

Typhoon disturbances and a subtropical forest canopy dynamics

the use of imagery with very-high spatial & temporal resolution for an ecological study

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In Taiwan, typhoons are the most common natural disturbance of low elevation forests. Strong winds and rainfall lead to defoliation and the formation of gaps within the canopy, contributing to the formation of a heterogeneous and dynamic environment with regenerating patches. Recently, the shapes of these openings have been suggested to have different origins and to follow distinct regenerative patterns¹ although ecological and regeneration differences have not yet been studied. In addition, typhoons are known to affect the phenology of plant species such as *Ficus* spp.²⁻³, but little is known about the phenology change at the forest scale.

Research questions

1. Phenological change at individual and forest scale (Fig1.A)

- ◆ Do canopies that have recently been hit by typhoons experience phenological changes such as shift or difference in intensity?
- ◆ Is the amplitude of this change varying between species, phenological phases, and locations?

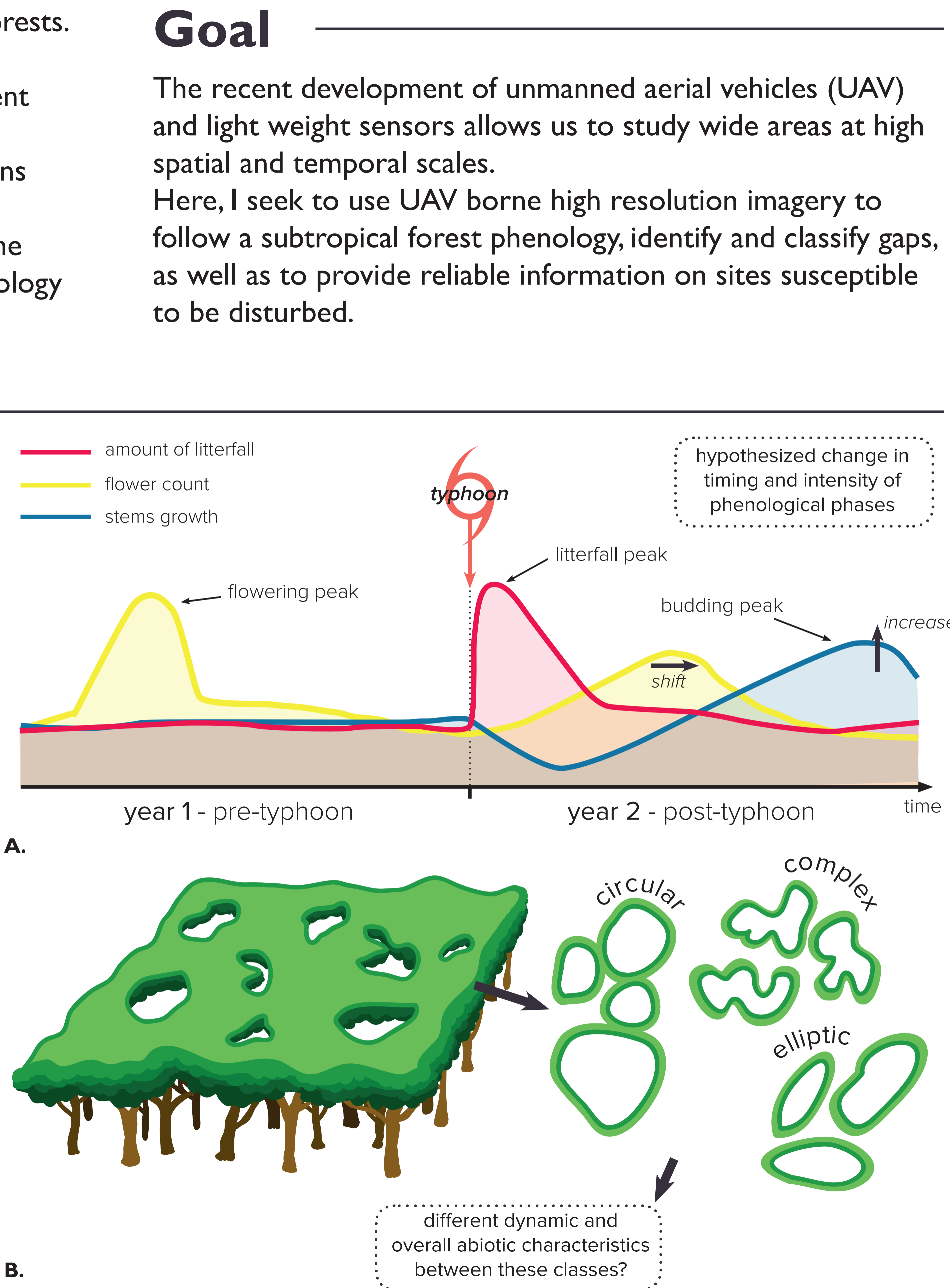
2. Gaps-specific dynamics (Fig1.B)

- ◆ Do gaps belonging to different metrics-based classes have different environments?
- ◆ Do they have specific damage susceptibility and regenerative patterns?

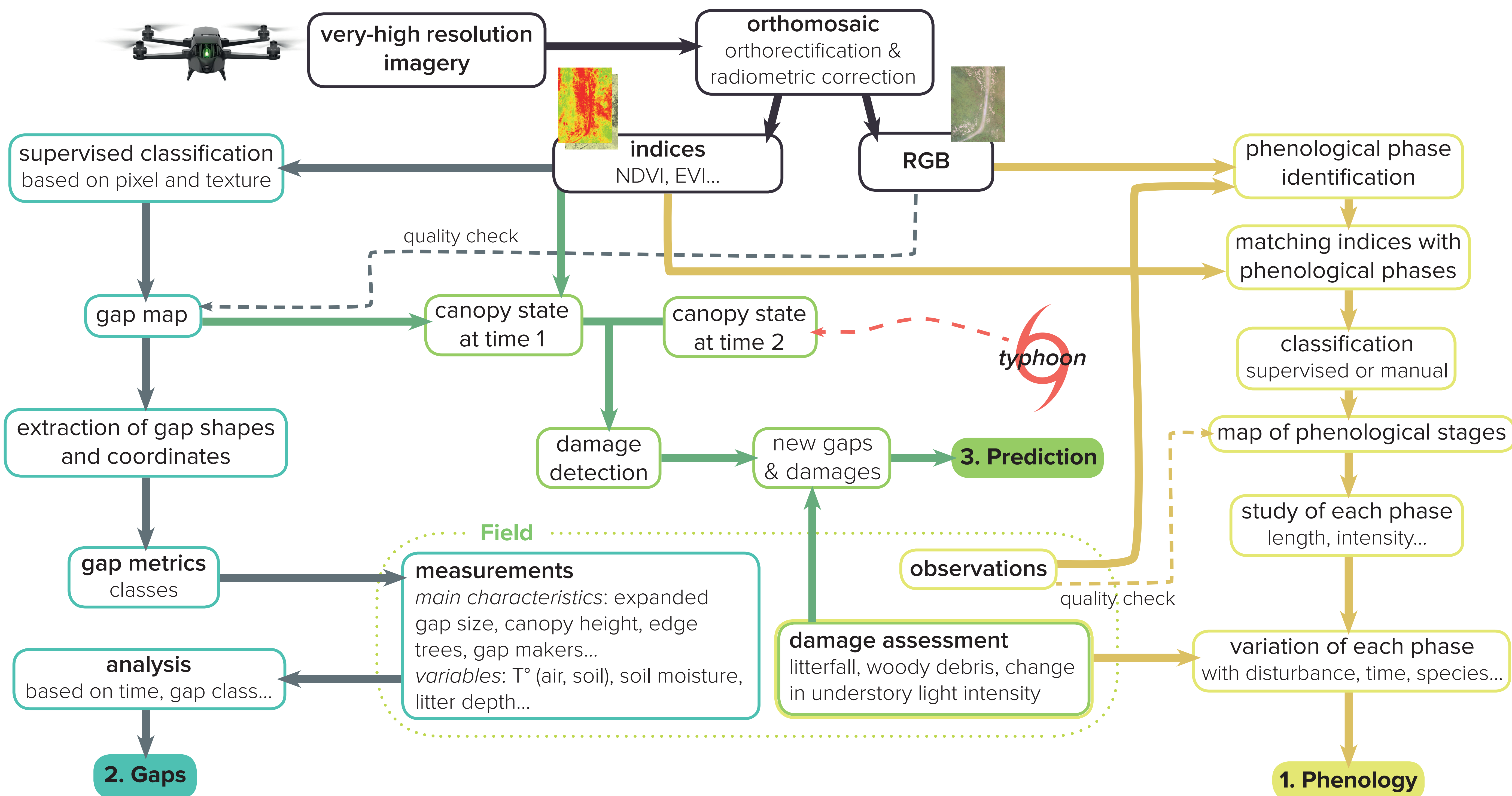
3. Susceptibility & damage prediction

- ◆ Can typhoon-caused damages be predicted with very-high resolution data through the detection of weakened or susceptible sites?

► Figure 1 - A. Hypothesized shift and intensity change of canopy phenological stages due to typhoon disturbance (based on observations of *Ficus* spp.²⁻³). B. Gaps classification based on metrics - here summarized by shape - may be associated to different environmental conditions.



Method



References

(1) Wu, C.-D. et al. Scientific reports 6 (2016): 38217.
(2) Bain, A. et al. Acta Oecologica 57 (2014): 124-134.
(3) Kuo, C.-C. et al. Scientific reports 7.1 (2017): 14699.
(4) Tu, J. et al. Journal of Climate 22.13 (2009): 3617-3628.