

# Detecting cocoa plantations in Côte d'Ivoire and Ghana and their encroachment on protected areas

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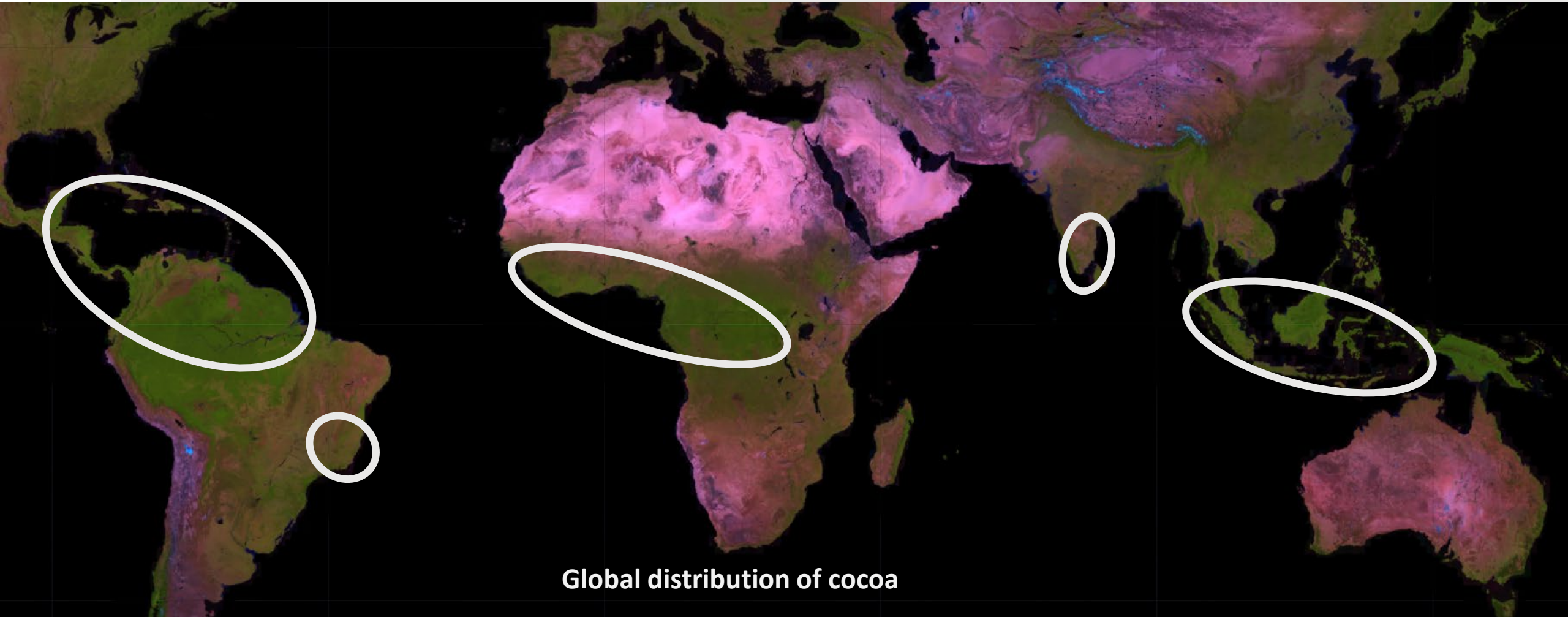
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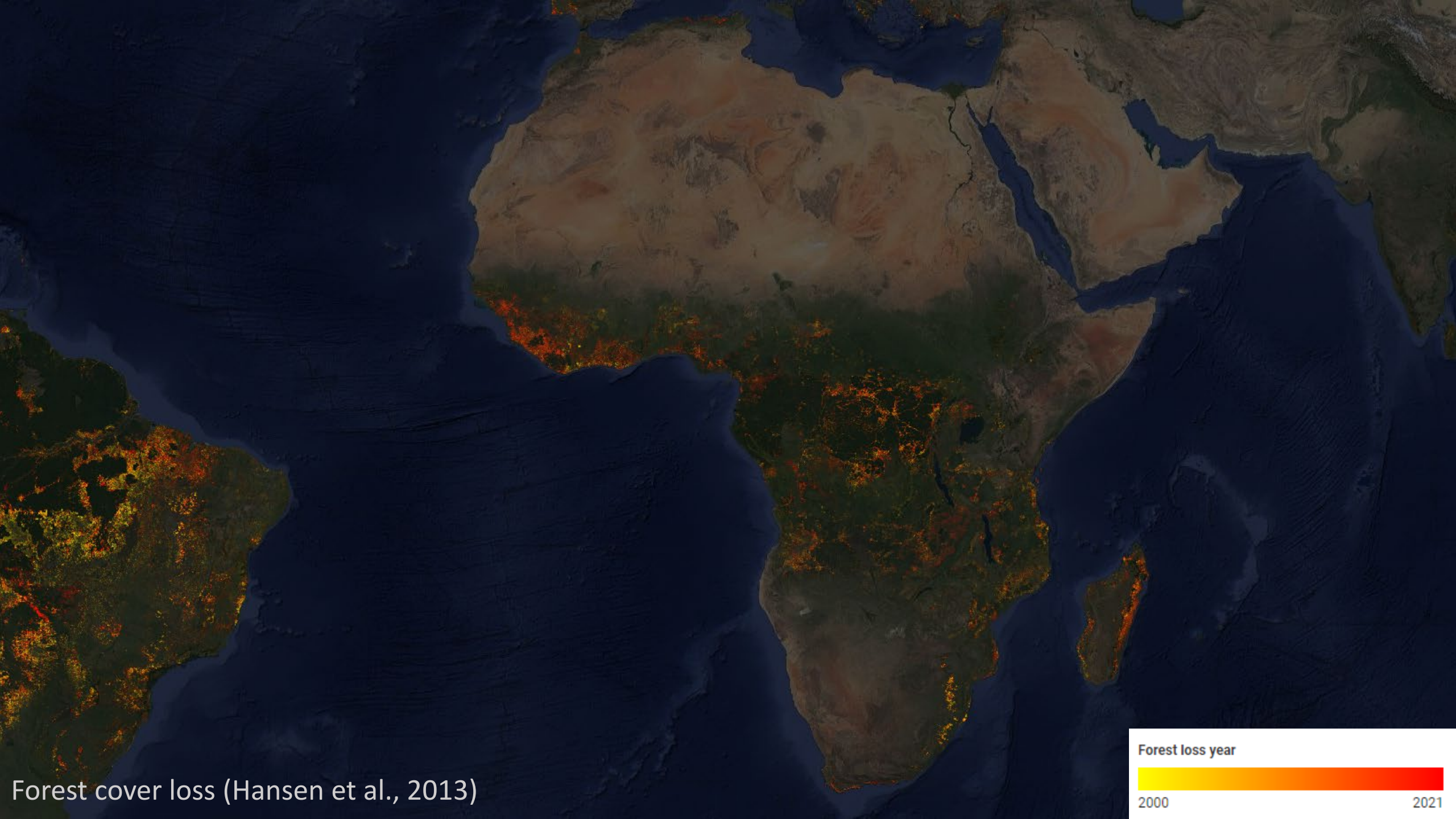


Global distribution of cocoa

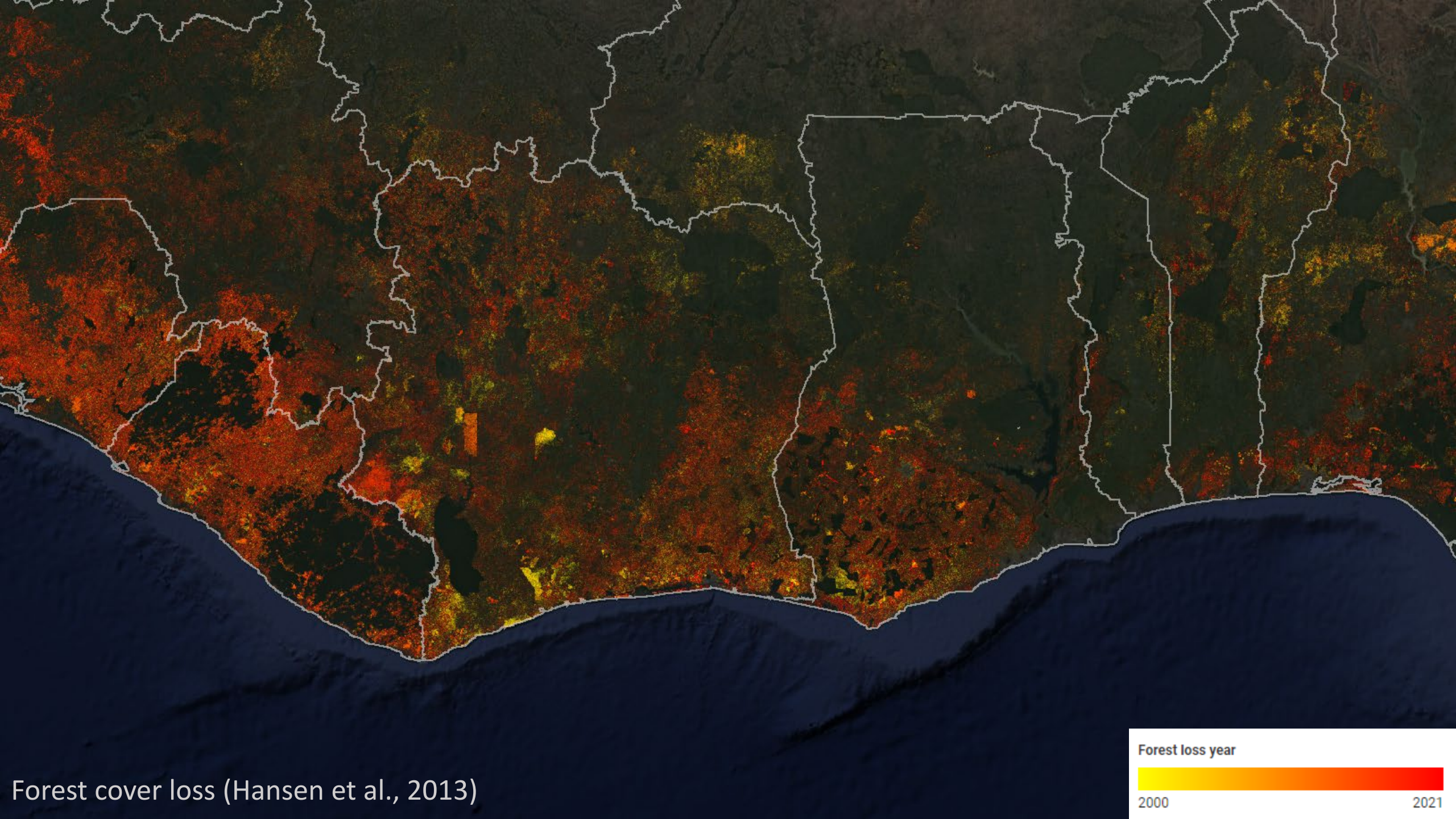
# Introduction



International commodities



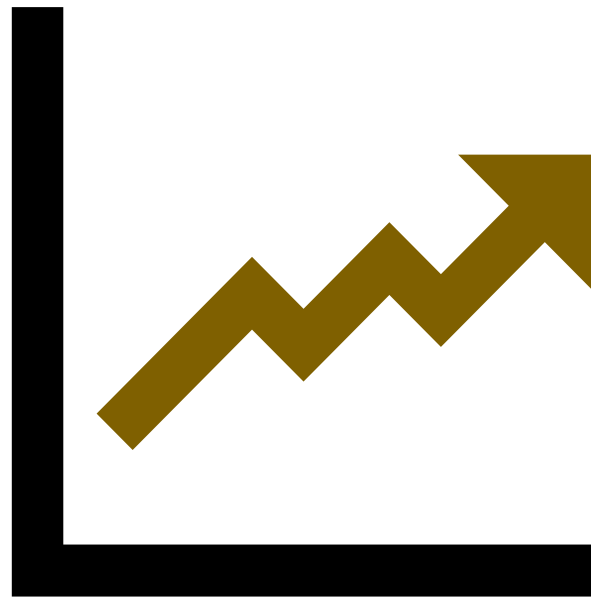
Forest cover loss (Hansen et al., 2013)



Forest cover loss (Hansen et al., 2013)



# Introduction



Increase in cocoa demand

# Introduction

- Protected areas (PAs) constitute a major conservation tool.
- Management effectiveness of several PAs is deficient.
- Cocoa threatens PAs in tropical Africa.
- Optical and radar data derivatives have proven to be useful in detecting shrub crops.



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# Objectives of this study

Generate a cocoa  
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Estimate the area of  
cocoa farms

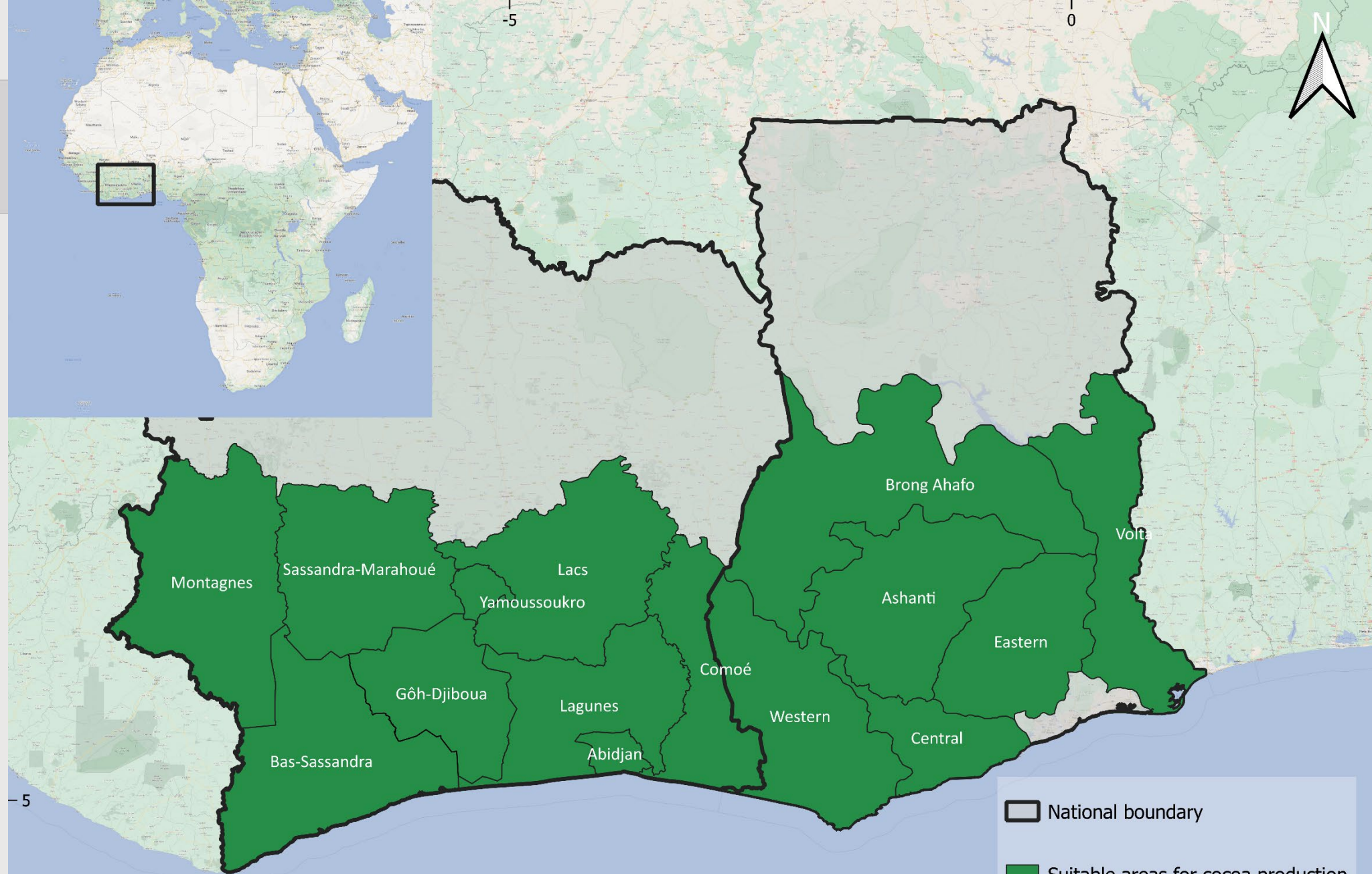
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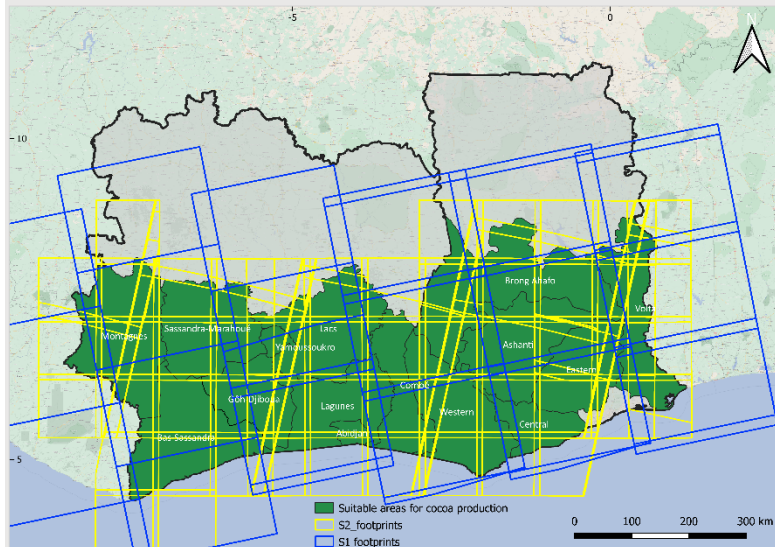
Estimate the area of cocoa farms

Assess the extent of cocoa farms within and around protected areas.

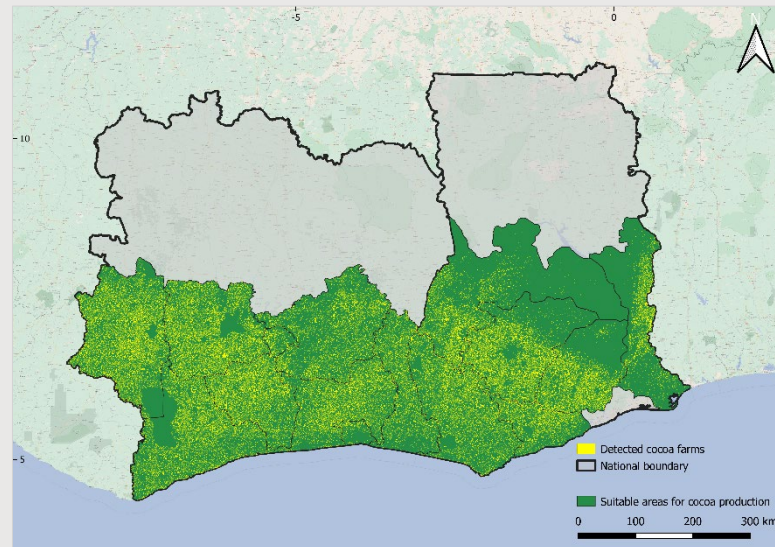
# Study Area



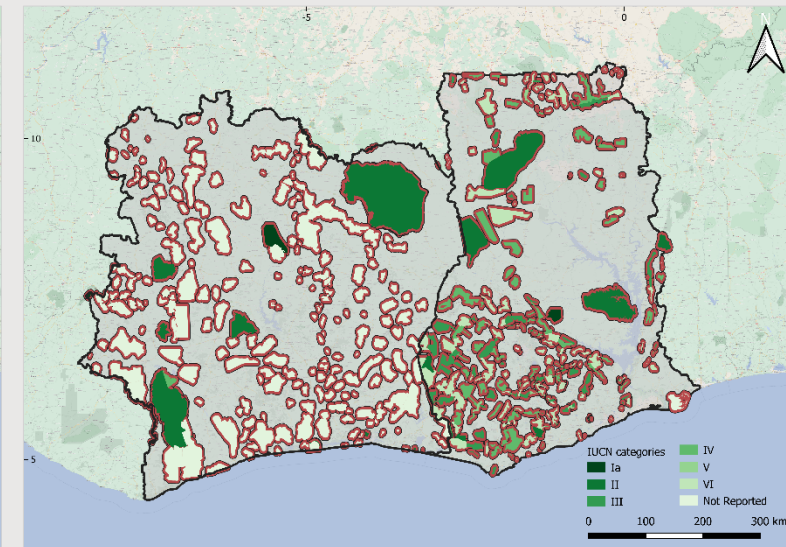
Climatically most suitable cocoa regions in Ghana and districts in Cote d'Ivoire (Läderach et al., 2013).



S-1 and S-2 Preprocessing  
& Feature extraction



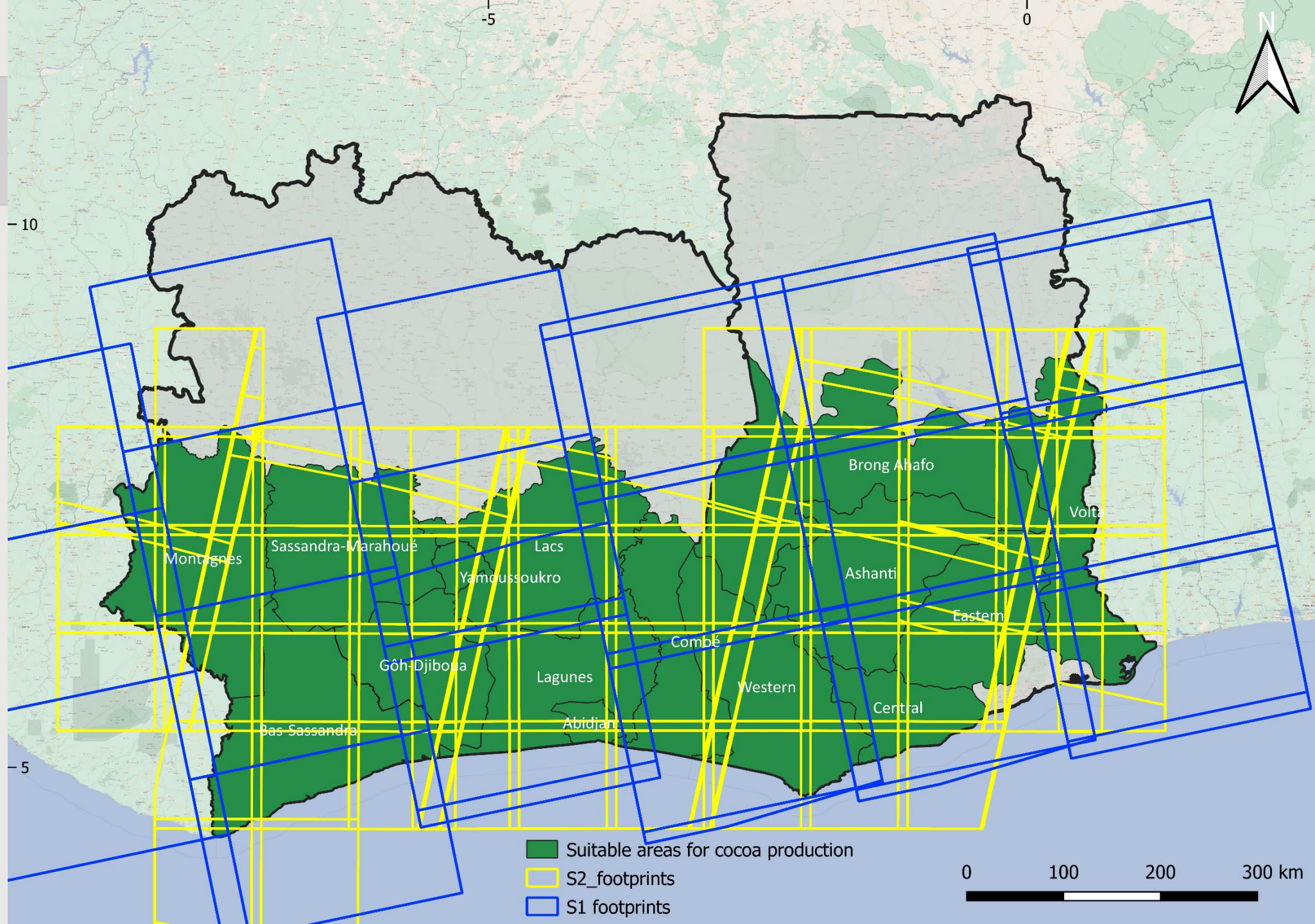
Classification & Cocoa  
area classification



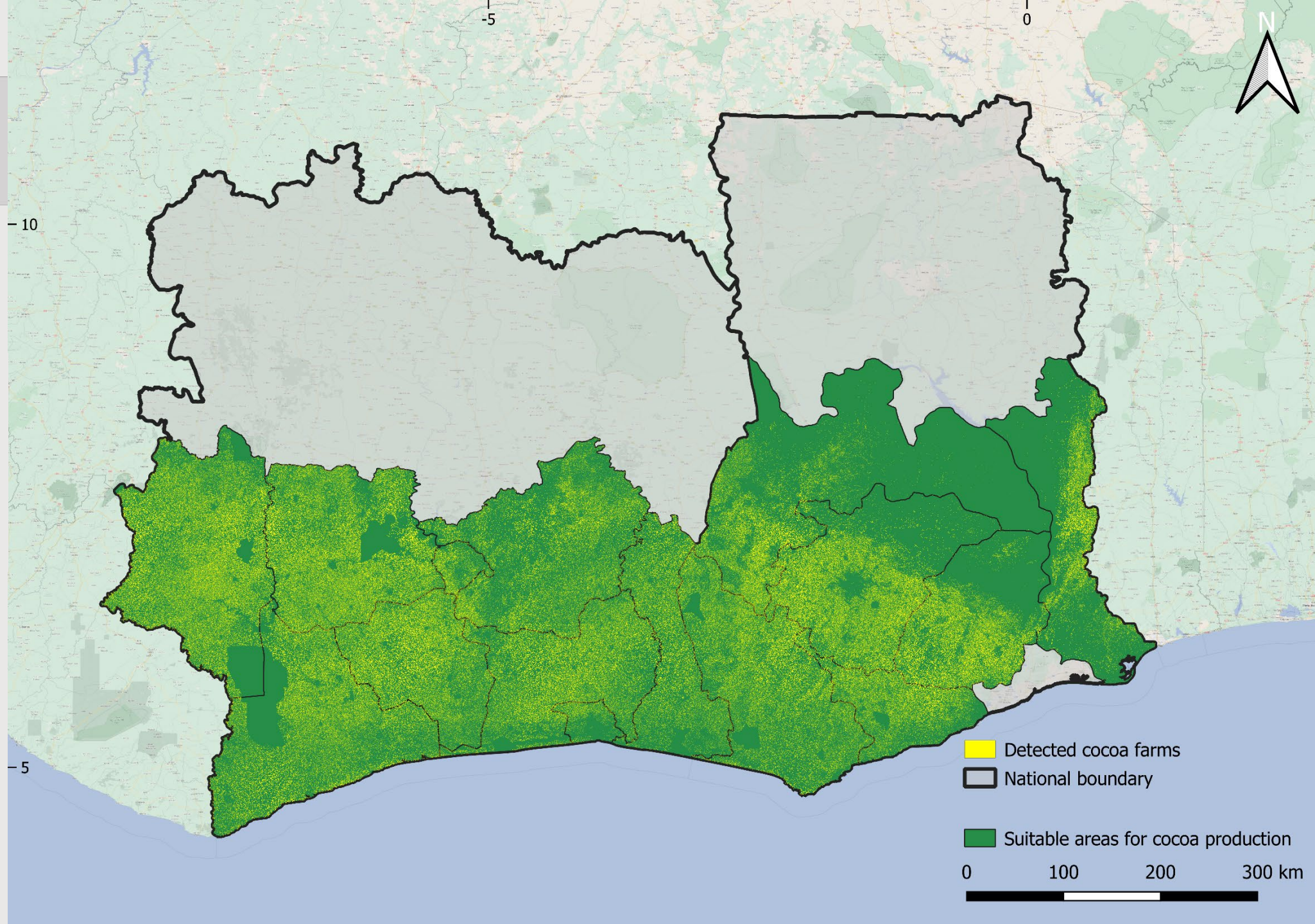
Protected Area analysis



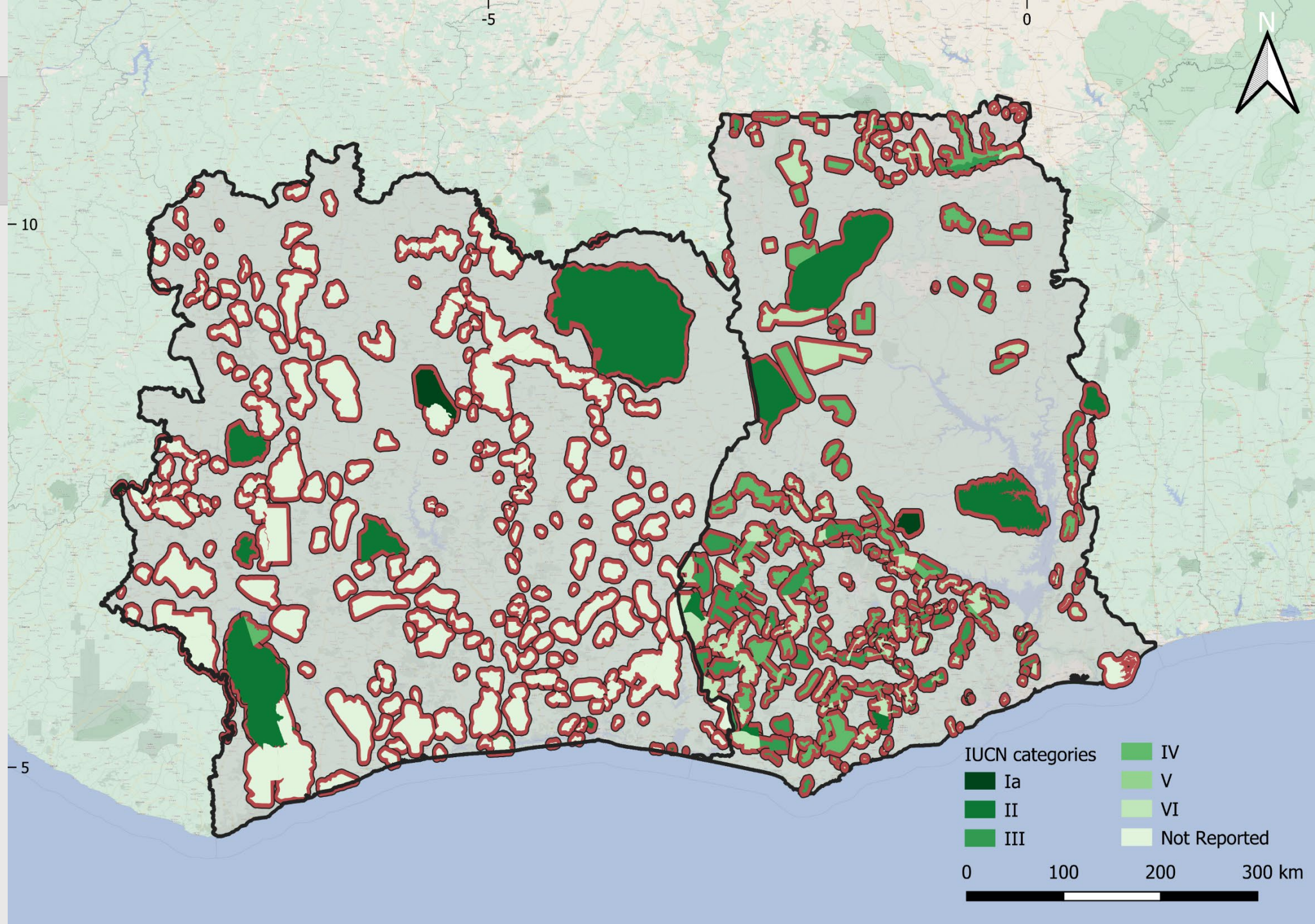
# Satellite data Preprocessing



# Classification & Cocoa area classification



# Protected Area Analysis

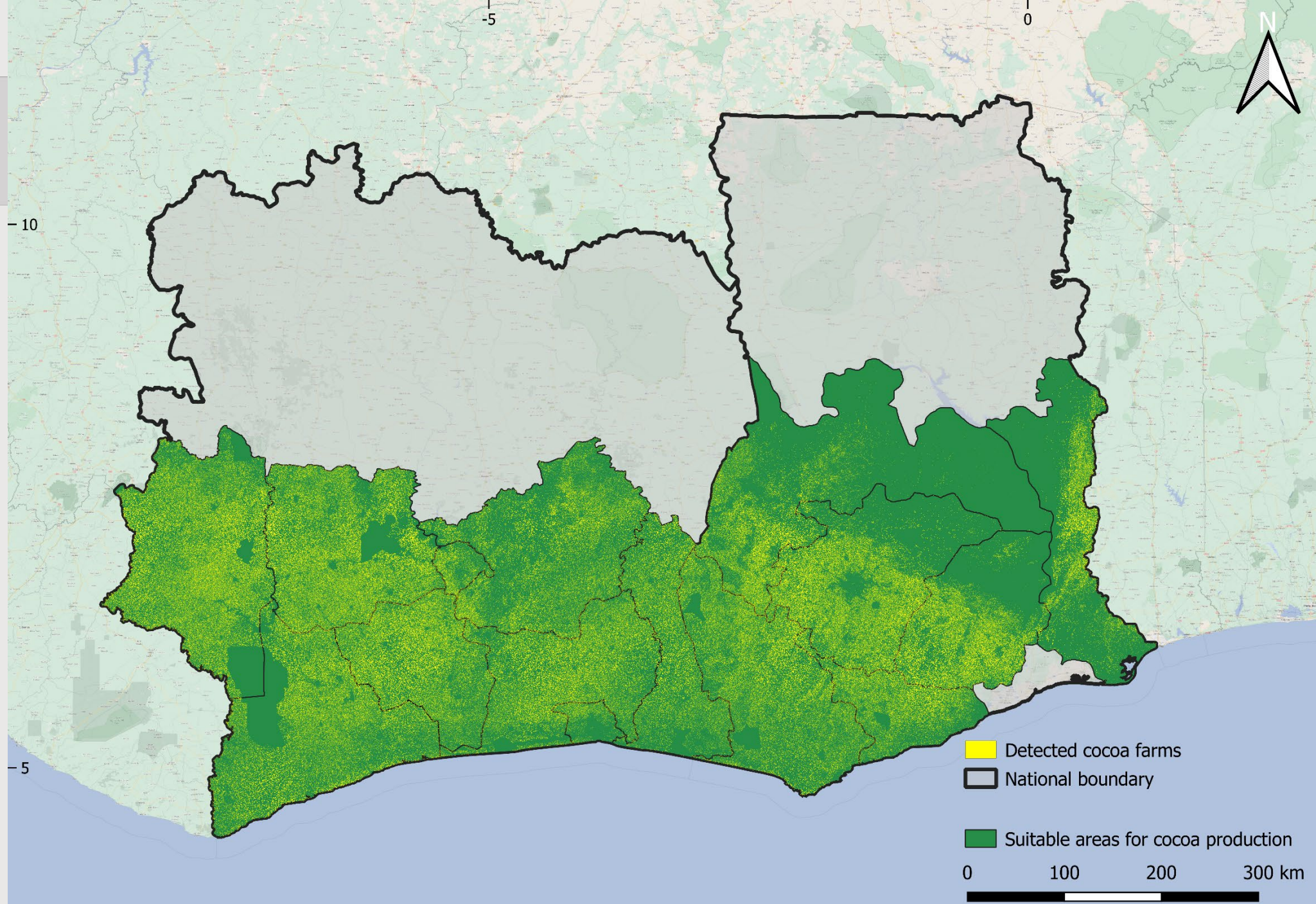


PA **82.9%**

UA **62.2%**

**3.69 Mha** in CIV and

**2.15 Mha** in GHA.

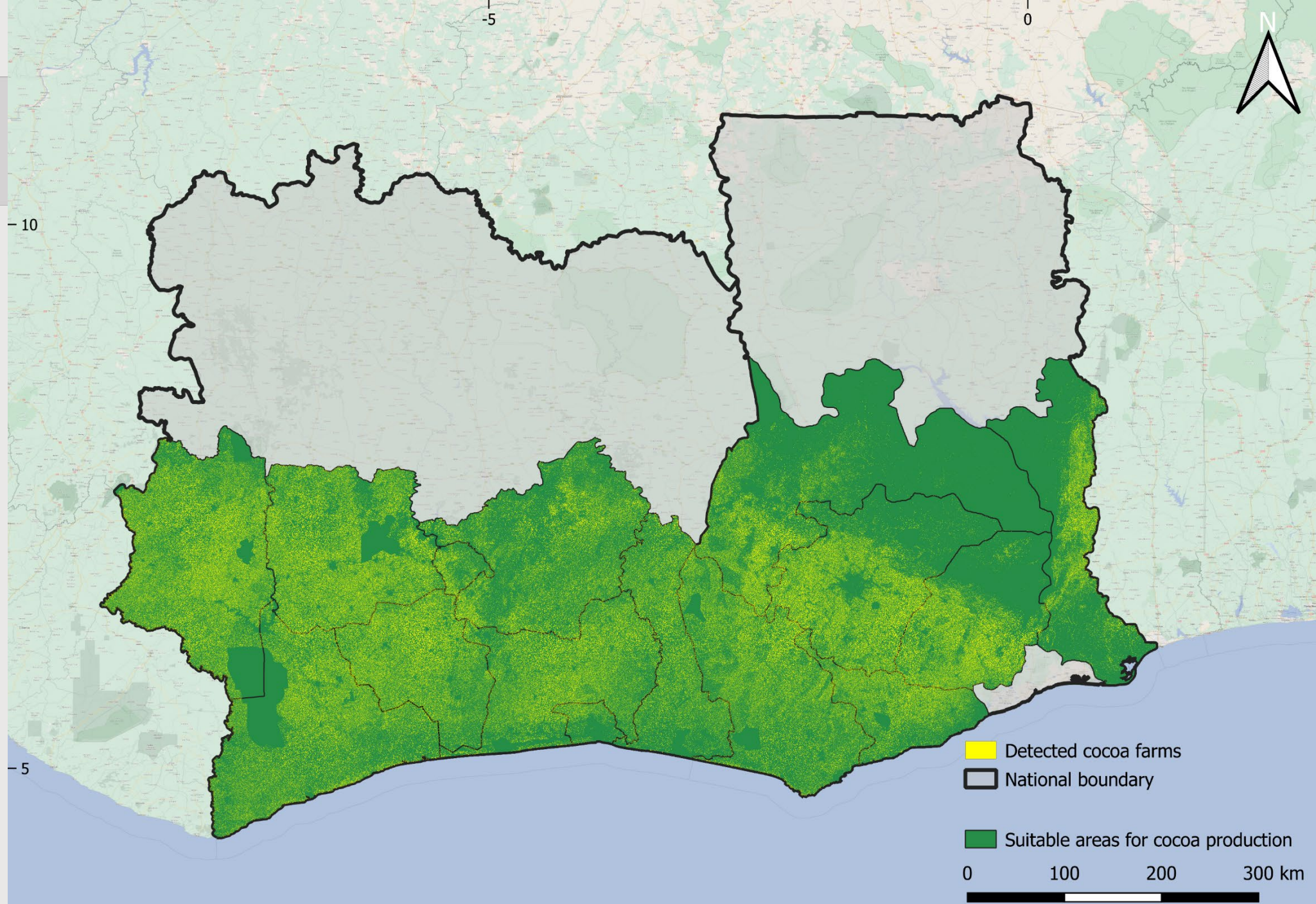


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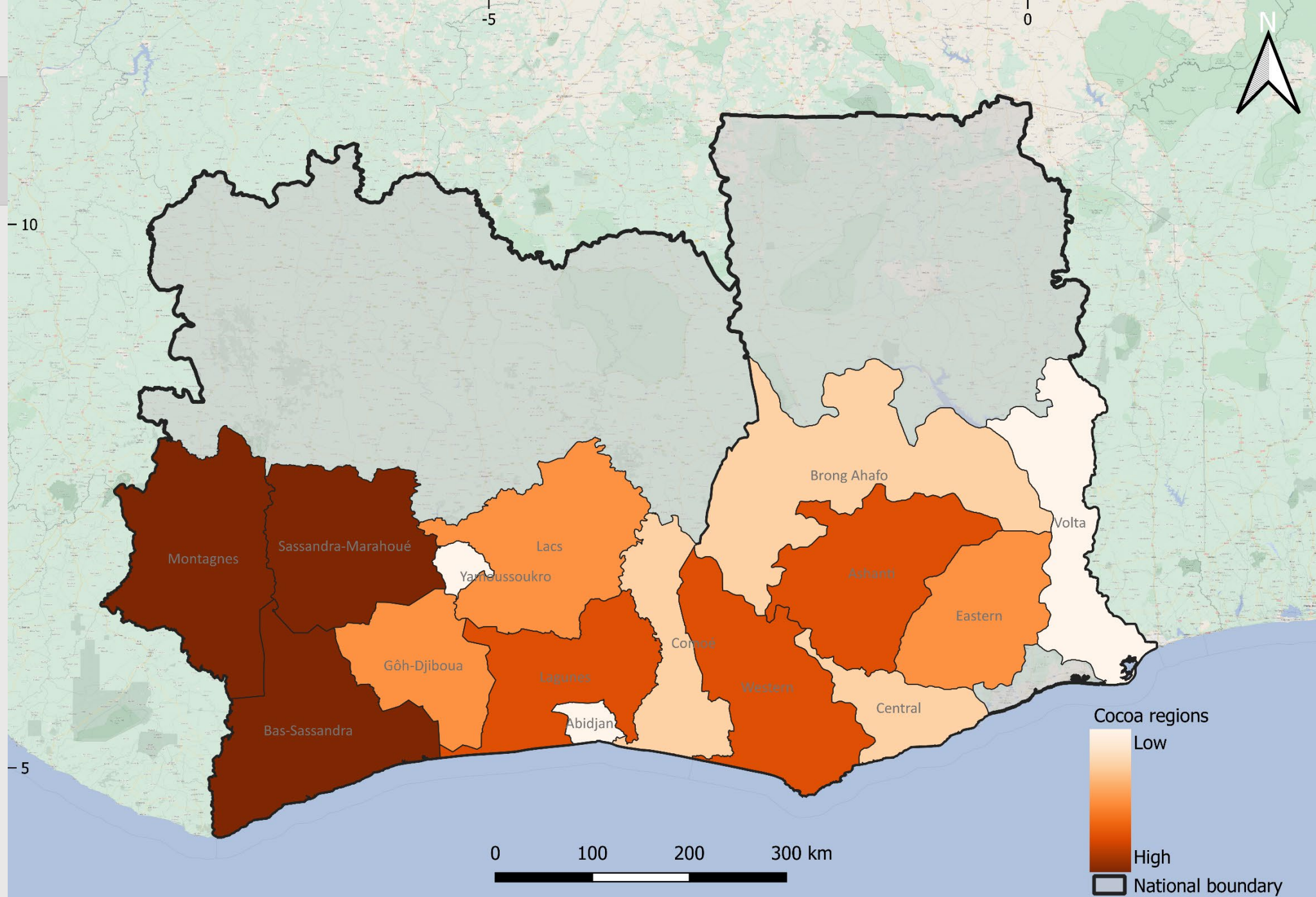
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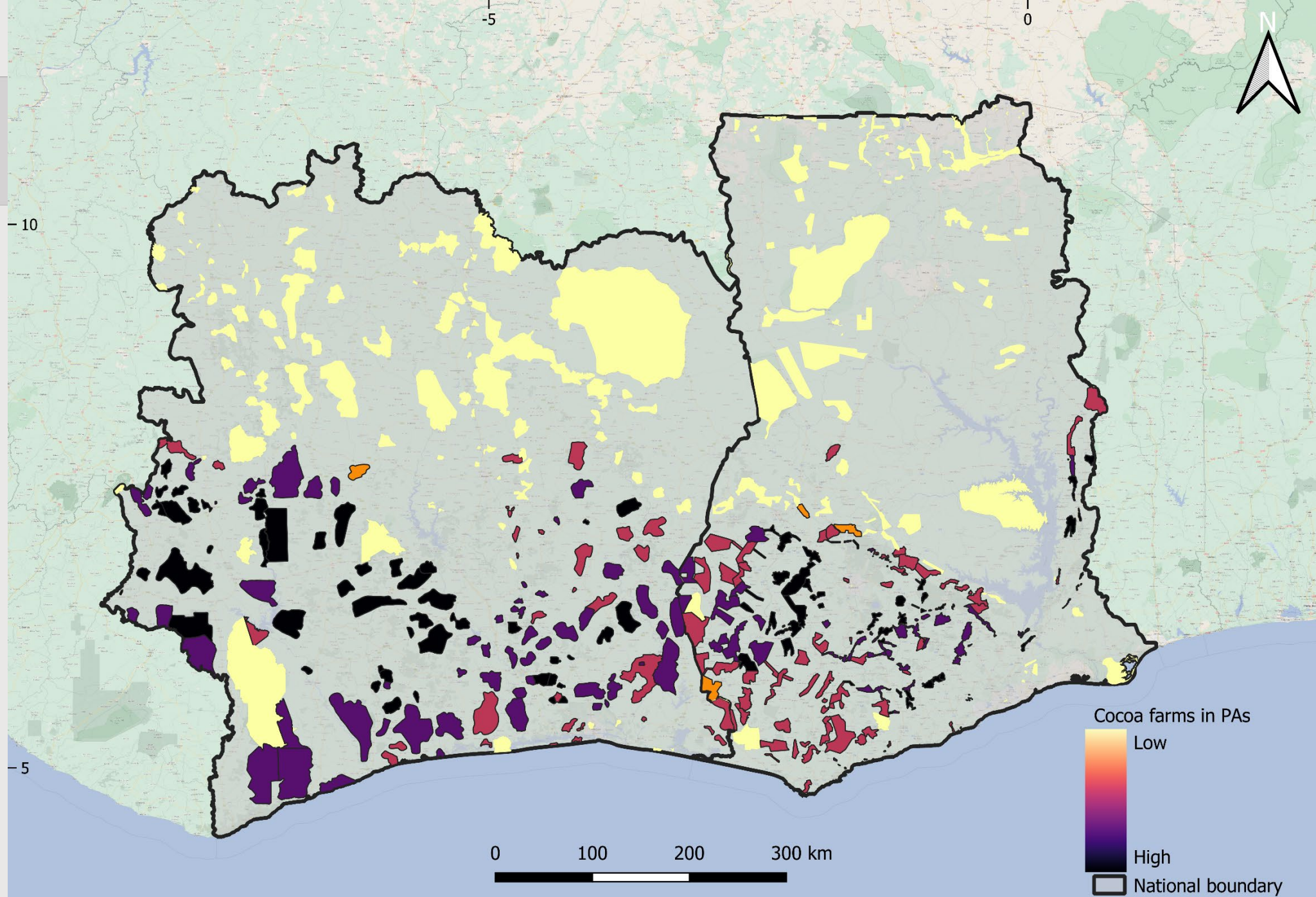
**2.15 Mha** in GHA.



# Cocoa farms in Ivorian and Ghanian regions

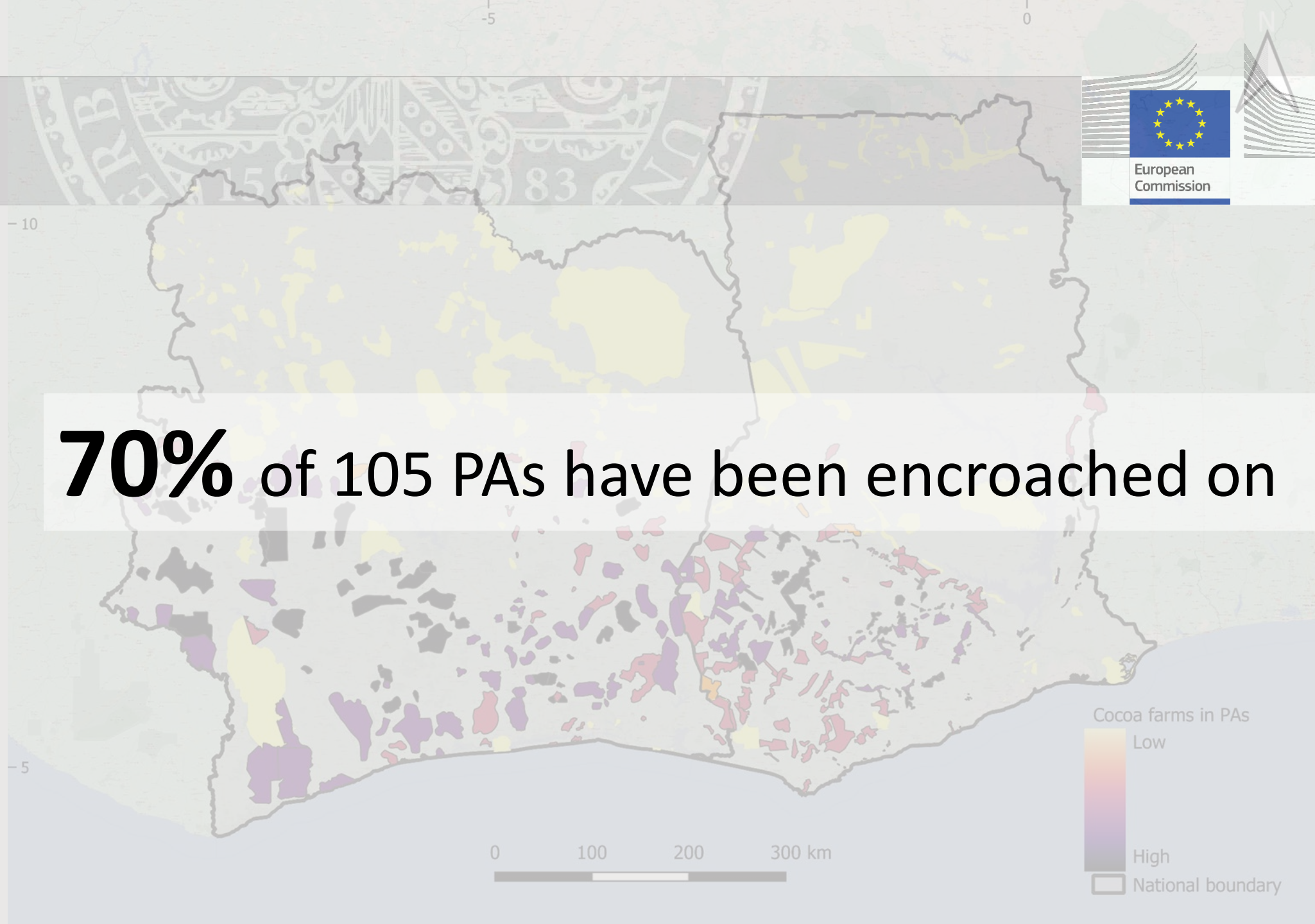


# Protected Area Analysis



# Protected Area Analysis

**70%** of 105 PAs have been encroached on

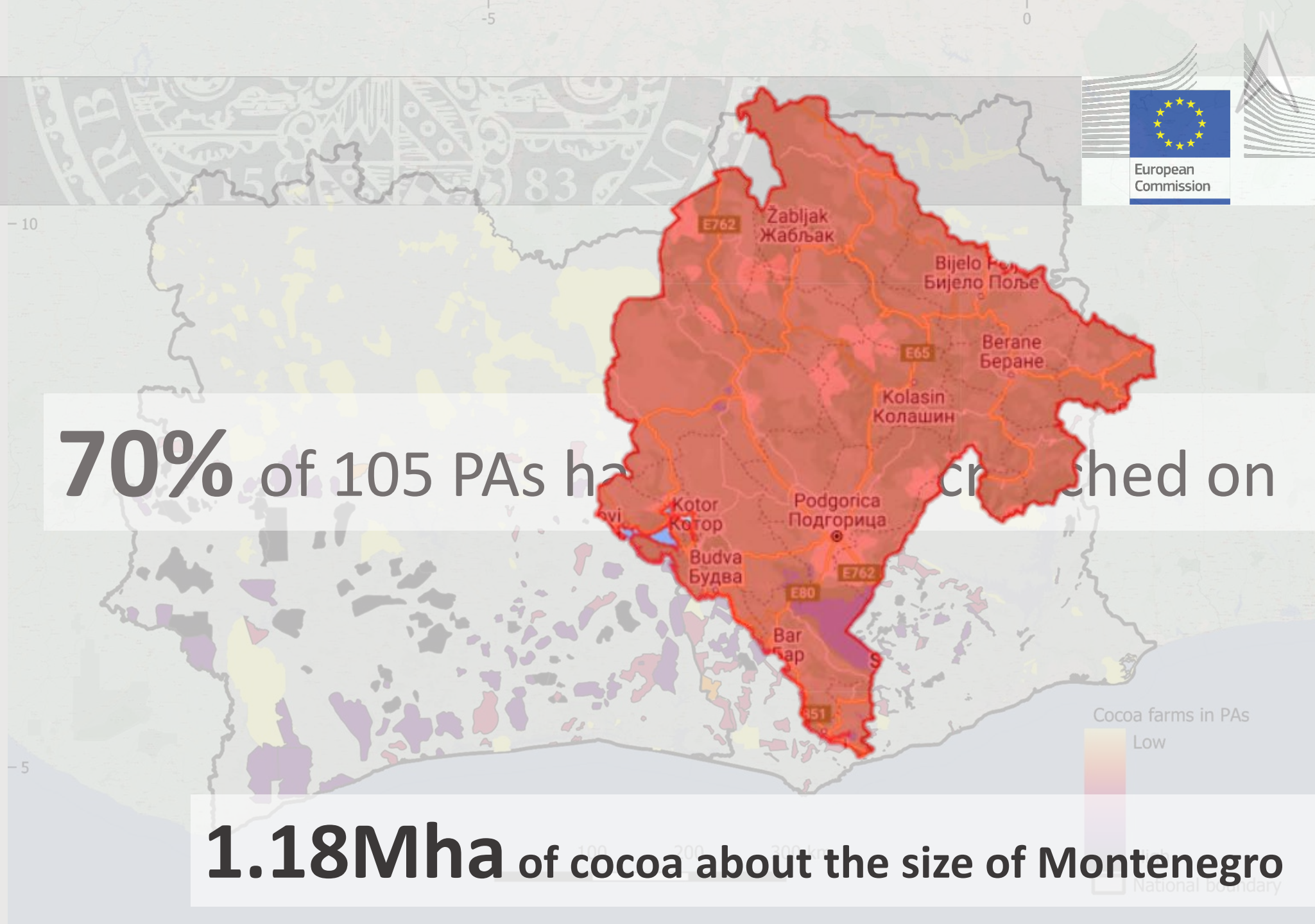




Protected  
Area Analysis

**70%** of 105 PAs have crashed on

**1.18Mha** of cocoa about the size of Montenegro



An aerial photograph of a dense, lush green forest. The trees are tightly packed, creating a textured canopy of various shades of green. A semi-transparent white rectangular box is overlaid on the left side of the image, containing the text 'Cocoa farms...'.

# Cocoa farms...

- detected with the synergistic use of Sentinel-1 and Sentinel-2;
- have a broad spatial distribution;
- have largely encroached into PAs.

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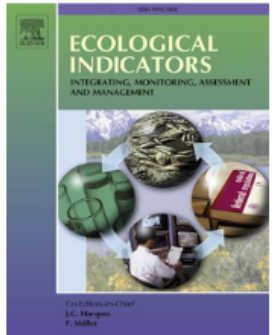


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University of Würzburg's WASCAL-DE COOP Partners

Be sustainable



**Be sustainable**



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