Integrating ecosystem services into impact assessment and offset siting in Colombia and beyond

natural capital PROJECT

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INSTITUTE ON THE ENVIRONMENT
UNIVERSITY OF MINNESOTA
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Globally, $57 trillion expected spending on new infrastructure to keep pace with growth
Road & rail network length expected to increase 60% by 2050
Nearly 200 countries and many international financial institutions require environmental impact assessments

Limitations of current offset approach

Current focus on biodiversity & ecosystem processes

Transfer or loss of benefits when ecosystems are removed in one place and offset elsewhere

Growing demand for including ecosystem services in mitigation

IFC
International Finance Corporation
World Bank Group

EQUATOR PRINCIPLES

REPÚBLICA DE COLOMBIA

MinAmbiente
Ministerio de Ambiente y Desarrollo Sostenible

ANLA
AUTORIDAD NACIONAL DE LICENCIAS AMBIENTALES

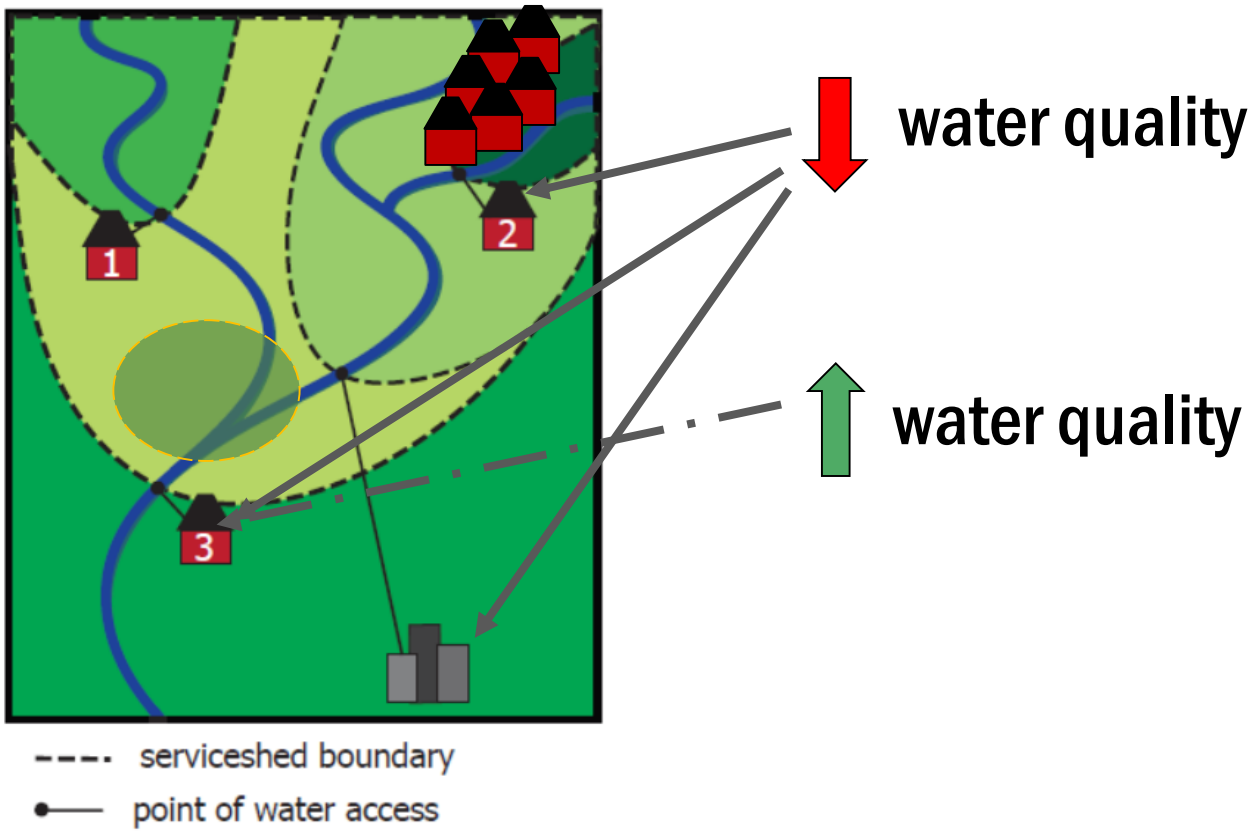
Need for practical approaches and tools to answer questions such as:

- How much habitat and ecosystem services will be lost with project development?
- How much mitigation is needed to offset losses?
- Where should offsets be located to return services to affected people?

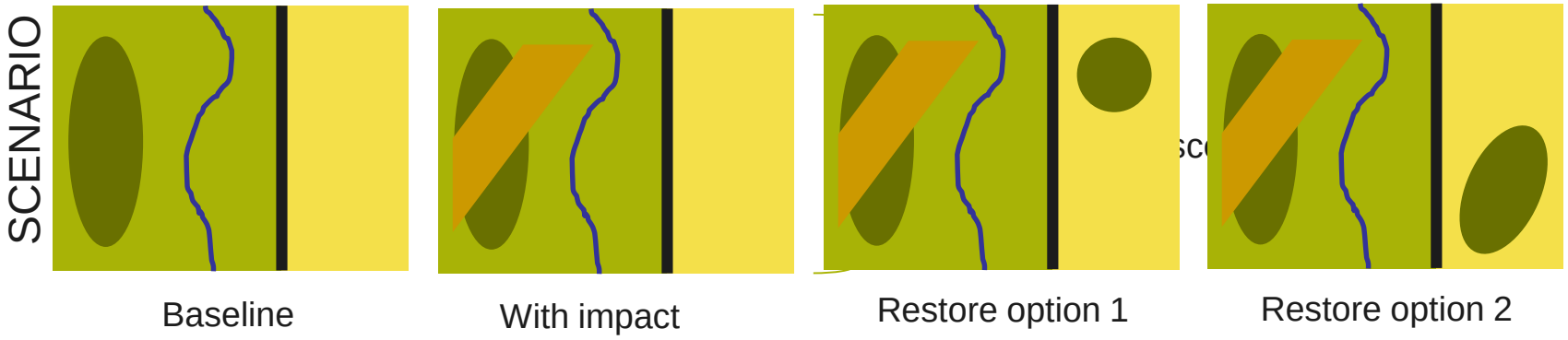
Colombia's 2012 Biodiversity Offset Policy + ecosystem services → OPAL

Offset Portfolio Analyzer & Locator

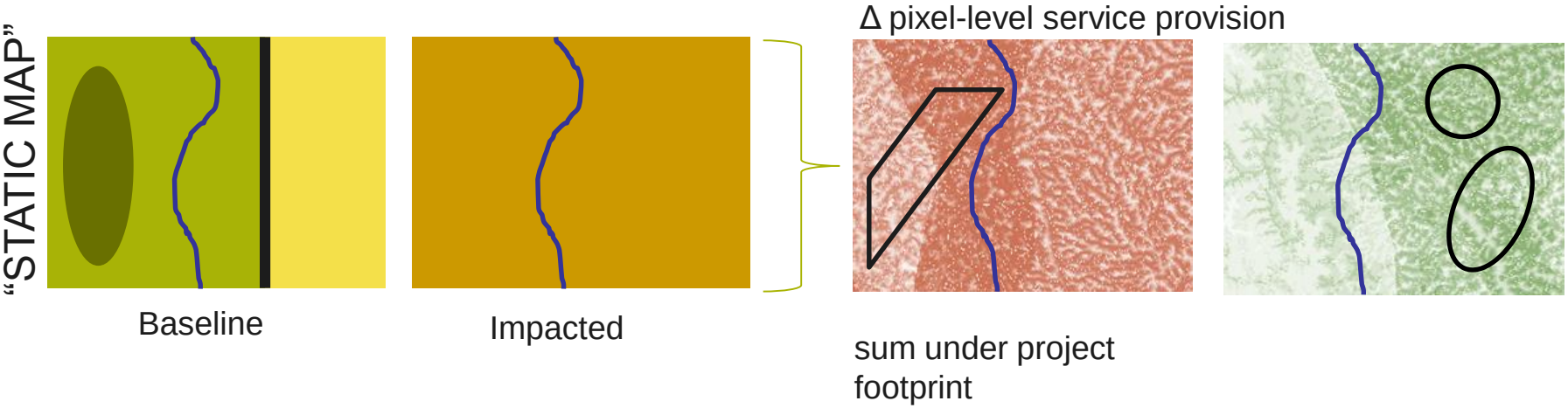
Servicesheds track impacts to people



Static maps simplify repeated analyses

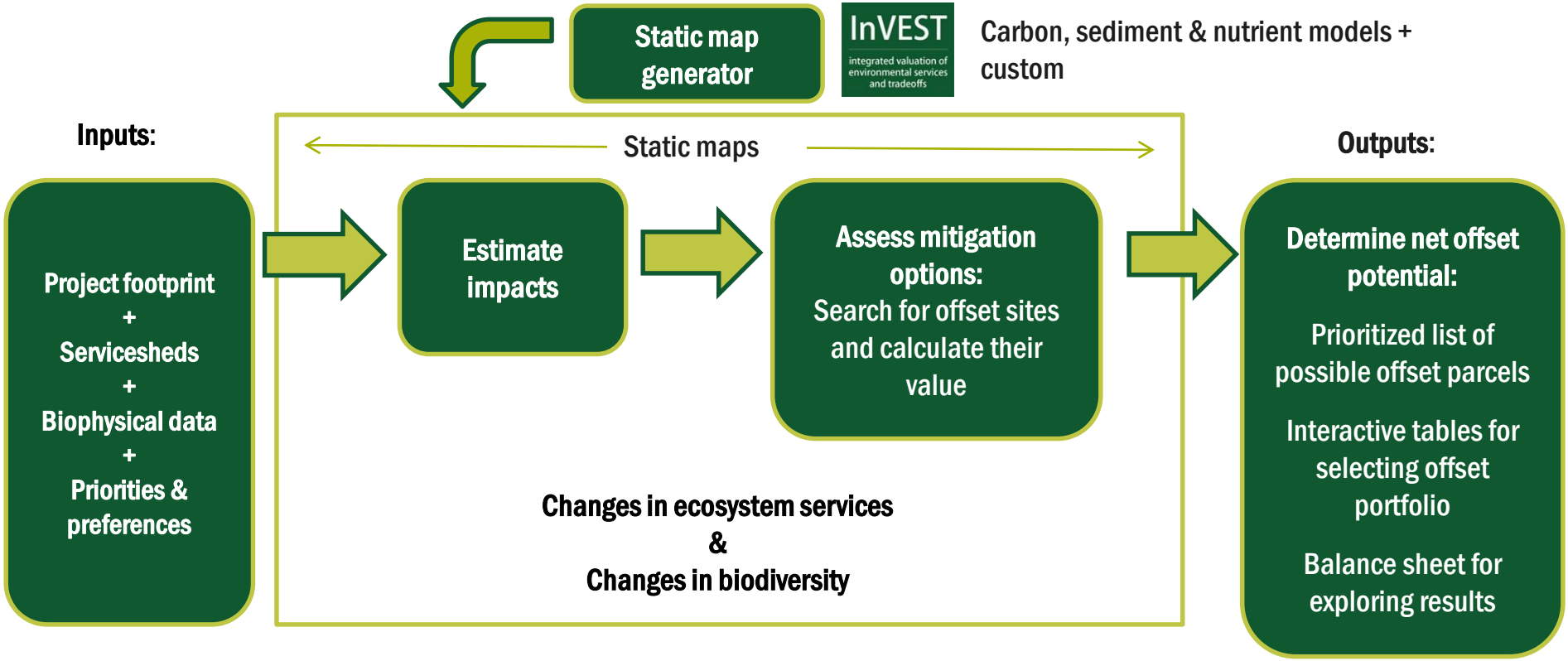


Need to repeat ecosystem service model runs for each impact scenario and all mitigation options



A few upfront model runs provide good repeated approximations of service change (for spatially dependent services)

The OPAL approach



1) Quantifying impacts

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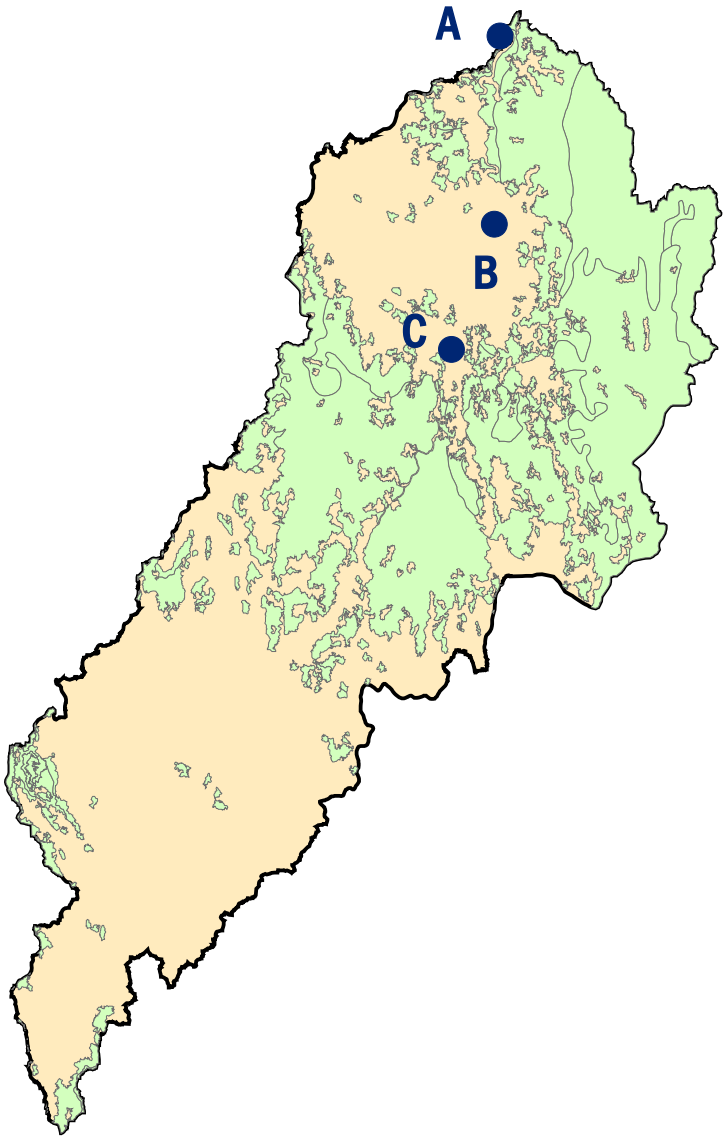

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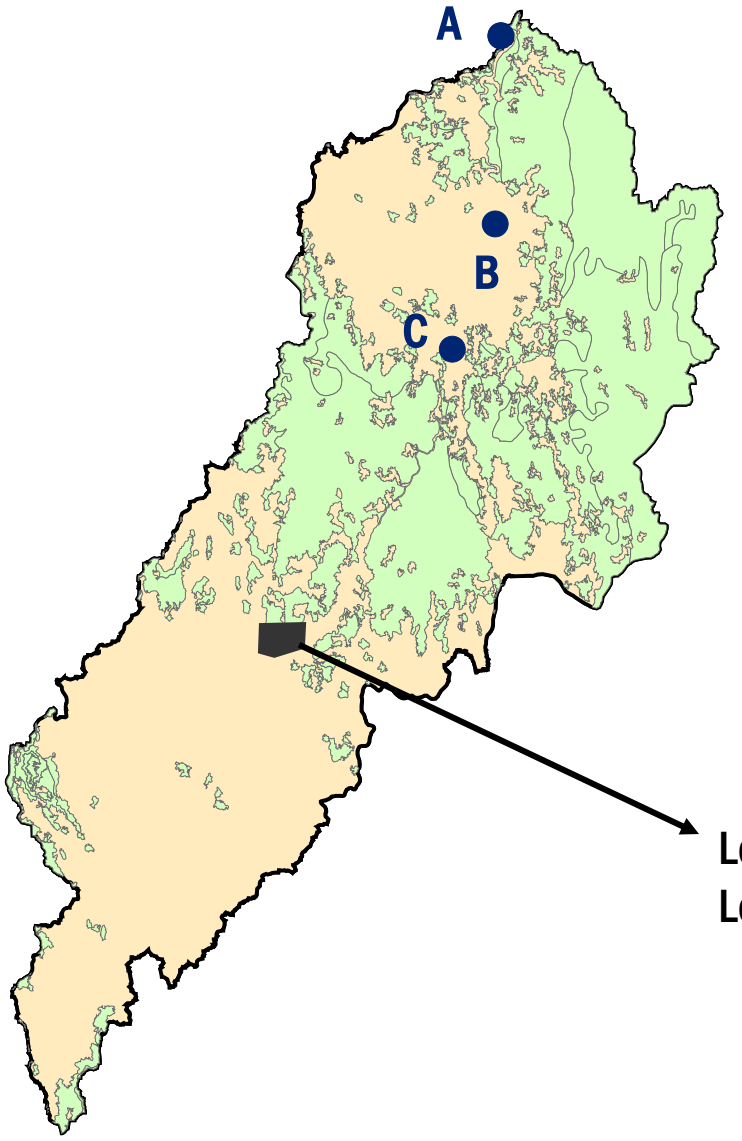
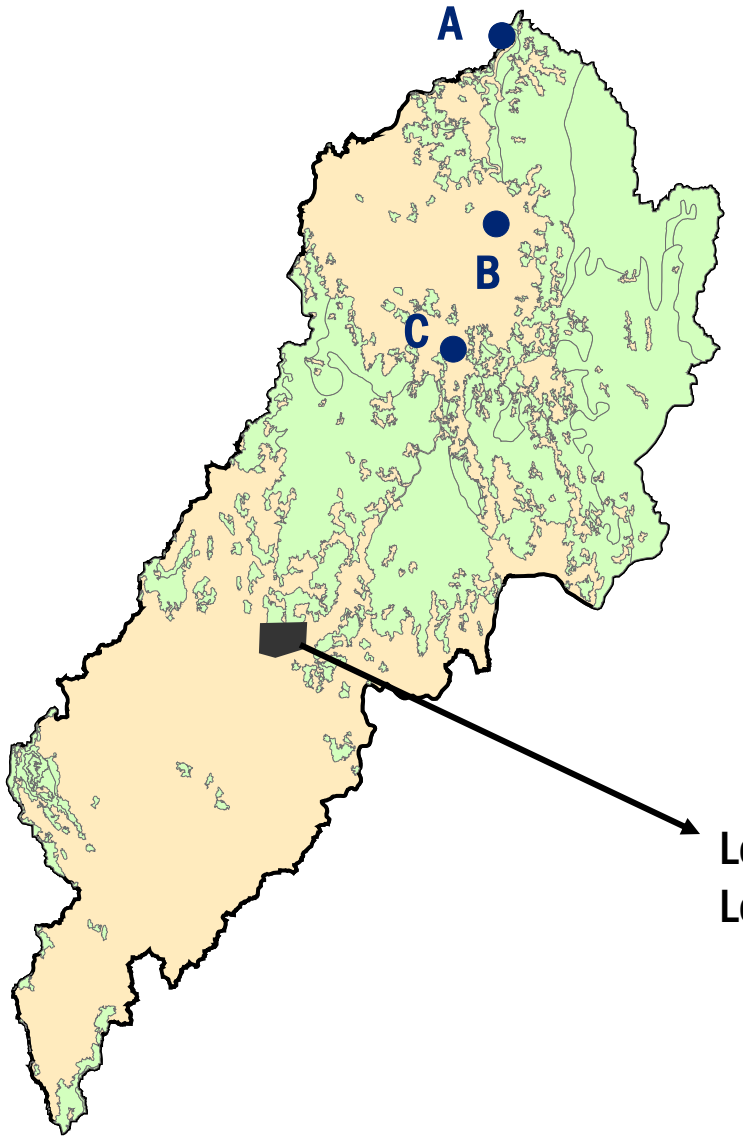
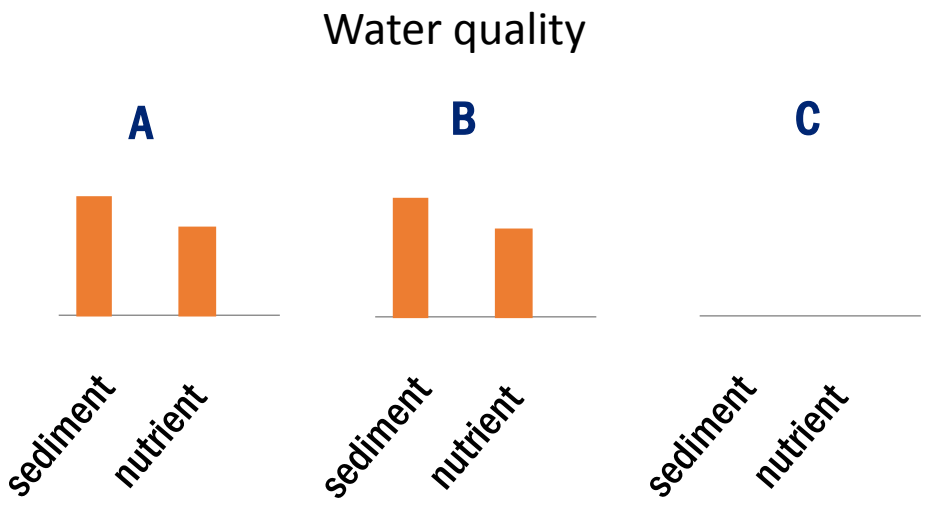


Loss of 1600 ha
Loss of soil & nutrient retention

1) Quantifying impacts





Loss of 1600 ha
Loss of soil & nutrient retention

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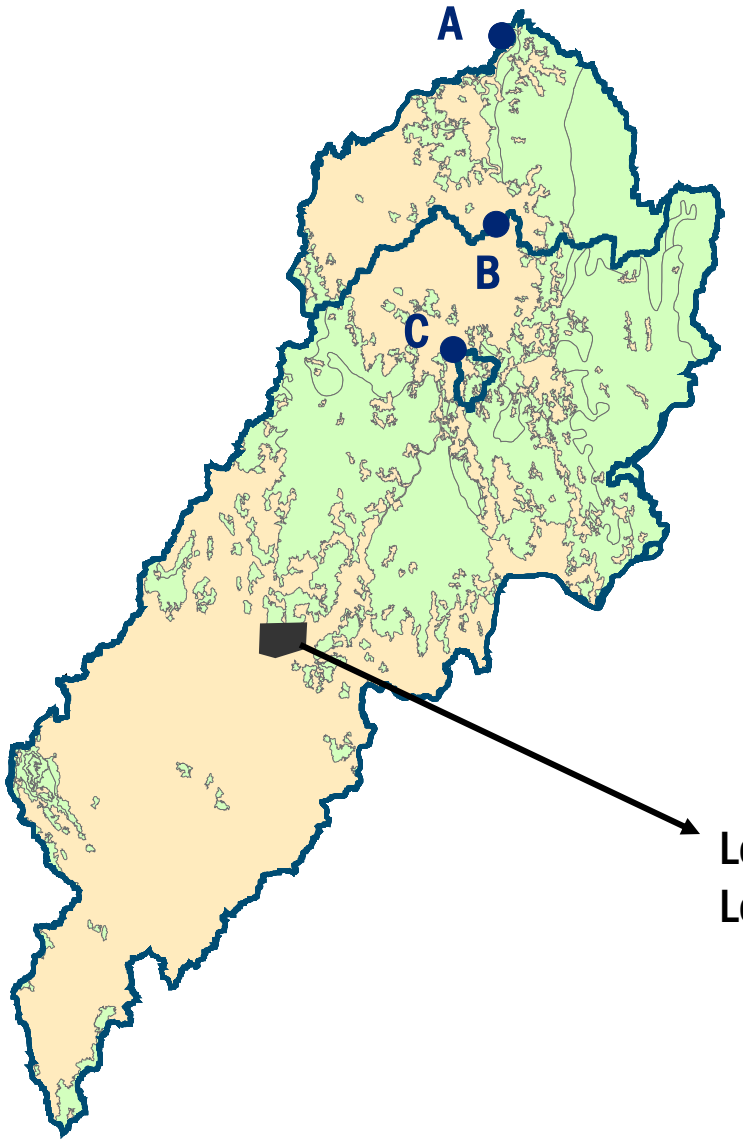
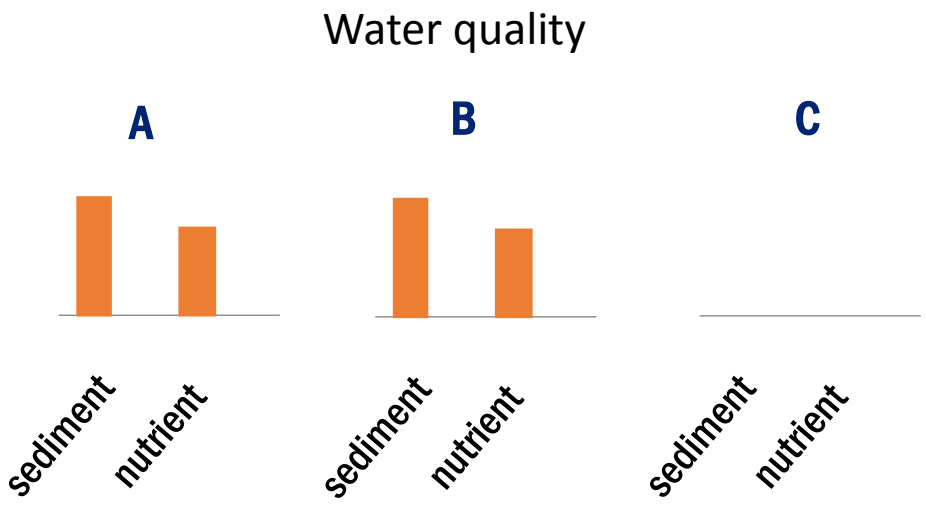
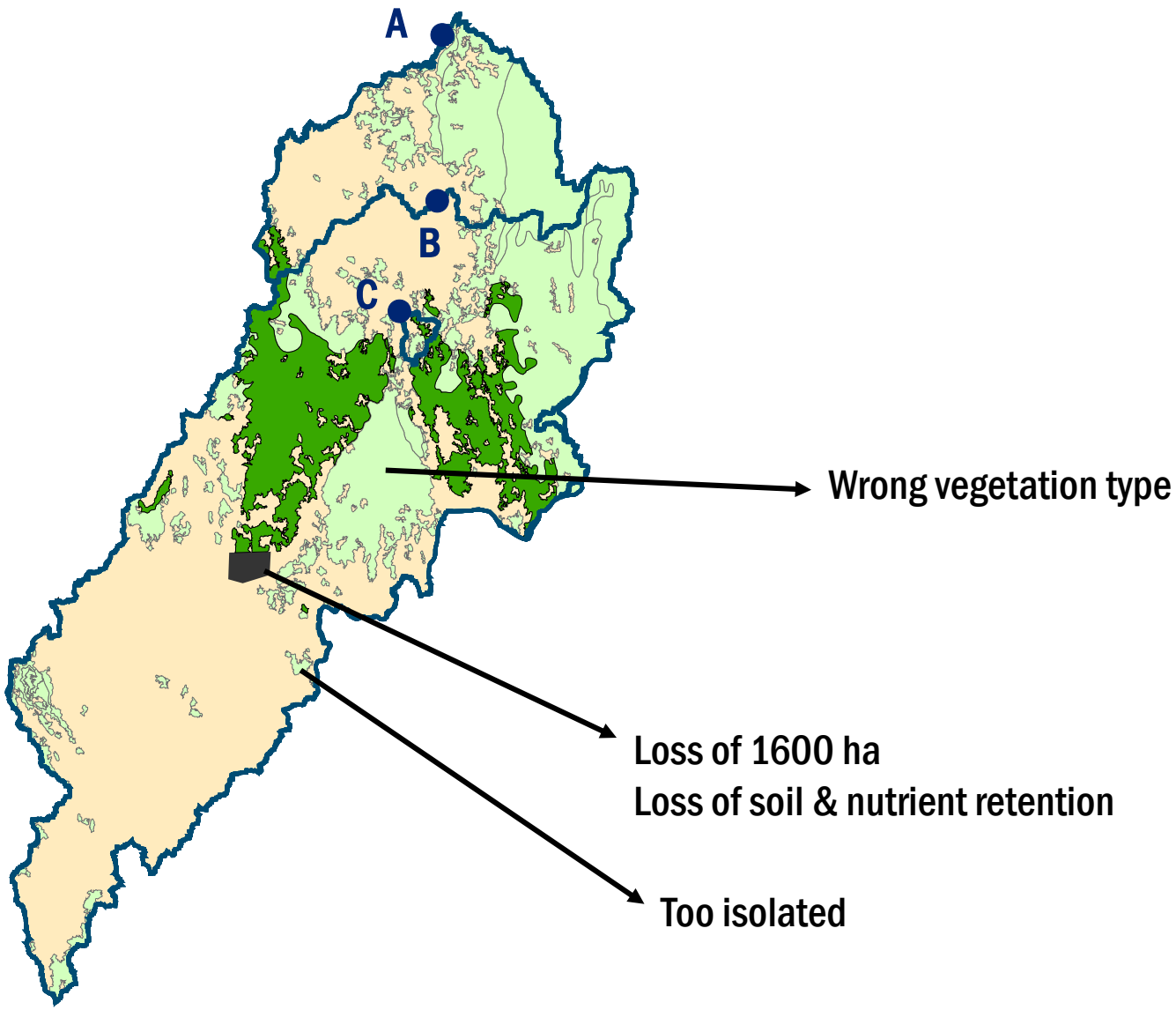


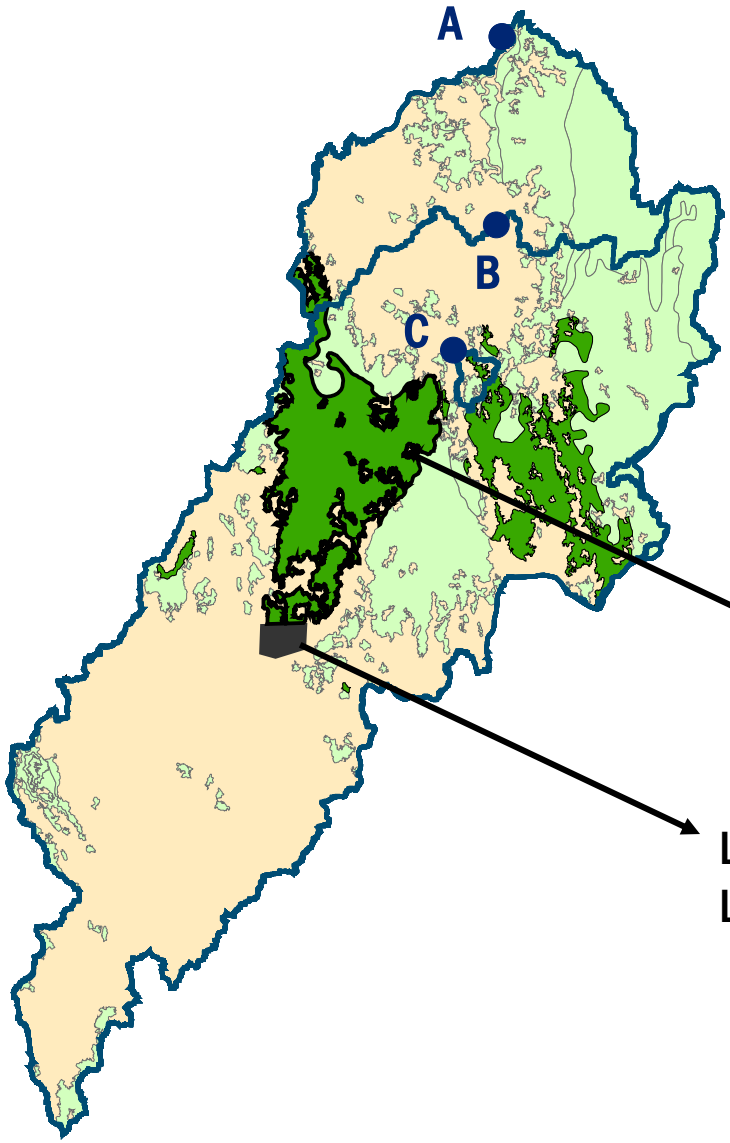


Loss of 1600 ha
Loss of soil & nutrient retention

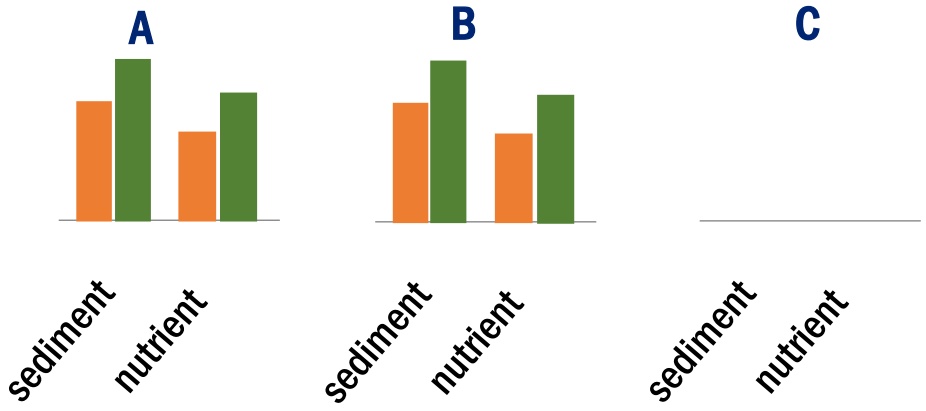
2) Assessing mitigation options



3) Selecting offsets & tracking benefits



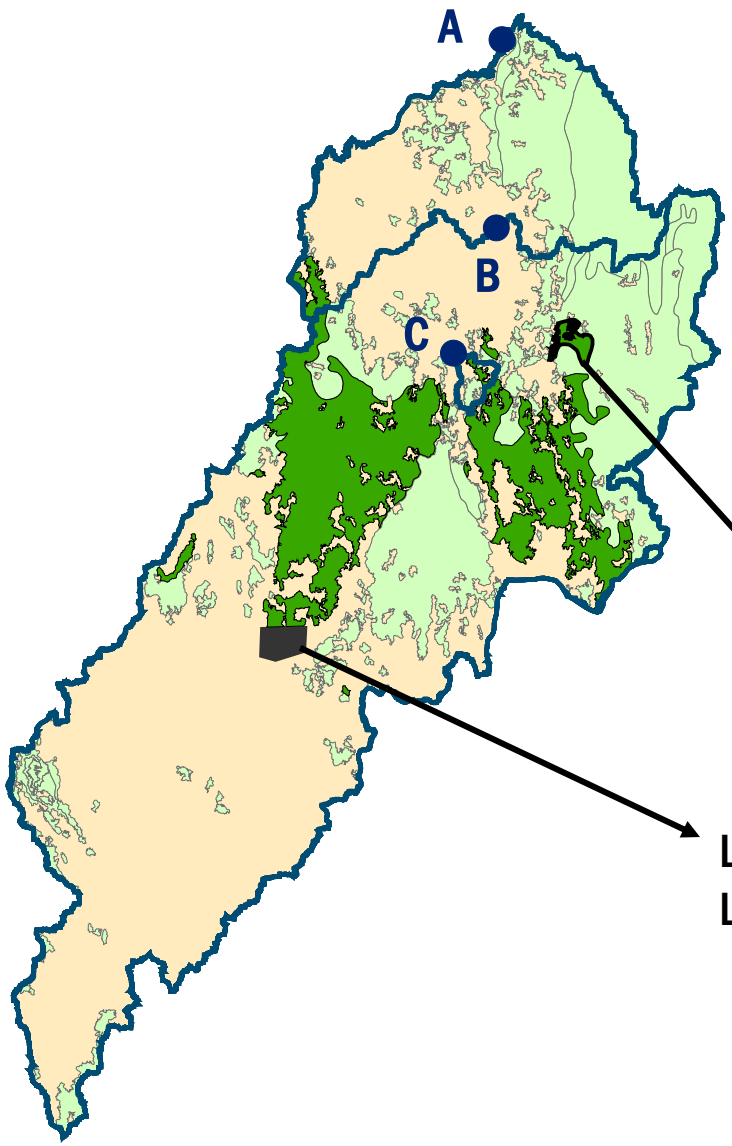
Water quality



Gain of 114,000 ha
Gain of soil & nutrient retention

Loss of 1600 ha
Loss of soil & nutrient retention

3) Selecting offsets & tracking benefits



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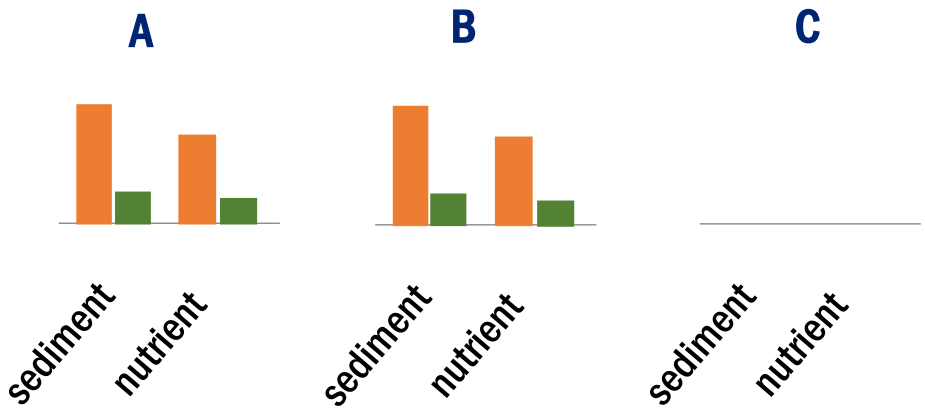
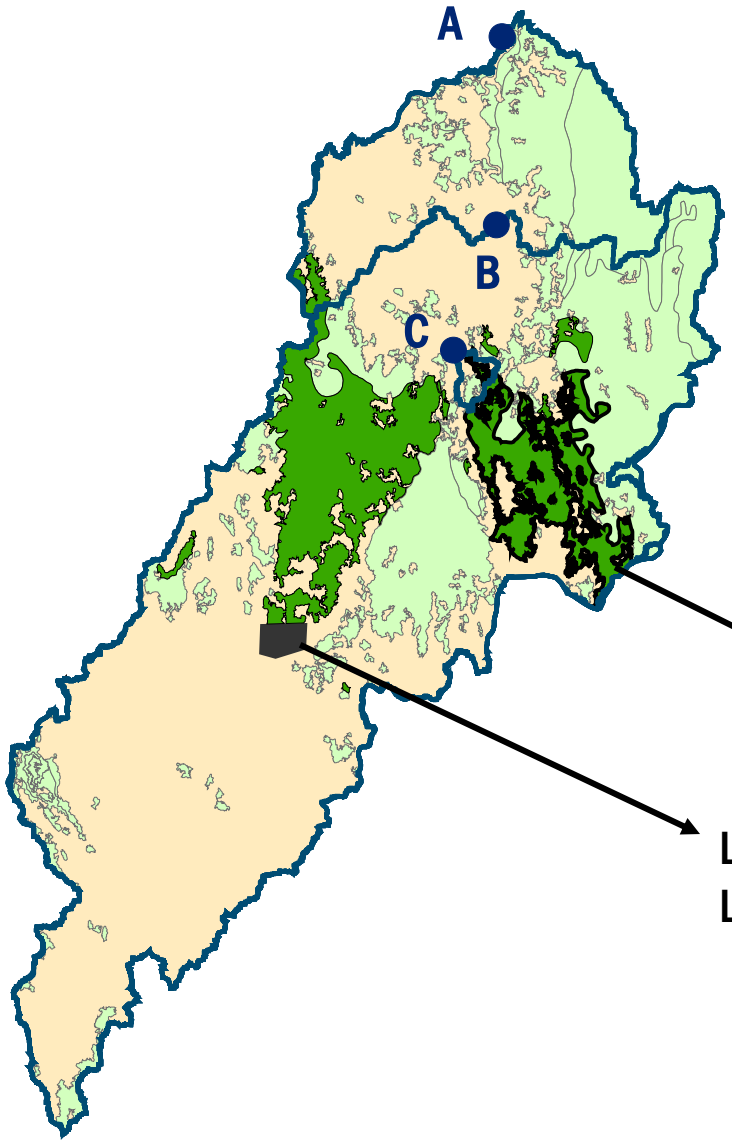


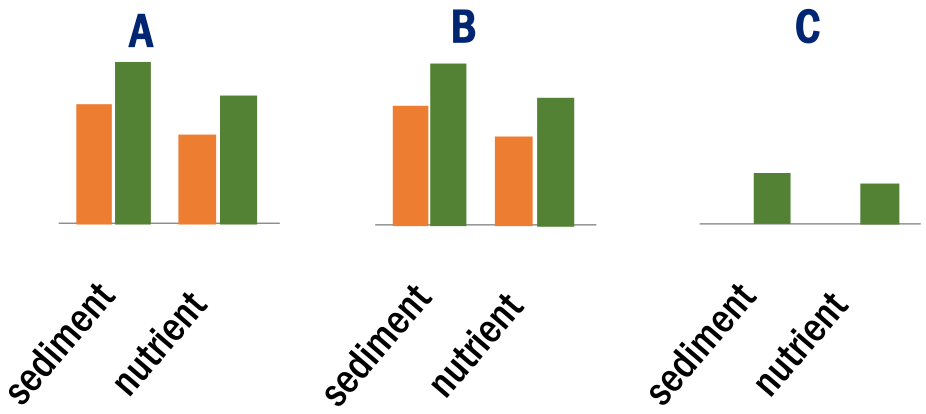
Gain of 3800 ha
Gain of soil & nutrient retention

Loss of 1600 ha
Loss of soil & nutrient retention

3) Selecting offsets & tracking benefits



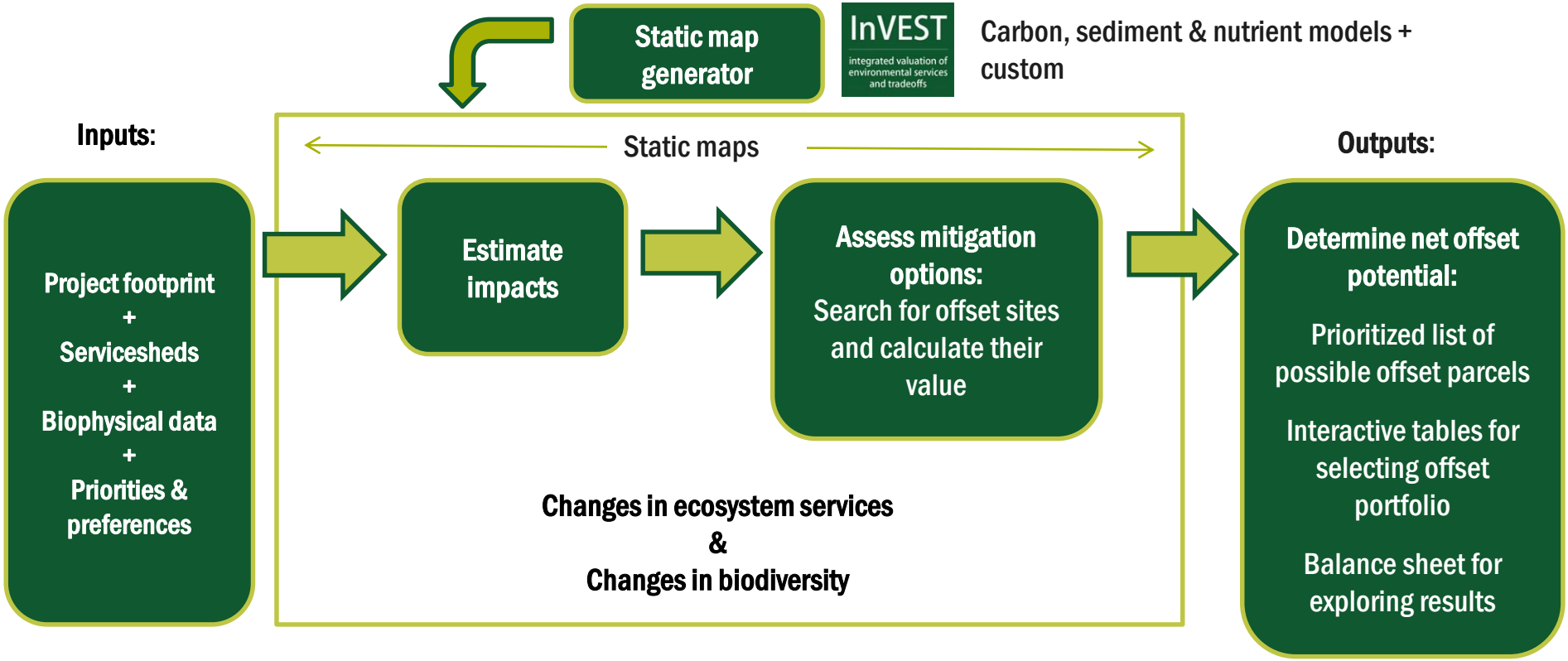
Water quality



Gain of 6300 ha
Gain of soil & nutrient retention

Loss of 1600 ha
Loss of soil & nutrient retention

The OPAL approach



OPAL

Tailored version for Colombia:

- Default national Colombia-specific data
- Mitigations ratios set by national offset policy
- ES offsets chosen from within possible biodiversity offsets
- Protection is preferred offset method

Only required input is project footprint

Flexible version for elsewhere:

- User-provided inputs
- Mitigation ratios specified by user (and can vary spatially)
- ES offsets not necessarily constrained by biodiversity offset rules
- Protection OR restoration possible

Adaptable to wide variety of contexts

Offset Portfolio Analyzer & Locator

Available at: www.naturalcapitalproject.org/OPAL.html

Free & open source, ArcGIS independent

lmandle@stanford.edu

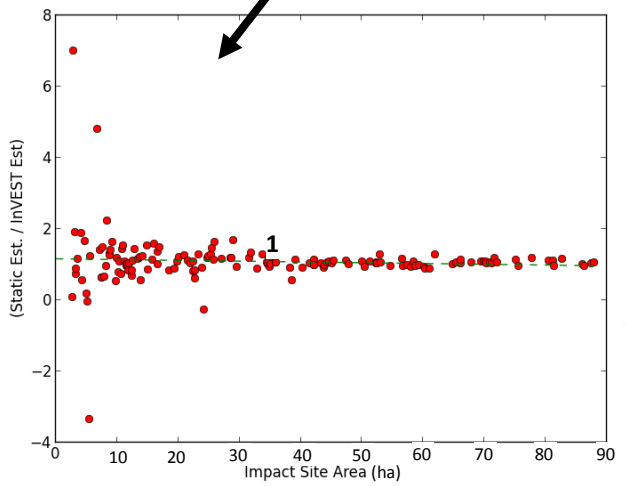
How much habitat and ecosystem services will be lost with project development?

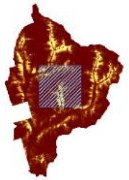
How much mitigation is needed to offset losses?

Where should offsets be located to return services to affected people?

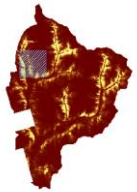
RAPIDLY ESTIMATING IMPACTS

Trial run: conversion to bare ground with Willamette data for 1 watershed





Area: 2515 ha
Sediment Load: 435 load units
Estimated Impact: 404 load units
Ratio: 0.93 (plot point)



Area: 1910 area units
Sediment Load: 271 load units
Estimated Impact: 246 load units
Ratio: 0.91 (plot point)

Adjusting for % export to stream improves estimates (esp. for smaller impact sites) by accounting for interception between impact site and stream