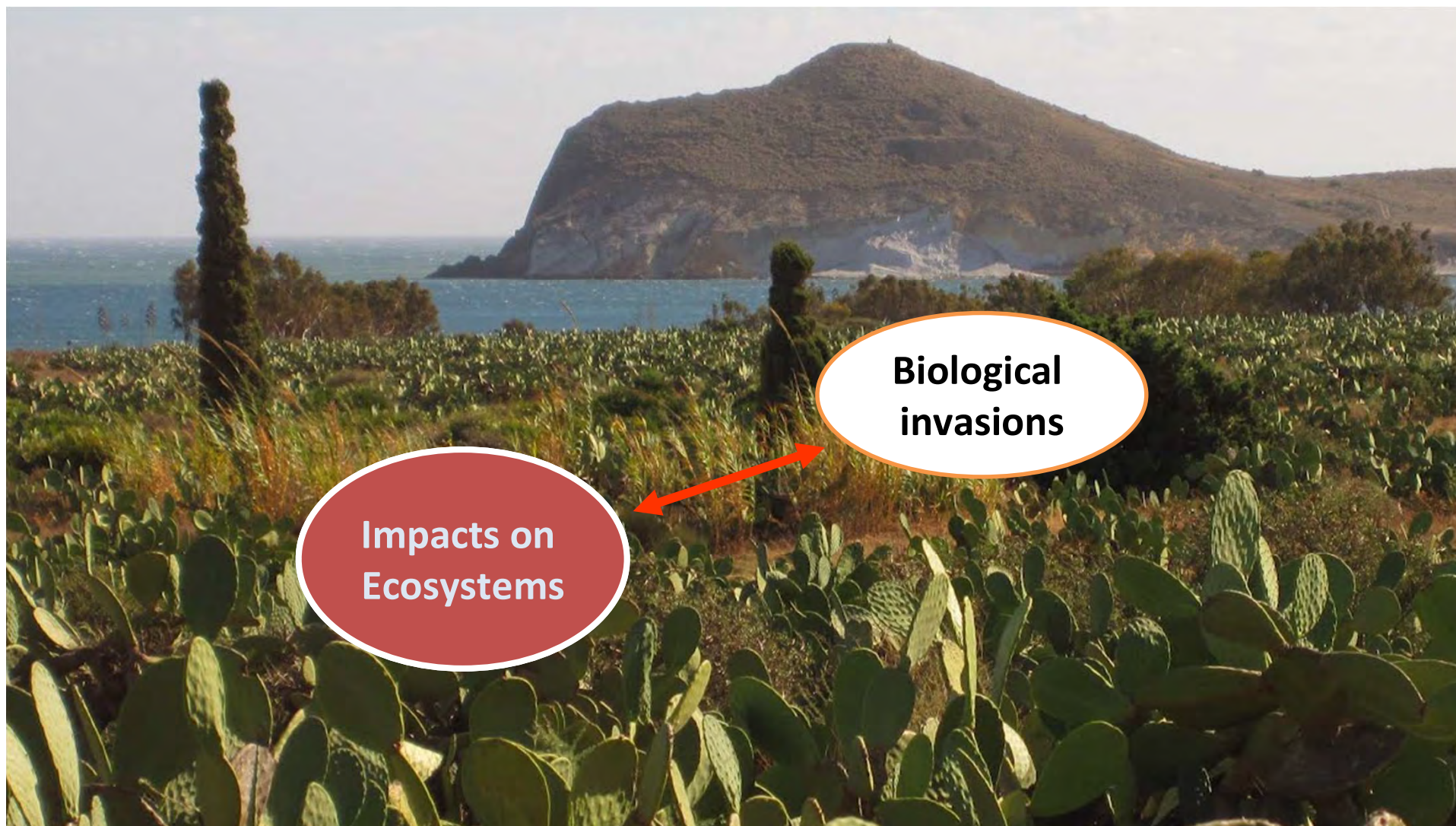


The impact of agriculture and forest Non-native Invasive Species



Pablo González-Moreno. University of Córdoba (Spain)



**Impacts on
Ecosystems**

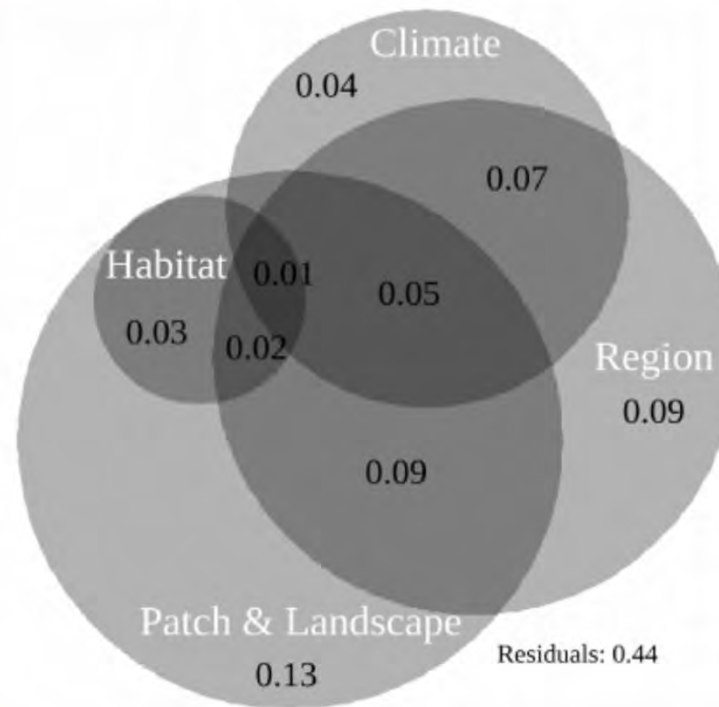
**Biological
invasions**



Interaction of drivers

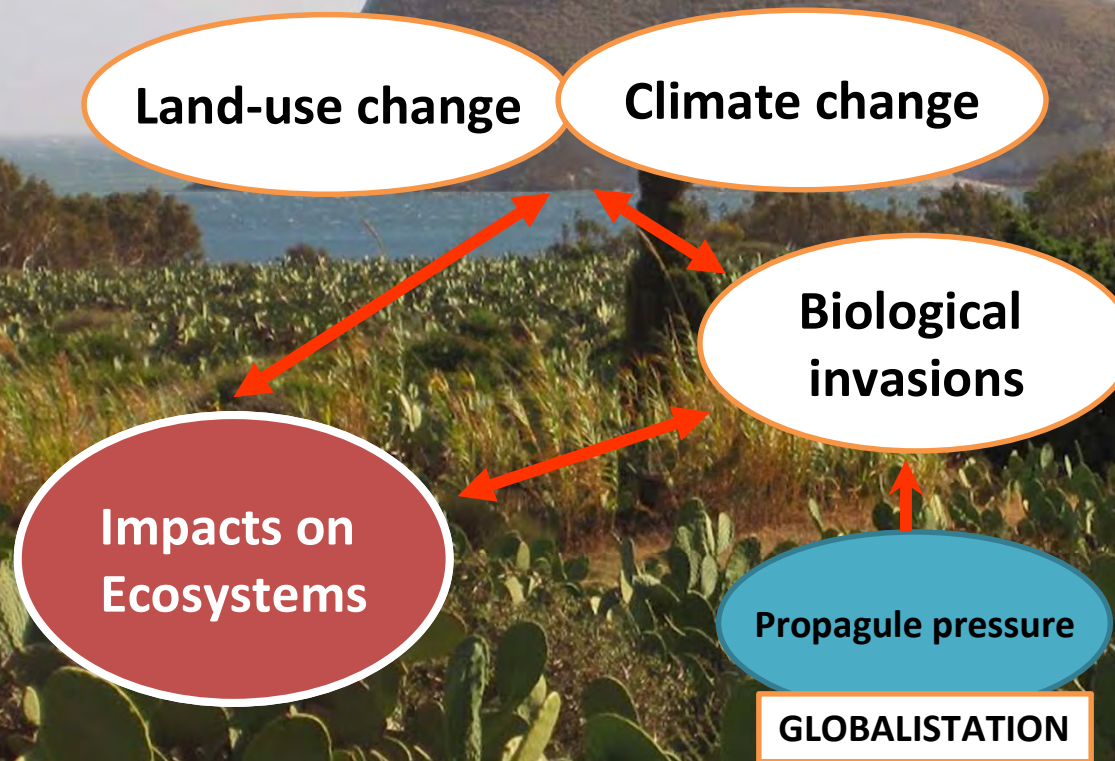
LEVEL OF
INVASION

Non-native species richness



González-Moreno et al 2013 Landscape Ecology

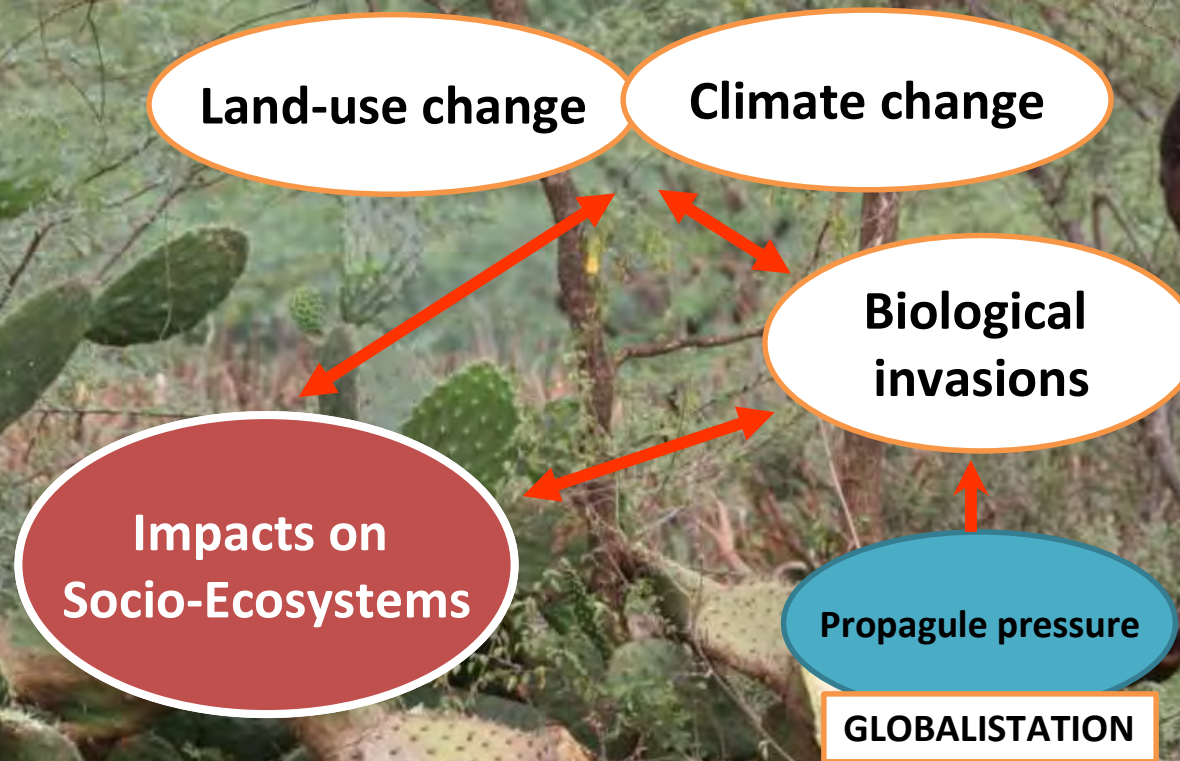
Global Change



Modified from Dukes & Mooney (1999)



Global Change



Modified from Dukes & Mooney (1999)

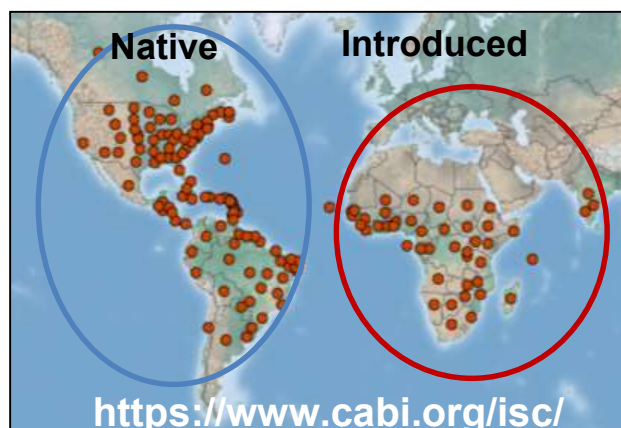


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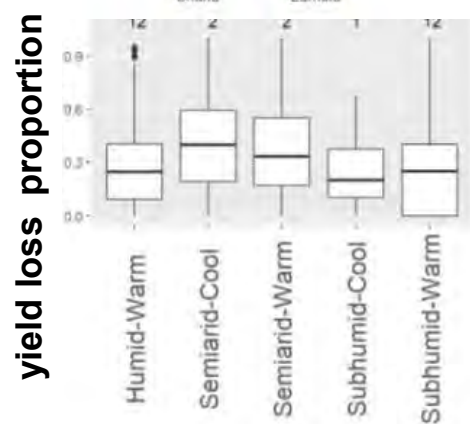
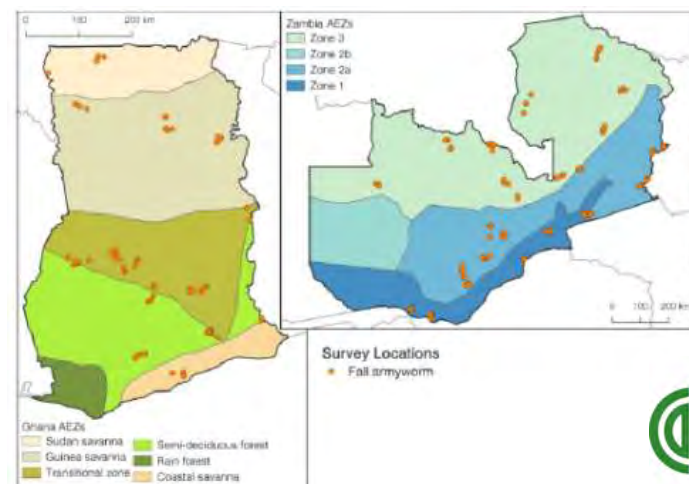
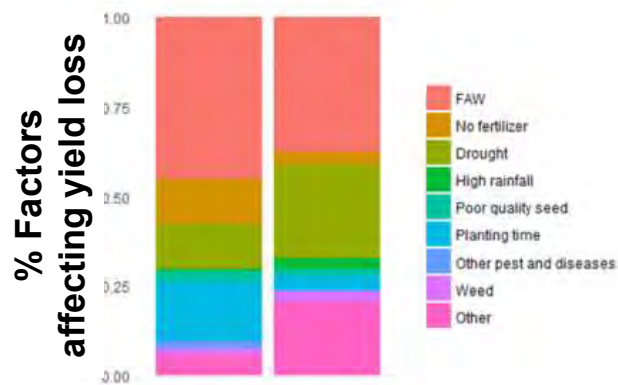


Agriculture NIS

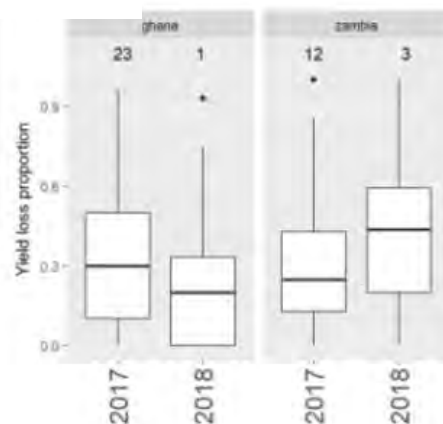
Fall armyworm
(*Spodoptera frugiperda*)



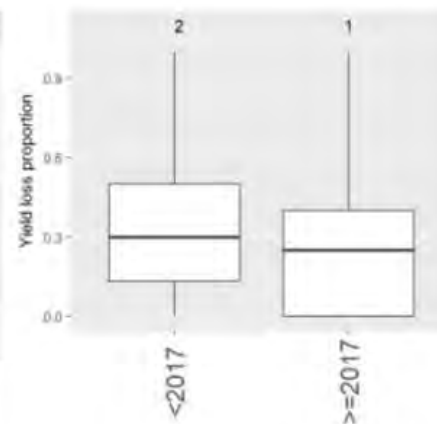
The impact



Agroecological zones

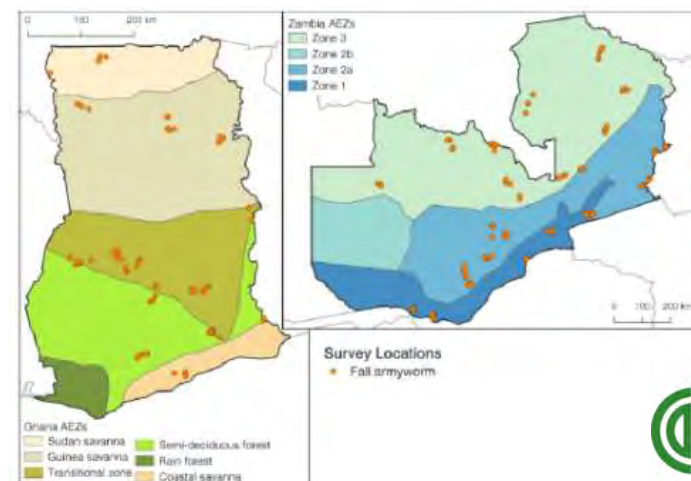
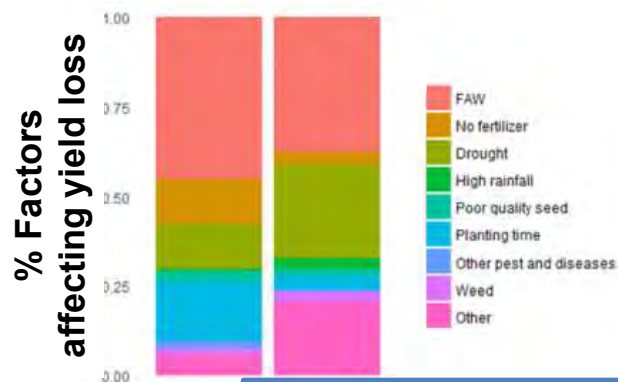


Year

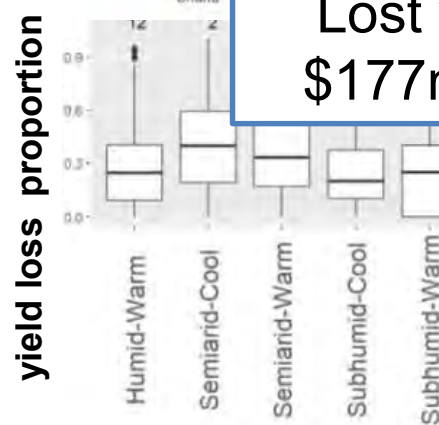


Time since seen

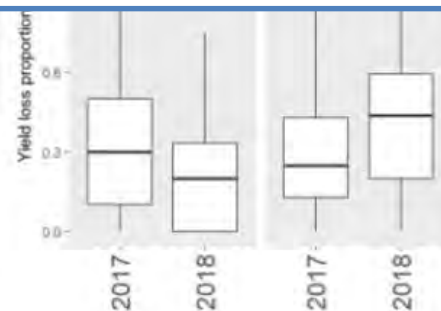
The impact



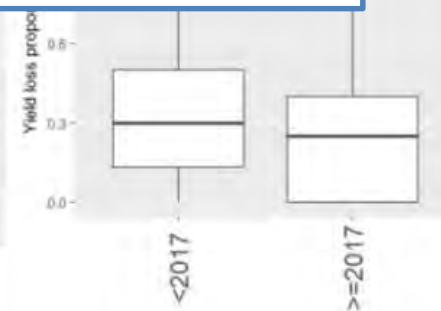
Lost value of the annual maize crop
\$177m Ghana and \$159m in Zambia



Agroecological zones



Year



Time since seen



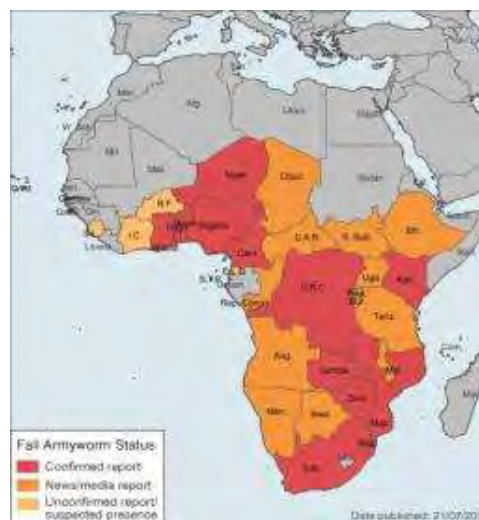
The spread

First official report in West Africa in 2016 (Goergen *et al.* 2016 PLoS ONE)

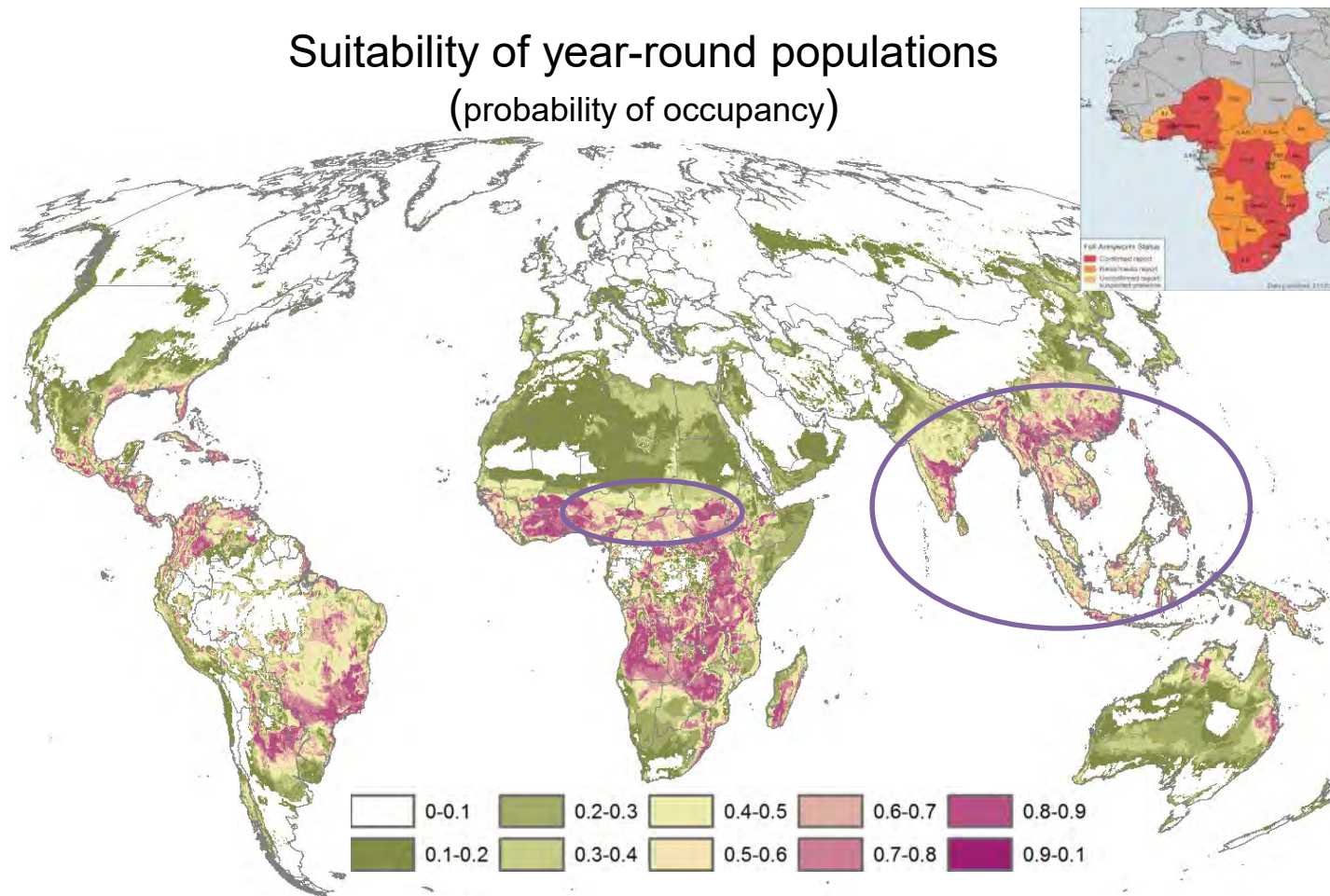
April 2017



September 2017



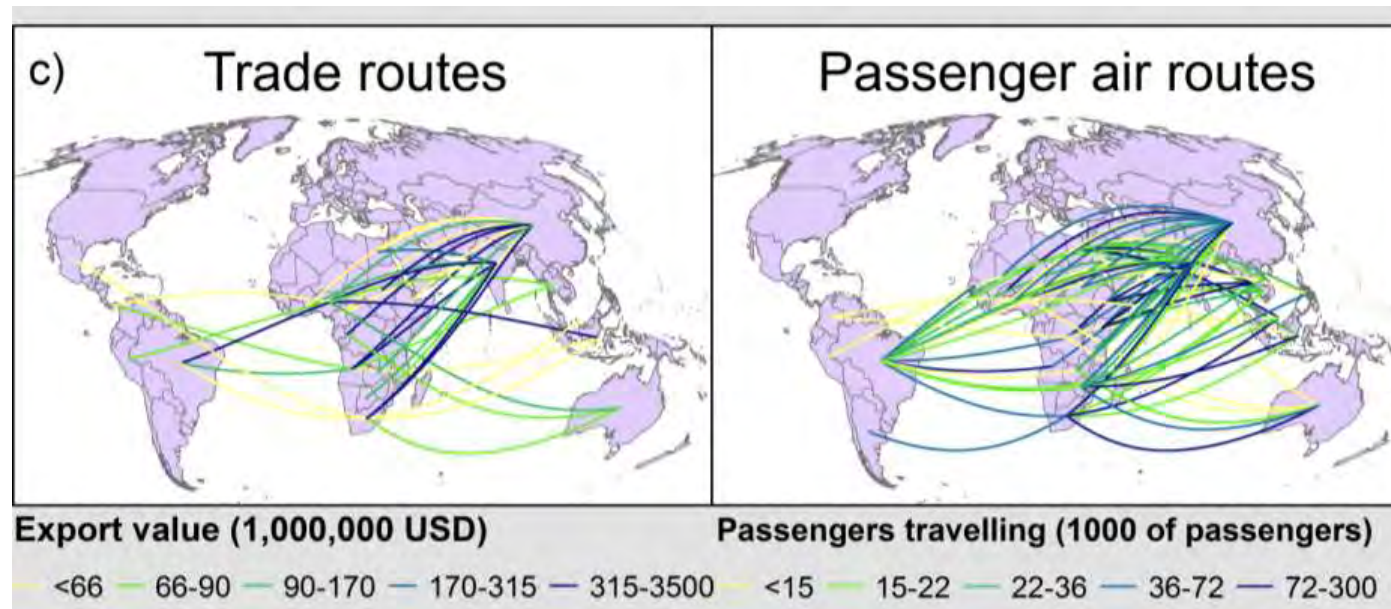
Suitability of year-round populations (probability of occupancy)



Early et al 2018. Neobiota



Where next?



Early et al 2018. Neobiota



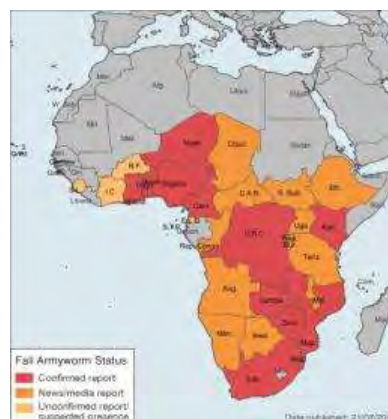
The spread

First official report in West Africa in 2016 (Goergen *et al.* 2016 PLoS ONE)

April 2017



September 2017



September 2018



2018 First reported in India!

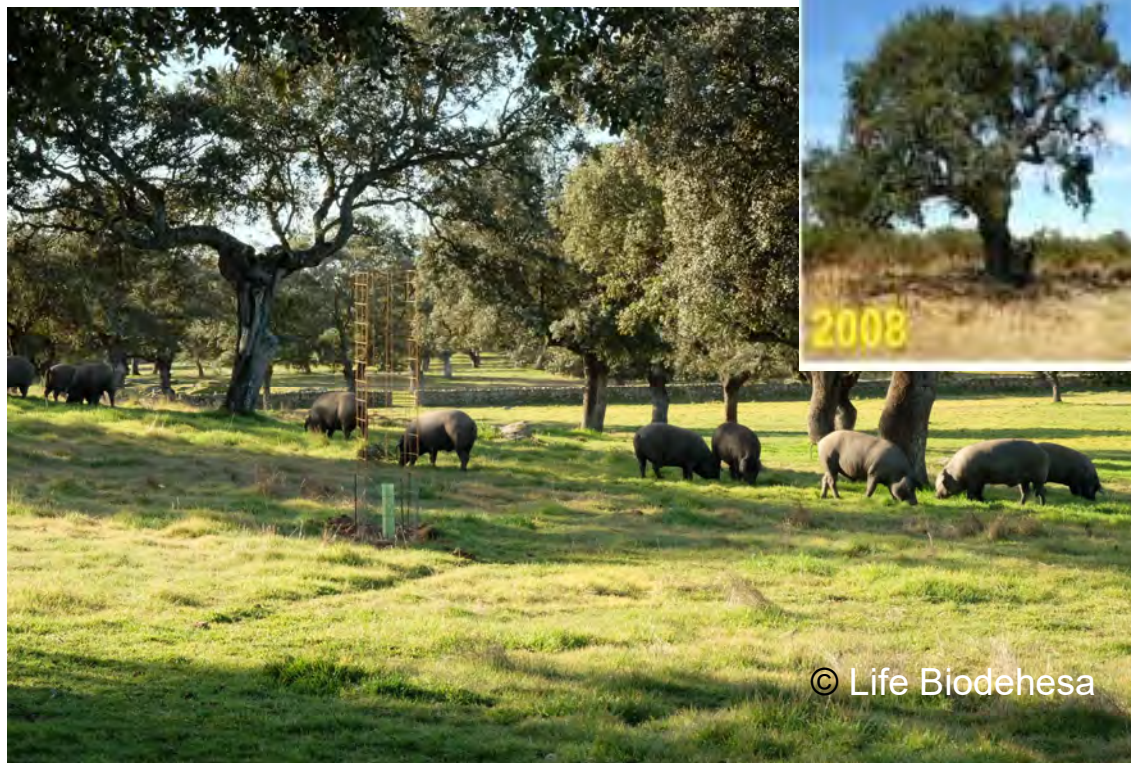




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Forest decay and NIS



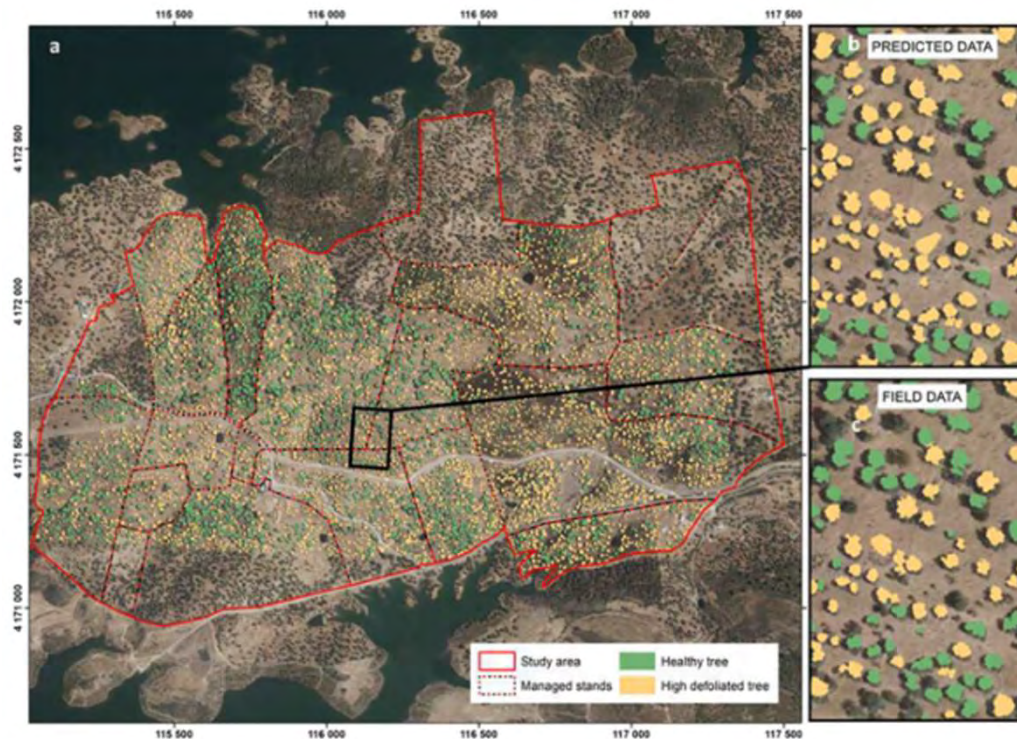
© Esperanza Sánchez UCO

Invasive soil pathogen
Phytophthora cinnamomi

© Life Biodehesa



Quantifying impact

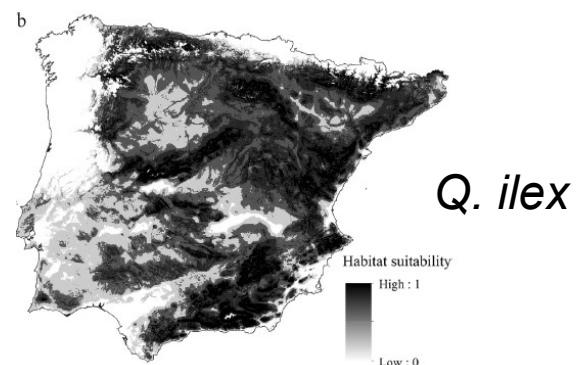
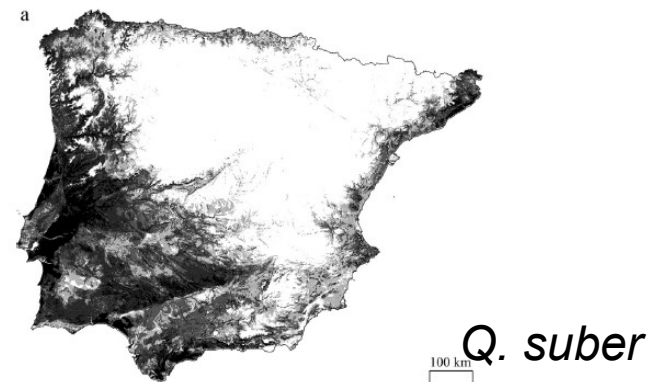
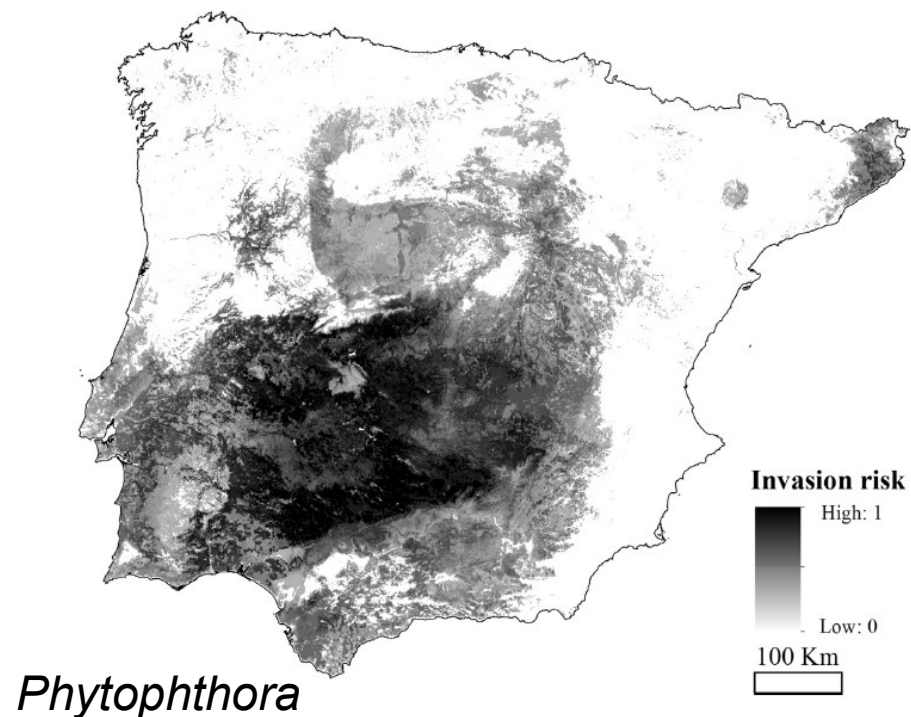


- Detecting defoliation from “above”
- Multispectral WorldView-2 (WV-2) and Airborne Laser Scanning (ALS) overall classification accuracy (86.7%) and the highest Kappa index (0.73).

Navarro-Cerrillo et al. 2019, Foreco



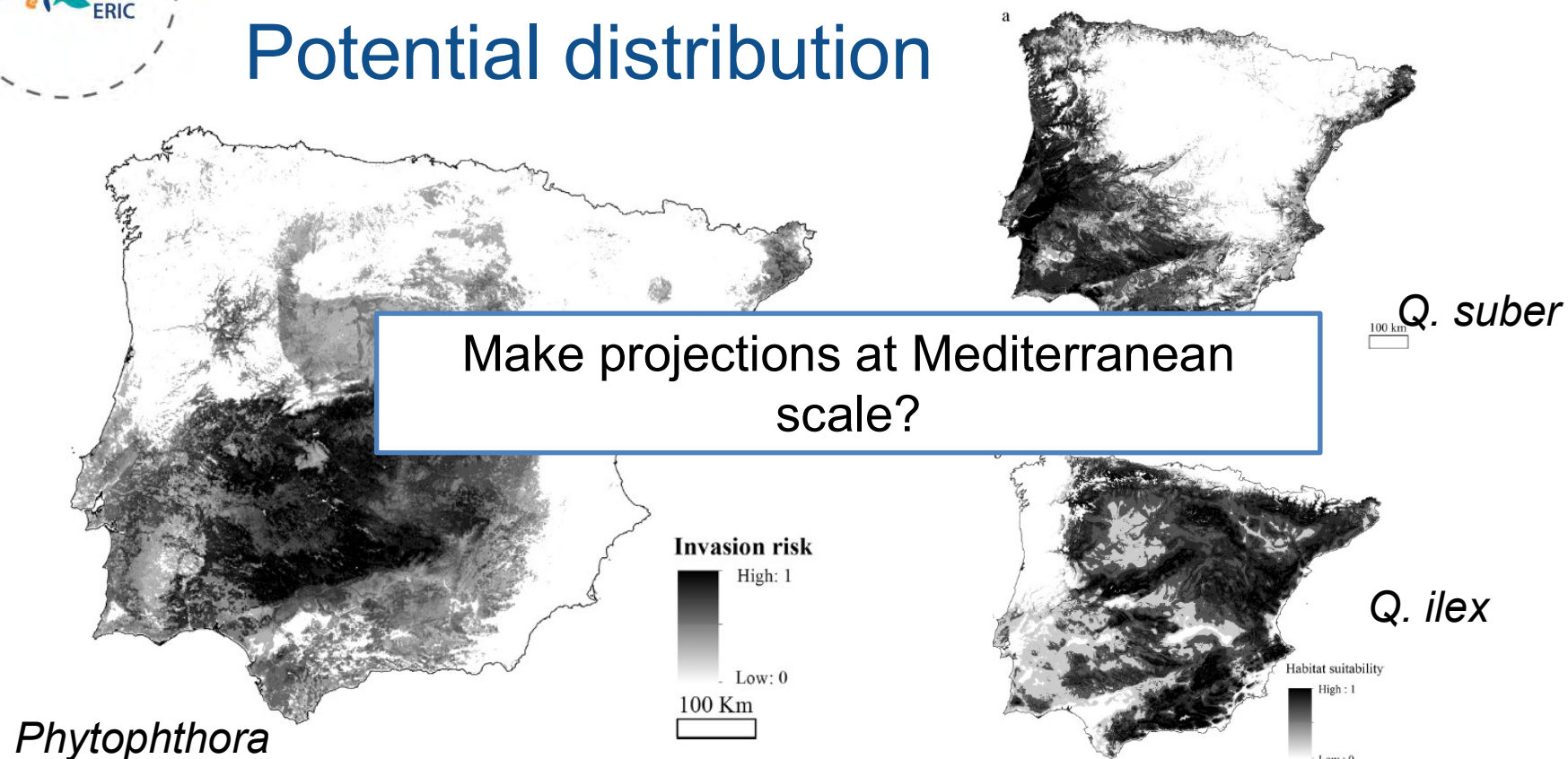
Potential distribution



Hernández-Lambrano et al 2018, Foreco



Potential distribution



Hernández-Lambrano et al 2018, Foreco

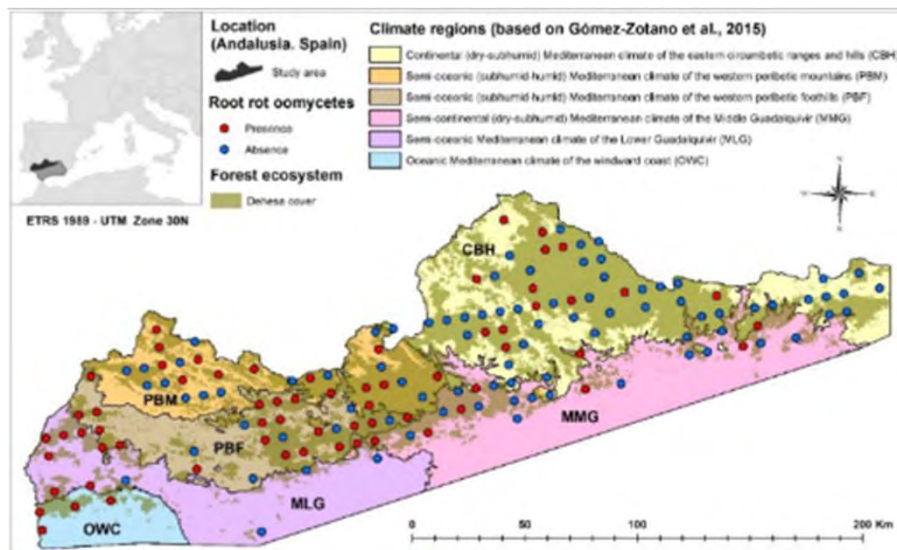


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The environmental drivers influencing spatio-temporal dynamics of oak defoliation and mortality in *dehesas* of Southern Spain

Rafael Sánchez-Cuesta^{*}, Francisco J. Ruiz-Gómez, Joaquín Duque-Lazo, Pablo González-Moreno, Rafael M. Navarro-Cerrillo



Learning from standardized forest inventories:

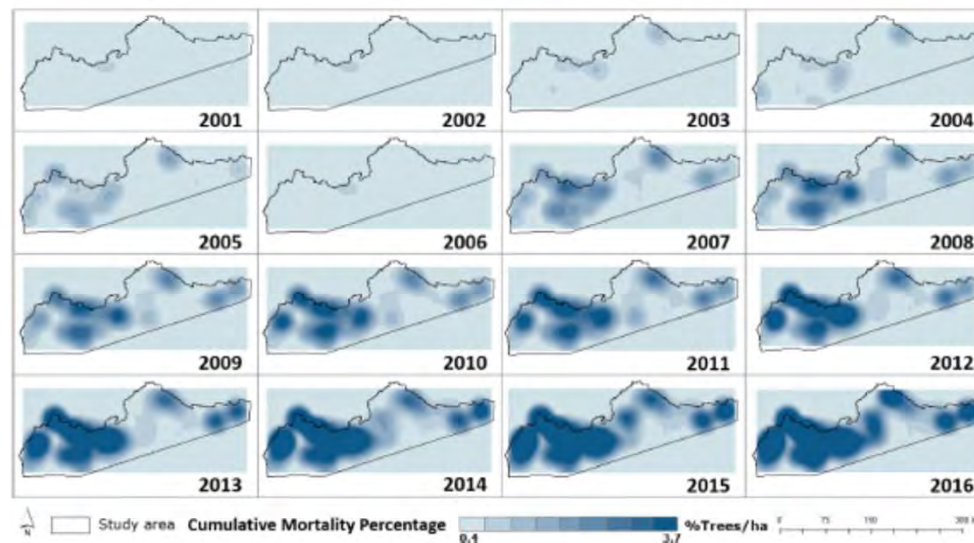
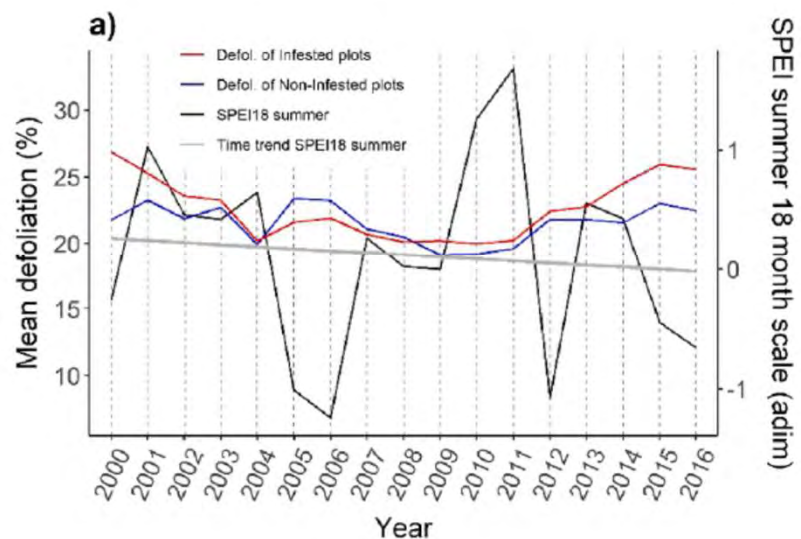
Spatio-temporal patterns of mortality and defoliation?

Environmental factors triggering decay?

What's the effect of *P. cinnamomi*?



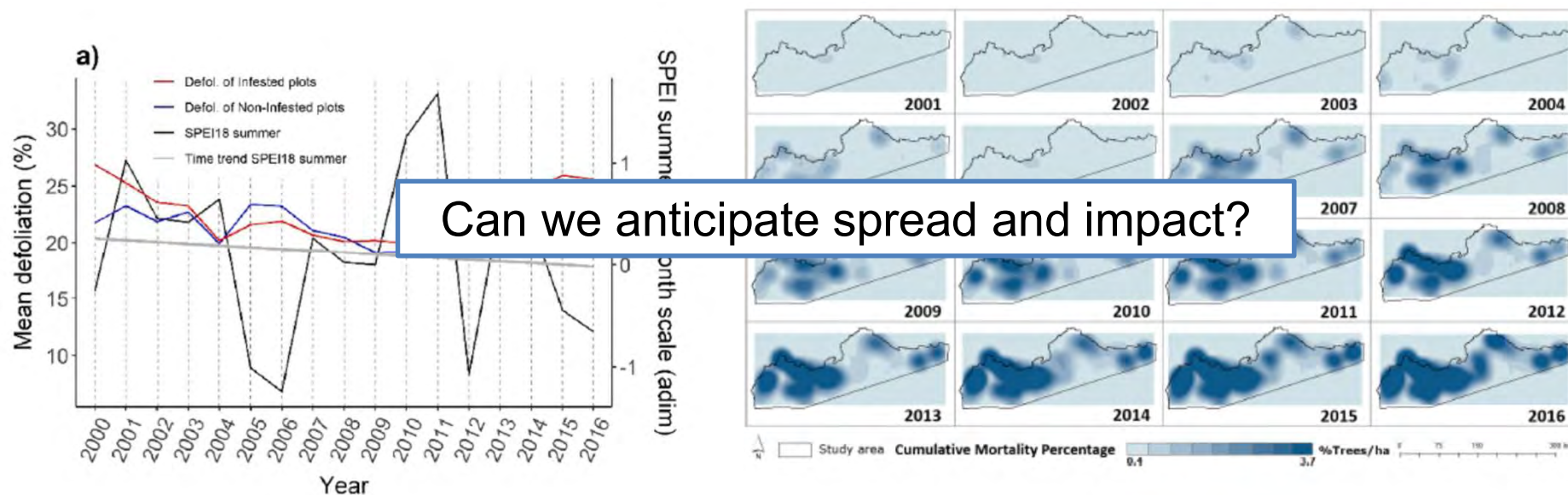
Learning from the time line



Sánchez-Cuesta et al 2021. Foreco



Learning from the time line



Sánchez-Cuesta et al 2021. Foreco



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LIFEWATCH scope

- Include the temporal domain.
- Long term monitoring of IAS and their **drivers** in systematic designs for FAST analysis and response
- Providing evidence. Monitoring impact on socioecosystems, both positive and negative.
- Novel technologies: remote sensing at high spatial, temporal and spectral resolution



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Thank you!



IJCI-2017-31733

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