



## Analysing Climate Change Effects on Cocoa Production and Its Potential Consequences for Forest Conservation

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### Background & Justification

Climate change is expected to impact negatively on cocoa production. Impact models have predicted geographic shifts in production areas & potential loss of about 50% of current climatically suitable areas for growing cocoa by 2050. However, eco-physiological response of cocoa tree, elevated CO<sub>2</sub> effects & possible adaptations practices that might help adapt cocoa was not considered, hence effects on production is not sufficiently quantified.

Geographic shifts could have serious implications for forest biodiversity & ecosystem services,

### Objectives

This project aims to,

1. improve understanding of impacts of climate change on cocoa yield, and to
2. assess implications of climate change for cocoa production in West Africa, including effects of possible shifts in production areas on forest cover.

### Research Questions

1. To what extent do environmental variables determine spatiotemporal variability in cocoa yields?
2. How will predicted changes in climate and underlying rise in [CO<sub>2</sub>] affect cocoa production in West Africa?

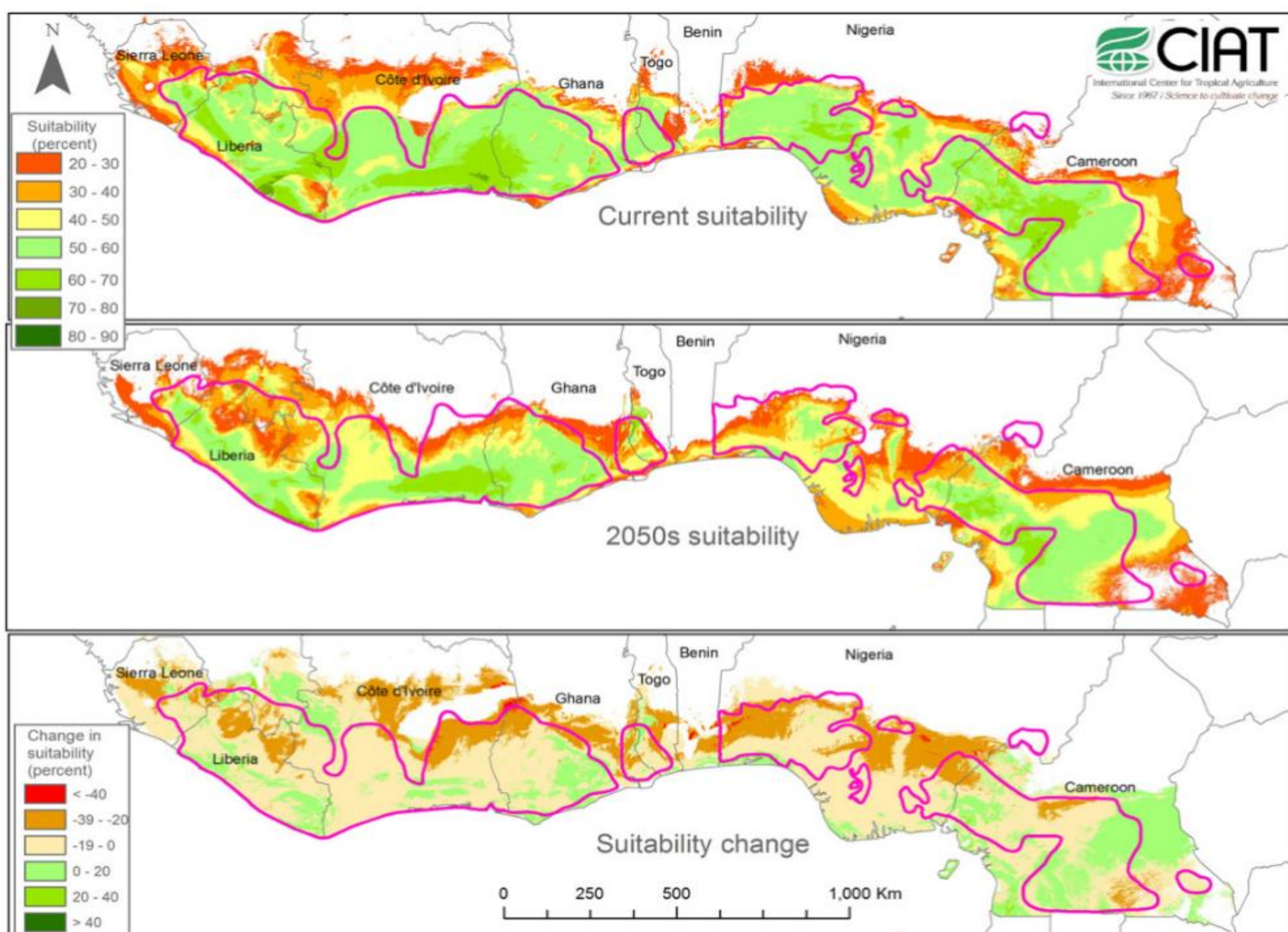


Fig. 1: Current, projected & change in climate suitability in West African cocoa belt (redline). (Schroth et al., 2016)

3. To what extent would projected shifts in cocoa suitability areas due to climate change affect forest cover?

### Methods

A combined crop modelling & spatial analysis approach will be used. An existing cocoa crop model, SUCROS-Cocoa, will be improved by updating and extending the model to include effects of [CO<sub>2</sub>] on cocoa physiology.

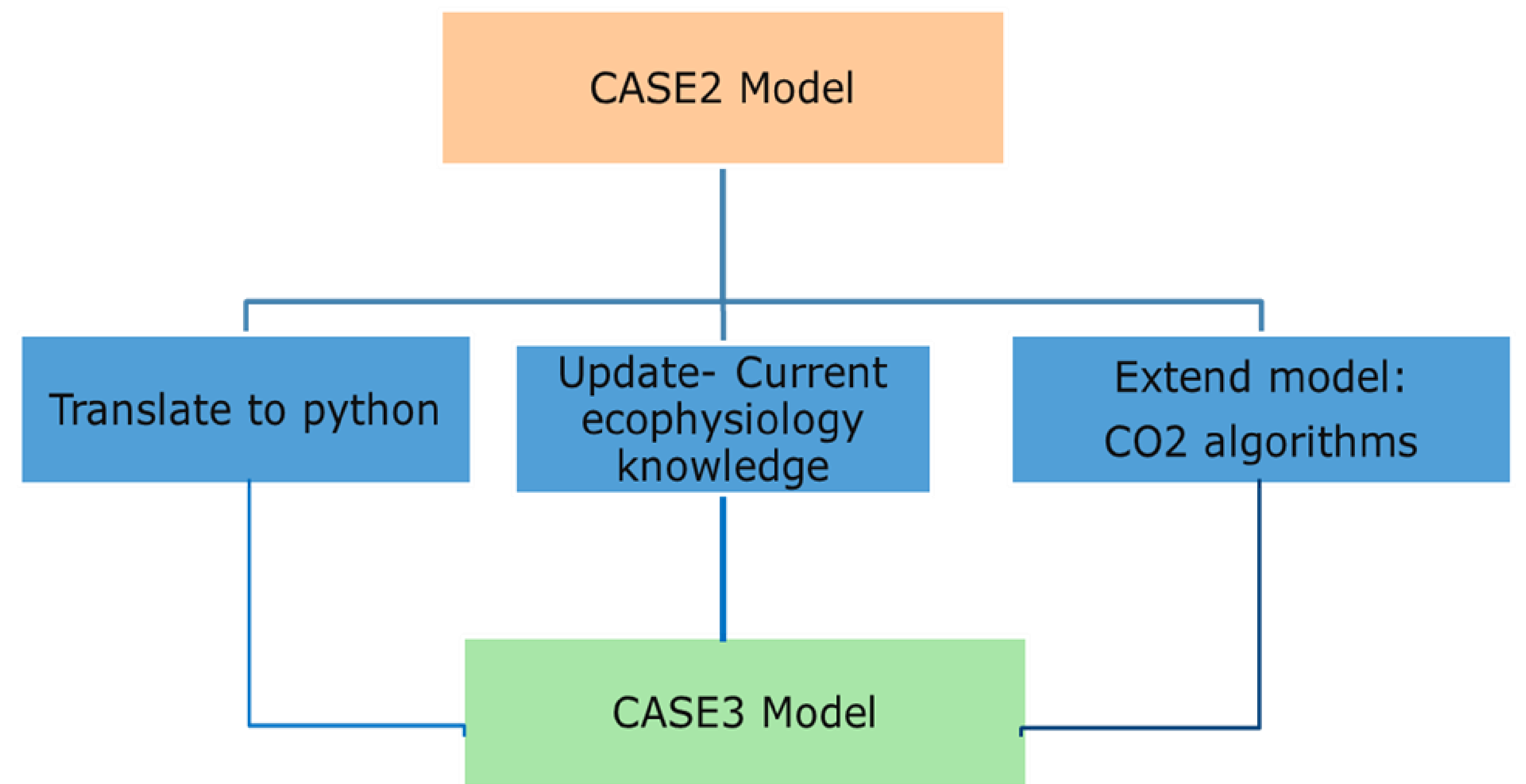


Fig.2 Flowchart of CASE2 Adaptation

The model will be used to simulate cocoa growth and yields for the coming decades for the entire West African cocoa belt, based on climate projections, for the current cocoa growing area and for areas that will become suitable in the future.

### Research Area

A detailed study to test & calibrate model will be conducted in Ghana. Ghana is chosen for the detailed study because of data availability and the large scale spatial temporal variation in environmental conditions observed over the area. Then, a more extensive study will be conducted for the West African cocoa belt, because of its crucial role in world cocoa supply.



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