SPATIO-TEMPORAL DYNAMICS OF MANGROVE FOREST DIVERSITY IN EASTERN THAILAND

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BACKGROUND

- Spatiotemporal information on mangrove species assemblage of natural, regenerated, and rehabilitated is an essential prerequisite for effective strategies for biodiversity conservation and management. Appropriate linkage of field-based sampling strategies and remote sensing approaches of spatial heterogeneity still hamper the detection of the species distribution and its temporal development.
- To address these concerns, we must improve our ability to gather reliable forest inventory measurements, spatial scale biodiversity predictions, and good practices for using Earth observation data.

OBJECTIVES

- We aim to investigate the knowledge gaps considering potential spatial diversity, sea-to-land species distribution, and the historic state of mangrove forest species, and tested the role of environmental settings such as topography and anthropogenic (rehabilitation) settings on diversification.
- In addition, explore the full potential of freely available Landsat and a combination of Sentinel-1 SAR and -2 MSI satellite imagery to discriminate the spatiotemporal patterns of mangrove species diversity.

STUDY SITE

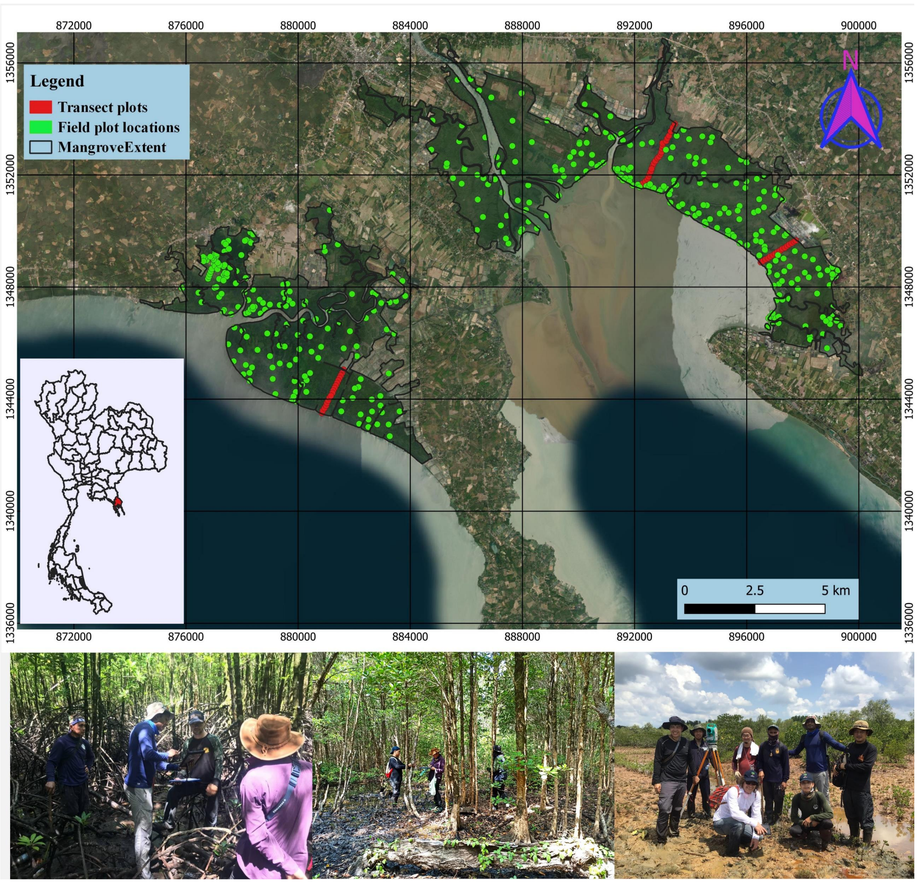

Figure 1 Location of the study site in the Trat Province, Thailand. Stratified samples across the landscape and three transects perpendicular to shoreline 257 plots are 10 x 10 m, 69 Ground points, 134 using high resolution database)

METHODS

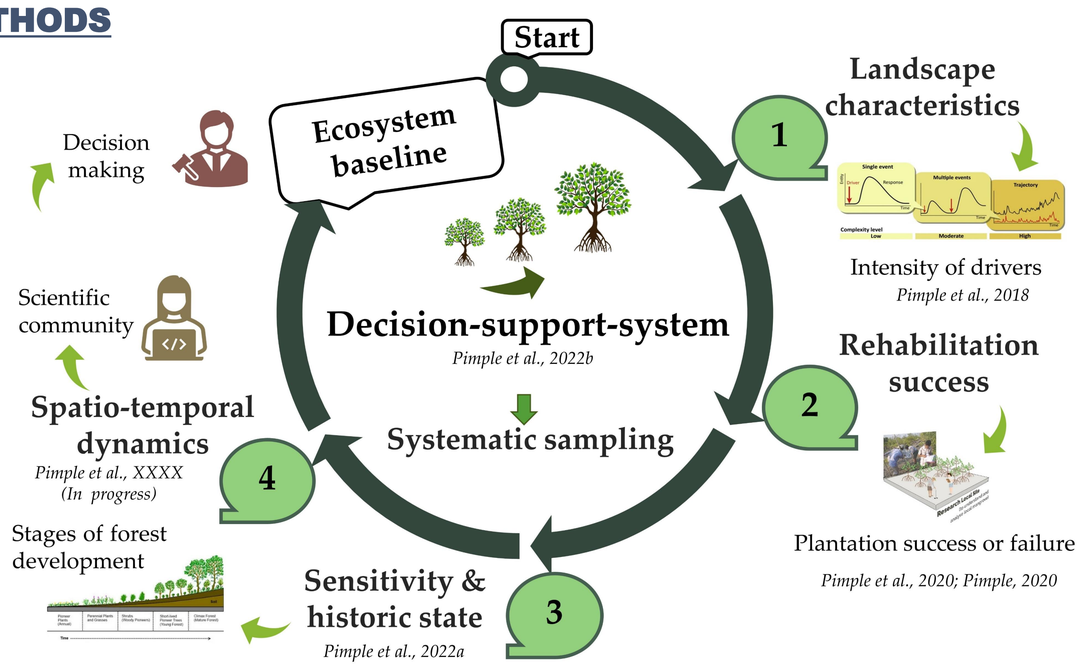

Figure 2 Decision-support-system for monitoring species diversity and management aspects of mangrove forestry. Key component of decision-support-system for ecosystem baseline

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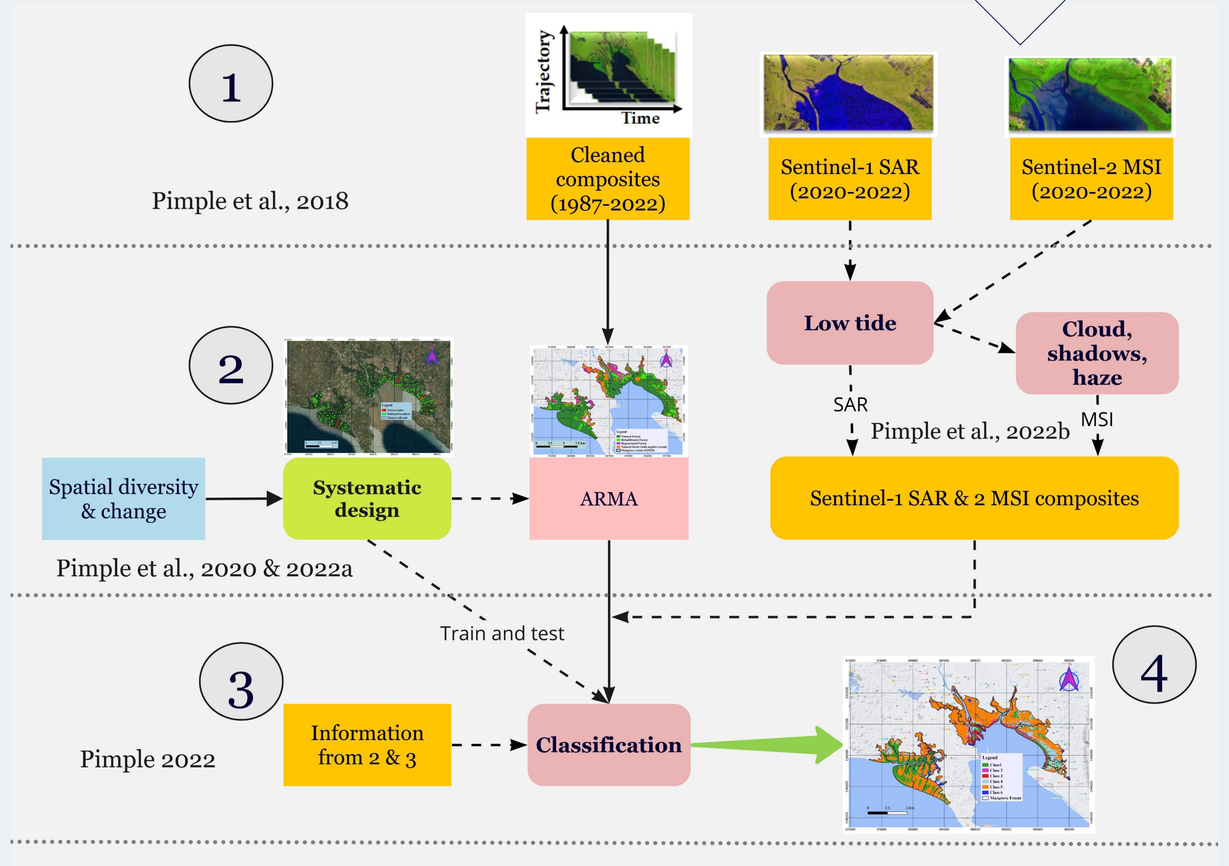
RESCuE

Figure 3 Practical implementation of decision-support-system. ARMA: automatic regrowth monitoring algorithm; SAR: synthetic aperture radar; MSI: multi-spectral instrument



RESULTS

The key findings include: (1) the mangrove forest made a significant recovery over time (1987-2022), due to local community's awareness for mangrove conservation. (2) the rehabilitated mangroves (34 years old) at the study site consist of monocultures of Rhizophoraceae, however, reached heights comparable to adjacent natural stands. (3) the absence of any single species zonation patterns within transects along the elevation gradient from sea to land. (4) final classification identified six groups of species. Class 1 and 7 was monoculture of natural *Rhizophoraceae*. The remaining Classes were an association of relevant species (Figure 4)

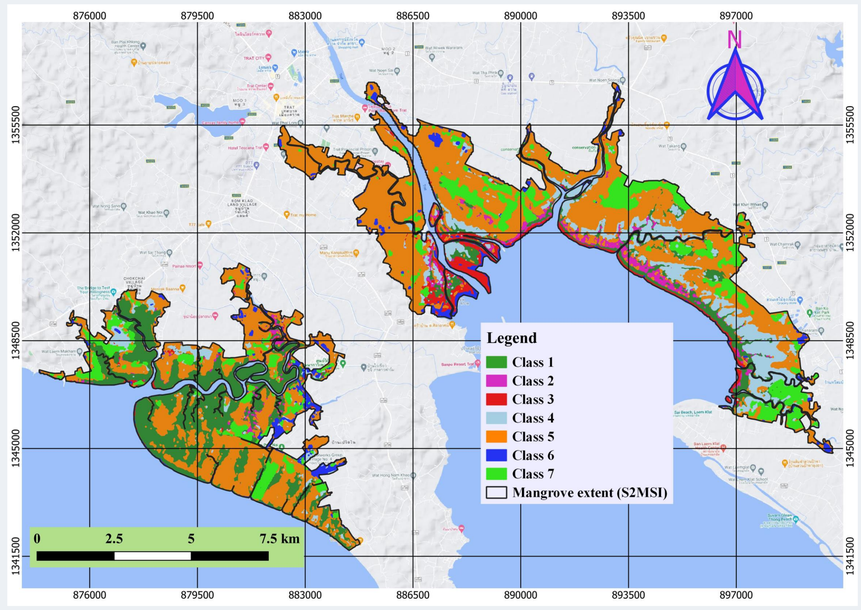


Figure 4 Spatiotemporal dynamics mangrove species diversity (1987-2022). Class 1: natural *Rhizophoraceae* (Ra and Rm); Class 2: association of Xg, Xm, Bg, Ea and Ra; Class 3: contains Aa or Am or Sa or So; Class 4: association of Ll, Lr, Ct and Ra (scrub stands); Class 5: association Bruguiera spp.(Bg, Bc, Bs and Bh), Ct, Ea and Ra; Class 6: water and mud; Class 7: rehabilitated and *Rhizophoraceae* (Rap and Ram). *Sonneratia alba* (Sa), *Avicennia alba* (Aa), *Avicennia marina* (Am), *Bruguiera cylindrica* (Bc), *Bruguiera gymnorhiza* (Bg), *Bruguiera sexangula* (Bs), *Bruguiera hainesii* (Bh), *Ceriops tagal* (Ct), *Excoecaria agallocha* (Ex), *Intsia bijuga* (Ib), *Lumnitzera littorea* (Ll), *Lumnitzera racemosa* (Lr), *Rhizophora apiculata* (Ra), *Rhizophora mucronata* (Rm), *Rhizophora apiculata* planted (Rap), *Rhizophora mucronata* planted (Rmp), *Xylocarpus granatum* (Xg), and *Xylocarpus moluccensis* (Xm). Note: *Sonneratia ovata Backer* (So), *Ceriops decandra* (Cd), *Bruguiera hainesii* (Bh) and *Intsia bijuga* (Ib) rarely occurred.

Conclusion:

The proposed decision-support-system demonstrates several potential applications for restoration management planning, and therefore will be a useful tool to measure and evaluate spatial scale species biodiversity.

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