AFRIFORD PROJECT: GENETIC AND PALEOECOLOGICAL SIGNATURES OF AFRICAN RAINFOREST DYNAMICS: PRE-ADAPTED TO CHANGE?

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Tropical rainforests are the terrestrial biome with the greatest diversity of plant and animal species. Long-term stability has been considered for long as a prime cause of this remarkable biodiversity. However, paleoecological evidence of substantial change in the vegetation of tropical regions resulting from global climate fluctuation during the Quaternary, as well as evidence of significant ecological perturbation by humans in the last few thousand years, call for a reassessment of the temporal dynamics of biodiversity in tropical rainforests, and how this may influence their resilience and/or adaptation to rapidly accelerating human impact.

AFRIFORD is a multi-disciplinary research (2014-2017) project which aims to understand how past climate changes and the activities of ancient indigenous societies have shaped the current distribution and composition of African rainforests and the genetic diversity of their constituent tree species. This knowledge is essential for forecasting how the forest will respond to current and future environmental impacts, because the way tropical forests have responded to past climatic and human perturbation reveals their resilience, or innate adaptive capacity, to current and future perturbations resulting from massive ongoing deforestation, forest degradation and anthropogenic climate change.

AFRIFORD is therefore based on the integration of both paleoecological analyses (palynology, anthracology) on lake and soil sediments, dendrochronology, vegetation modelling and population genetics. Some key results of the project will be presented, to better:

- (1) understand the processes leading to the diversification/differentiation of African rainforest tree biodiversity at inter-specific and intra-specific levels.
- (2) document the main climatic and anthropogenic perturbations which affected the past vegetation dynamics in the Congo basin for a range of relevant time scales, with particular emphasis on the last glacial-interglacial cycle, the late Holocene where traces of forest fire become abundant, and the last two centuries when current tree communities were established.
- (3) develop and calibrate a vegetation model able to simulate reliably the changes in vegetation, productivity, and species distribution ranges in response to environmental forcing, in order to make predictions under scenarios of climate and anthropogenic environmental changes.