplitudes in climate fluctuations are moderate in rainforests that also face lesser occurrences of catastrophic extremes. Secondly, there is more pending uncertainty regarding trends on climate change in humid forests, which seem to be more resilient than other ecosystems to climate disturbances. Lastly, effects of climate change are overshadowed by deforestation, which constitutes a much heavier threat on rainforests.

Because the incidence of climate change in tropical forests is subtle and poorly understood, we need to investigate forest dwellers' perceptions with much greater attention. Indigenous peoples, traditional societies and local communities (IPTSLCs) may play a fantastic role as they would help the scientific community to better document the effects of climate change in places where these effects are poorly known.

We propose to focus our presentation on bio-temporal signals that are determining events upon which IPTSLCs have acquired the capacity to anticipate on climate fluctuations. Bio-temporal signals are from different kinds: visual, sonorous, olfactory, tactile, etc. IPTSLCs mobilize a beam of converging signals, a combination of determining events upon which they organize the calendar of their activities and take their decisions to invest in some activities and not in others. Among the various sources of bio-temporal signals that forest dwellers refer to, insects are probably the most accurate and the most fascinating. Insects are sensitive to very subtle fluctuations of climatic conditions not perceptible to humans. Pollinating insects play a keystone role as natural ecosystem engineers by maintaining a high biodiversity. Around 80% of the flowering plant species on our planet are known to reproduce by pollination. Many pollinating insects are under threat and alerts us about the damages caused by humans and induced climate change on terrestrial ecosystems. Countless species of—sting as well as stingless—bees also produce honey and equally serve biodiversity. Similarly ignored are the countless forms of traditional ecological knowledge that are mobilized throughout the tropics to hunt wild honey or to keep beehives in a sustainable manner, through various and extensive proto-domestication practices. Bees—and other pollinating insects alike—act as prominent bio-temporal signals, which efficiently alert IPTSLCs on subtle environmental disturbances. The analysis of traditional entomological knowledge may be an efficient way of approaching forest dwellers' perceptions of ongoing climate change and their induced adaptive strategies to adjust their livelihoods and mitigate their vulnerability.

We advocate in favor of a greater involvement of IPTSLCs into the process of assessing the poorly visible impacts of climate change on tropical forests. Through their extensive knowledge and know-how, IPTSLCs could play a determining role as "sentinels" by providing first-hand and accurate observations and supplying databases that dramatically fail at incorporating anthropological data into the elaboration of predictive models on climate change.