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IMPACTS OF CLIMATE EXTREMES ON ECOSYSTEMS AND HUMAN HEALTH IN BRAZIL: PULSE-BRAZIL

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The general aim of this RCUK-FAPESP joint proposal is to create the PULSE-Brazil system (where PULSE is Platform for Understanding Long-term Sustainability of Ecosystems) for analyzing, visualizing and understanding the interactions between climate, ecosystems and human health in Amazonia. PULSE-Brazil will enable stakeholders to explore the consequences of different policy options for adaptation and mitigation of environmental change in the Brazilian Amazon. Specifically, the objectives of PULSE-Brazil are to:

1. Support collaboration between UK Universities, the Met Office, FIOCRUZ, the Federal University of Minas Gerais, the National Institute for Space Research (INPE) – Brazil, Brazilian State Governments and the wider international community on topics related to the impact of climate extremes on ecosystem and human health and potential mitigation and adaptation strategies.

2. Develop and evaluate a spatially explicit database of recent climate extremes and their impacts on ecosystems and human health to establish the relationships between climatic variables and environmental and human health data.

3. Provide future climate change projections for Amazonia using state-of-the-art regional (Eta) and global climate models (MBSCG and UK Met Office-Hadley Centre models), covering a range of emission and land-use scenarios (through an associated Brazilian-funded project).

4. Develop a user-friendly GIS-based tool capable of integrating information of recent extremes and their impacts on ecosystems and human health with relevant physical climate variables and metrics from future climate projections, supporting stakeholders to develop their own understanding of the interactions between climate, ecosystems and human health.

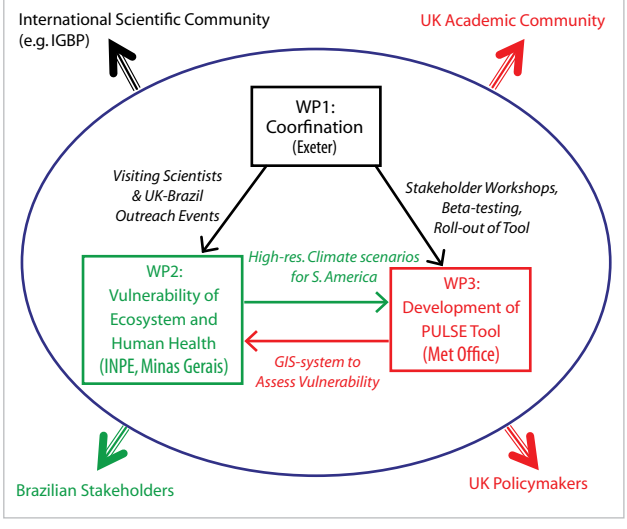

Figure 1. Conceptual model of PULSE-BRAZIl project

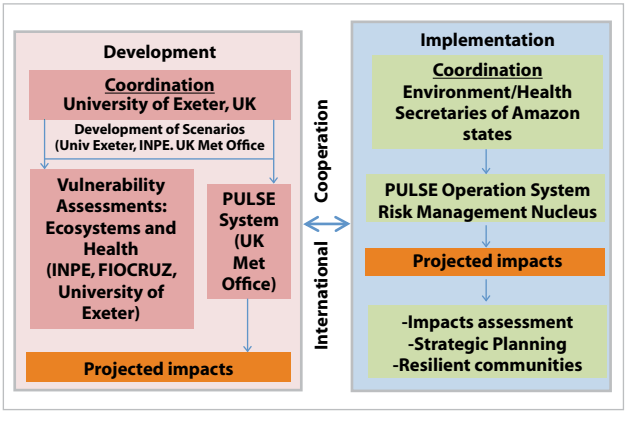

Figure 2. PULSE platform and integration of its components. This will be accomplished by an integrative cooperation between Brazil and UK partners, and governments from Amazonian states

OBJECTIVES

The PULSE-Brazil project consists of three inter-linked Work-packages (WPs – *Figure 1*):

Work-package 1 (WP1) will coordinate the exchange of scientists between the UK and Brazil, organise and run international conferences and stakeholder engagement activities, and manage the overall PULSE-Brazil project. The ultimate aim of this WP is to integrate the results and discussions between the cross-disciplinary research team and policymakers to propose strategies for mitigation and adaptation. (Leader: Luiz Aragão)

Work-package 2 (WP2) will focus on building the climate, environmental and human-health datasets for assessing the Impacts and Vulnerability to Climate Change in Brazil, based on state-of-the-art climate change projections from the regional Eta model and the MBSCG global model. The climate and environmental data will be delivered by INPE of Brazil, while the health data will be delivered by FIOCRUZ (Oswaldo Cruz Heath Foundation). The climate part is funded by a related proposal to FAPESP-FRPGCC. (Leader: Jose Marengo)

Work-package 3 (WP3) will develop a user friendly decision-support system (PULSE) that will allow both academic and non-academic users to visualise the impacts of Climate Change on ecosystems and human health in the Brazilian Amazon, using relevant outputs from pre-existing model projections. This will be subcontracted to the UK Met Office. (Leader: Richard Betts)

At the heart of each WP will be scientific collaboration and stakeholder engagement at both national and international levels. *Figure 1* illustrates the interaction between the work-packages, and links to stakeholders and the wider scientific community.

PULSE-Brazil would interact with long-term programs such as LBA, and Brazilian initiatives such as the National Institute of Science and Technology for Climate Change, the FAPESP Research Programme on Global Climate change (FRPGCC) and the Brazilian Rede-Clima.

PULSE-Brazil would have a lasting positive impact by greatly facilitate links between scientists in the UK and Brazil on global environmental change, by building capacity for the next generation of scientists and decision makers, and through the development of techniques to communicate scientific outcomes to stakeholders and the general public, using GIS-based systems.

CASE STUDIES

On the current developing phase of he project, case studies are key to identify the usefulness of the system and a "model state" for Amazonia. We are counting with the collaboration of the Environment Secretary of the Brazilian Amazonia state of Acre, a front-runner on environmental policies on the reduction of greenhouse gases as well as on risk management systems to react almost immediately to natural disasters, as the drought followed by forest fires in 2005 and 2010, and floods in 2009, 2011 and 2012.

The increased capacity for identifying areas of high risk of climate variability and change as well as the improved potential for mapping vulnerability, may help considerably to enhance our understanding of the spatial patterns of future environmental changes and its effects on health and ecosystems. Therefore, we expect that the PULSE platform can assist in the planning of government actions directed towards the increase of resiliency of Amazonian communities to climate change.

RELATED PUBLICATIONS

Marengo JA, Tomasella J, Alves LM, Soares WR, Rodriguez DA. 2011. The drought of 2010 in the context of historical droughts in the Amazon region. *Geophysical Research Letters*. **38**: 1-5.

Kaye NR, Hartley A, Hemming D. 2011 Mapping the climate: guidance on appropriate techniques to map climate variables and their uncertainty. *Geosci. Model Dev. Discuss*. **4**: 1875-1906, www.geosci-model-dev-discuss.net/4/1875/2011/ doi:10.5194/gmdd-4-1875-2011.

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