

Ridge to Reef: Land Use, Sedimentation, and Marine Resource Vulnerability in Raja Ampat, Indonesia 🦳



Student Team: Brandon Doheny, Katy Maher, Andrew Minks, Jeremy Rude, Marlene Tyner | Faculty Advisor: Thomas Dunne | Client: Conservation International

Sedimentation Expected in Raja Ampat

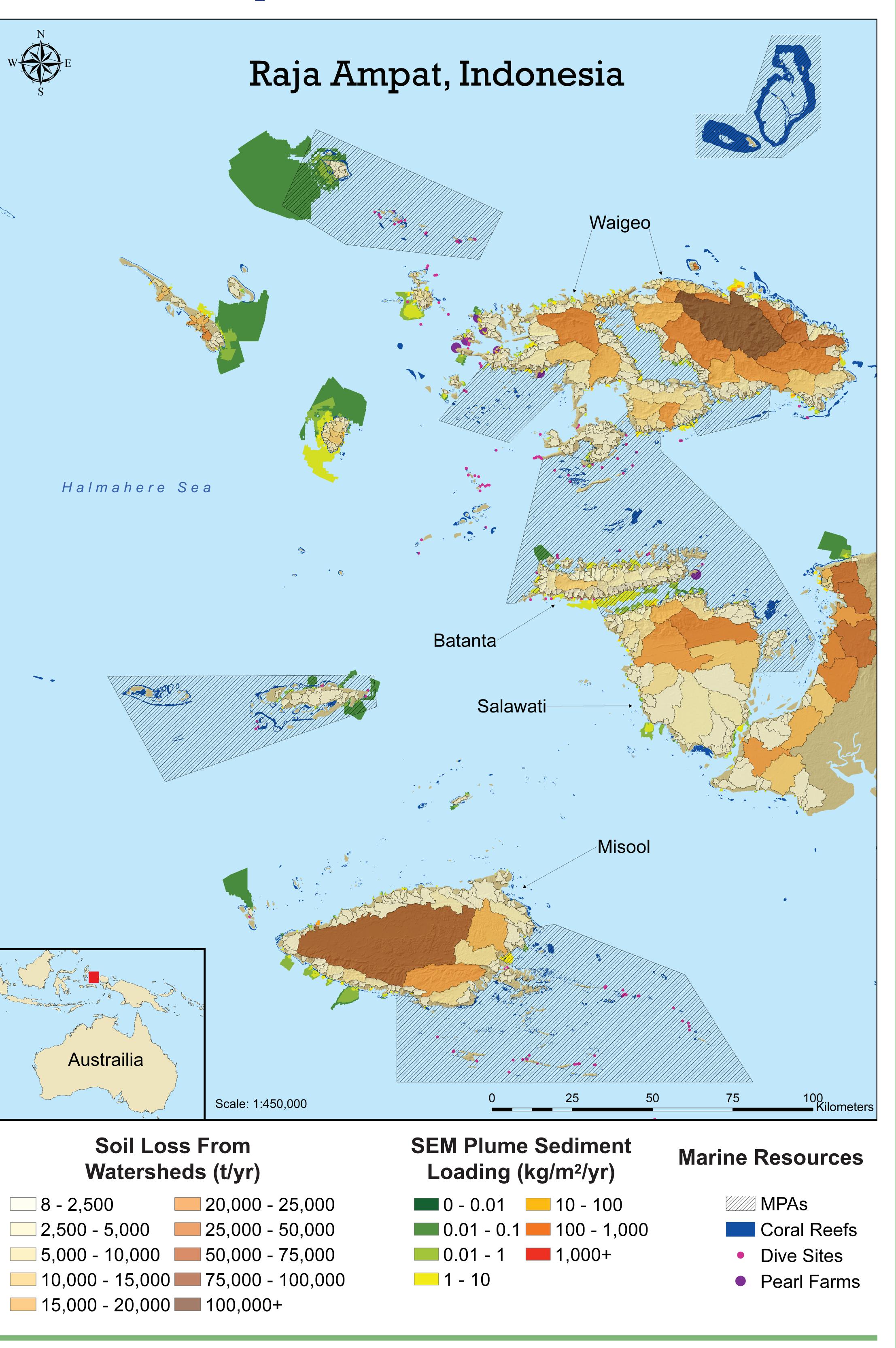
- Raja Ampat, Indonesia is home to some of the most biodiverse tropical coral reef ecosystems in the world.
- Sedimentation is one of the primary threats to coral reef ecosystems.
- Expanding mining and logging operations, a developing tourism industry, and population growth threaten to increase sedimentation in Raja Ampat.
- A tool was needed that could inform land use planners and other stakeholders of the risk land use change poses to marine resources.



Tool Capabilities

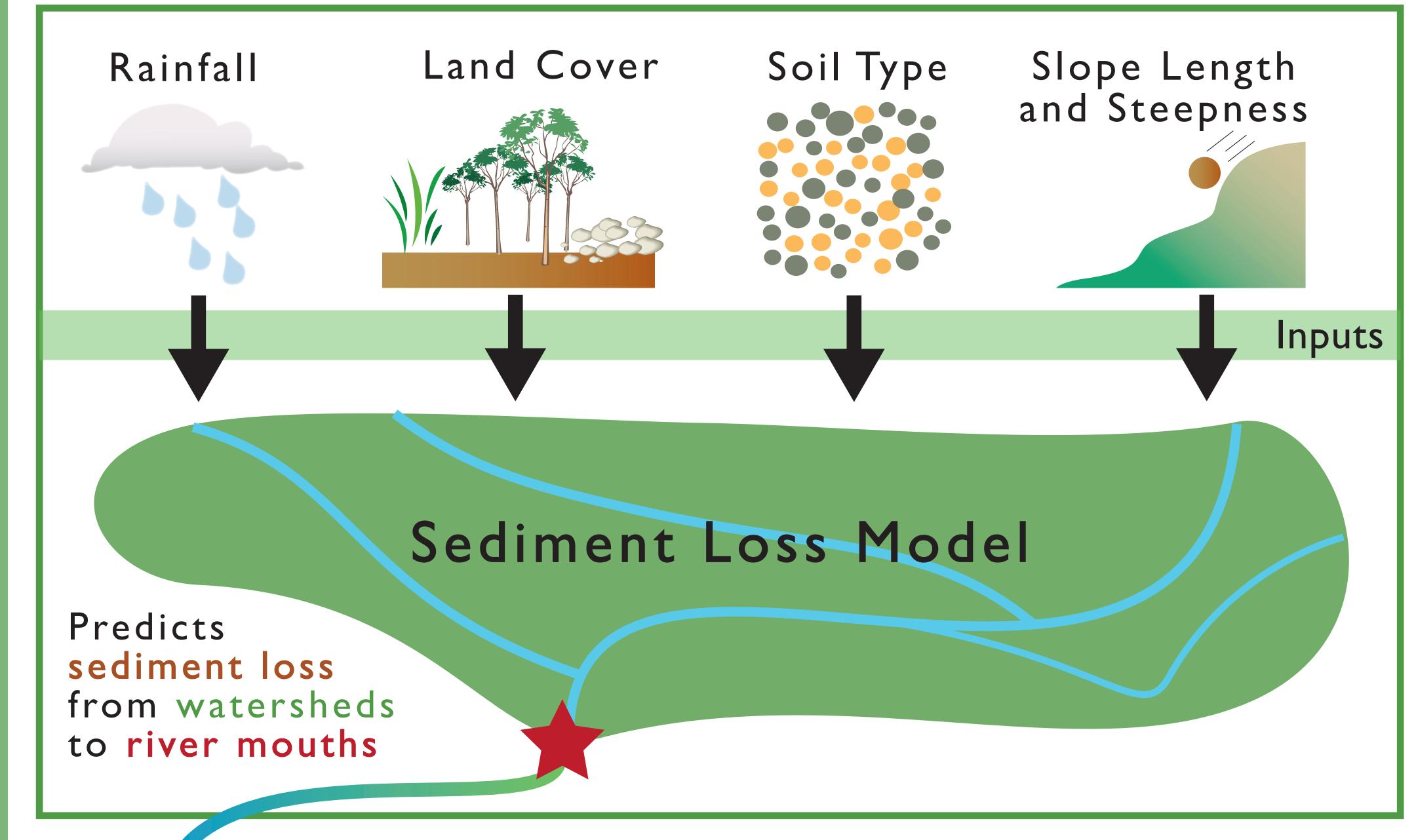
- Predicts sediment yields to river mouths resulting from current land use and any user-specified land use change scenarios.
- Maps near-shore areas at risk to sedimentation extending from each river mouth.
- Displays the extent of marine resources that overlap with potential sedimentation zones, including coral reefs, marine protected areas (MPAs), dive sites, and pearl farms.

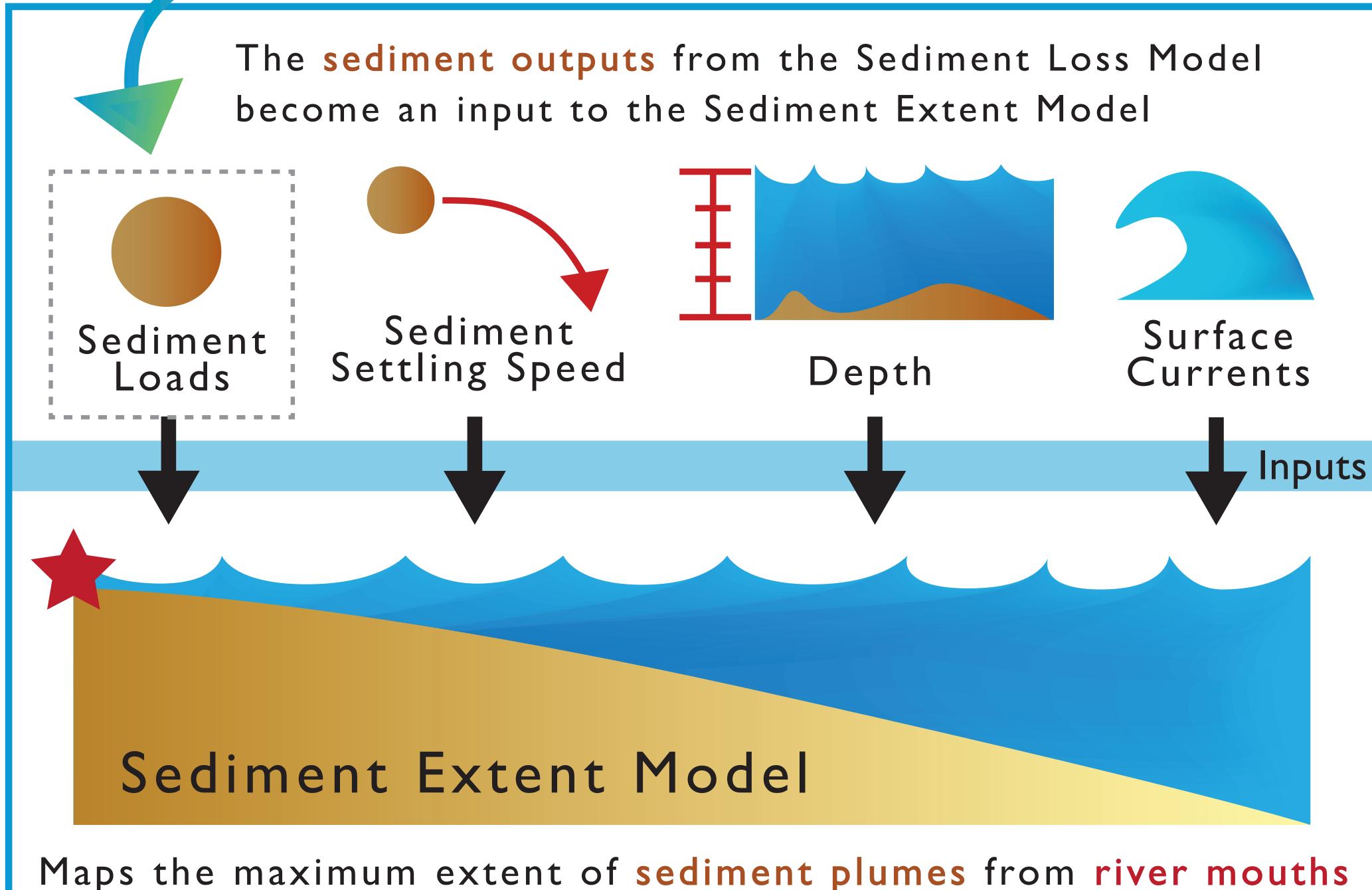
Model Output Under Current Land Use



The plumes cover $1,987 \, \mathrm{km}^2$ of Raja Ampat marine habitat area, impacting: 57 km² of coral reefs 479 km² of MPAs 4 dive sites 1 pearl farm

Coupled Land-Sea Model Methodology





A Useful Planning Tool

- Can compare the changes in soil loss rates for multiple land development scenarios.
- Informs development planning to facilitate marine resource protection.
- Predictions will be improved with locally-derived land data and higher resolution near-shore surface current data.