PRODUCING MORE INTERPRETABLE RECHARGE SUITABILITY MAPS:
Visualizing sensitivity to subjective choices during mapmaking

Galen Gorski, Michael van der Valk,
Andrew Fisher, and Sarah Beganskas

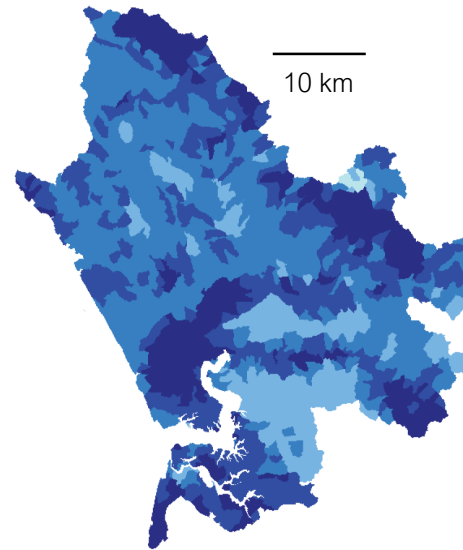International Symposium on Managed Aquifer Recharge

Madrid, Spain

21 May 2019

Considerations in creating suitability maps

DATA
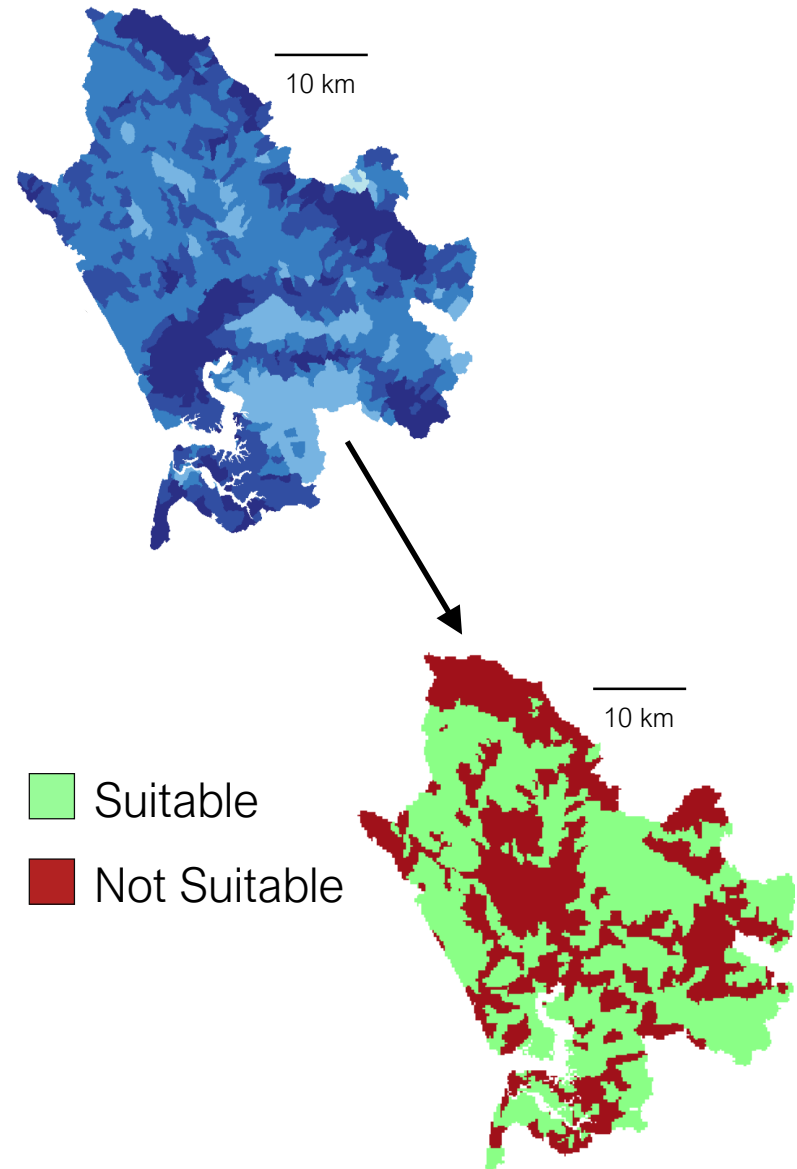
- Data availability/collection

- Co-registration/assimilation

- Ensuring data quality

- Extrapolating from limited datasets

- Data management and process development

10 km

Considerations in creating suitability maps

DATA

- Data availability/collection
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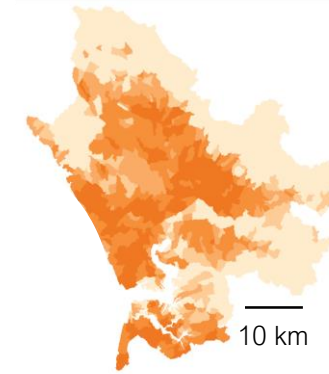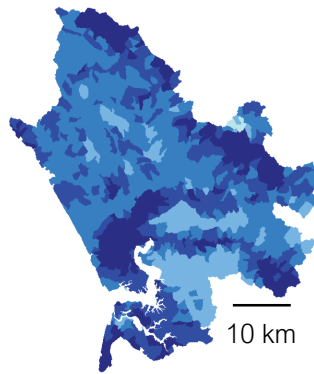- Data management and process development

DECISIONS

- Suitability thresholds
- Aggregating, weighting and layering data
- Factor inclusion and relevance
- Agency and governmental priorities
- Scale dependence
- Is there a way to calibrate/groundtruth maps?
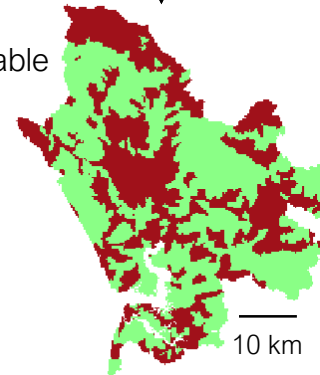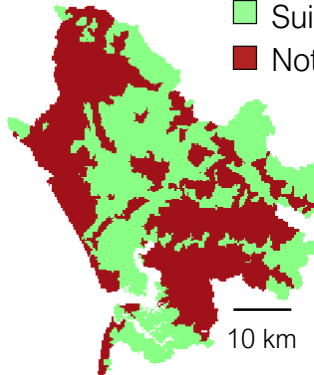- Effective display and communication of results

10 km

10 km

☐ Suitable
☐ Not Suitable

Factors

Thresholds

Individual
Factor
Suitability

Suitable
Not Suitable

10 km

Factors

Thresholds

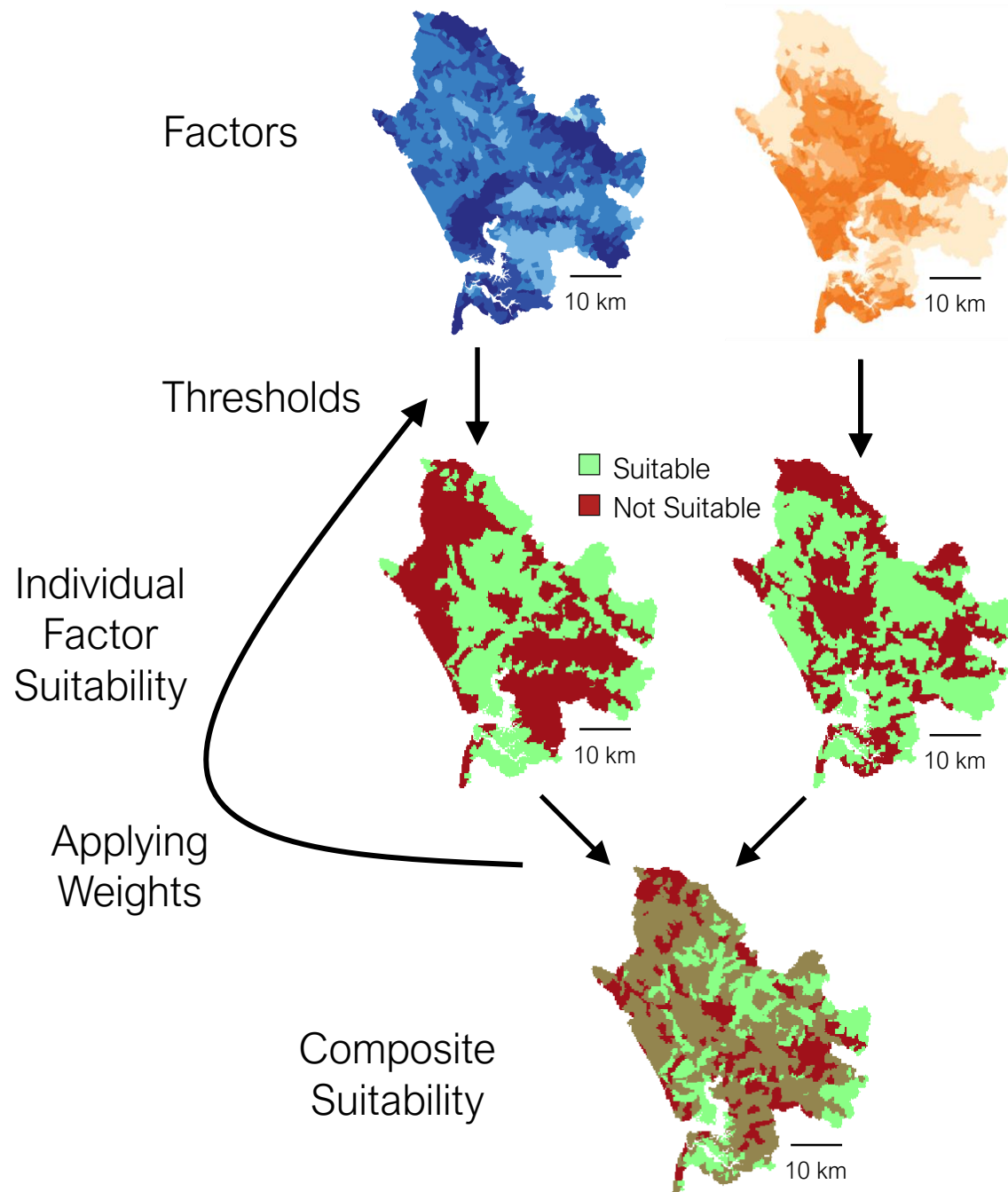Individual Factor Suitability

Applying Weights

Composite Suitability

Suitable
Not Suitable

10 km
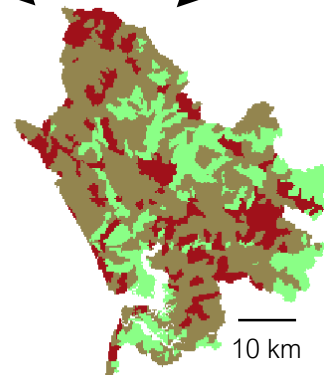
CHALLENGES

- These decision making processes are iterative and dynamic

- Their effect on final maps may not be obvious

- The decisions may be made on expert opinion or data not available to all

- Often a disconnect between how decisions are made and who is using and interpreting the mapping products

Factors

Thresholds

Individual Factor Suitability

☐ Suitable
☐ Not Suitable

10 km
10 km
10 km
10 km

Applying Weights

Composite Suitability

10 km

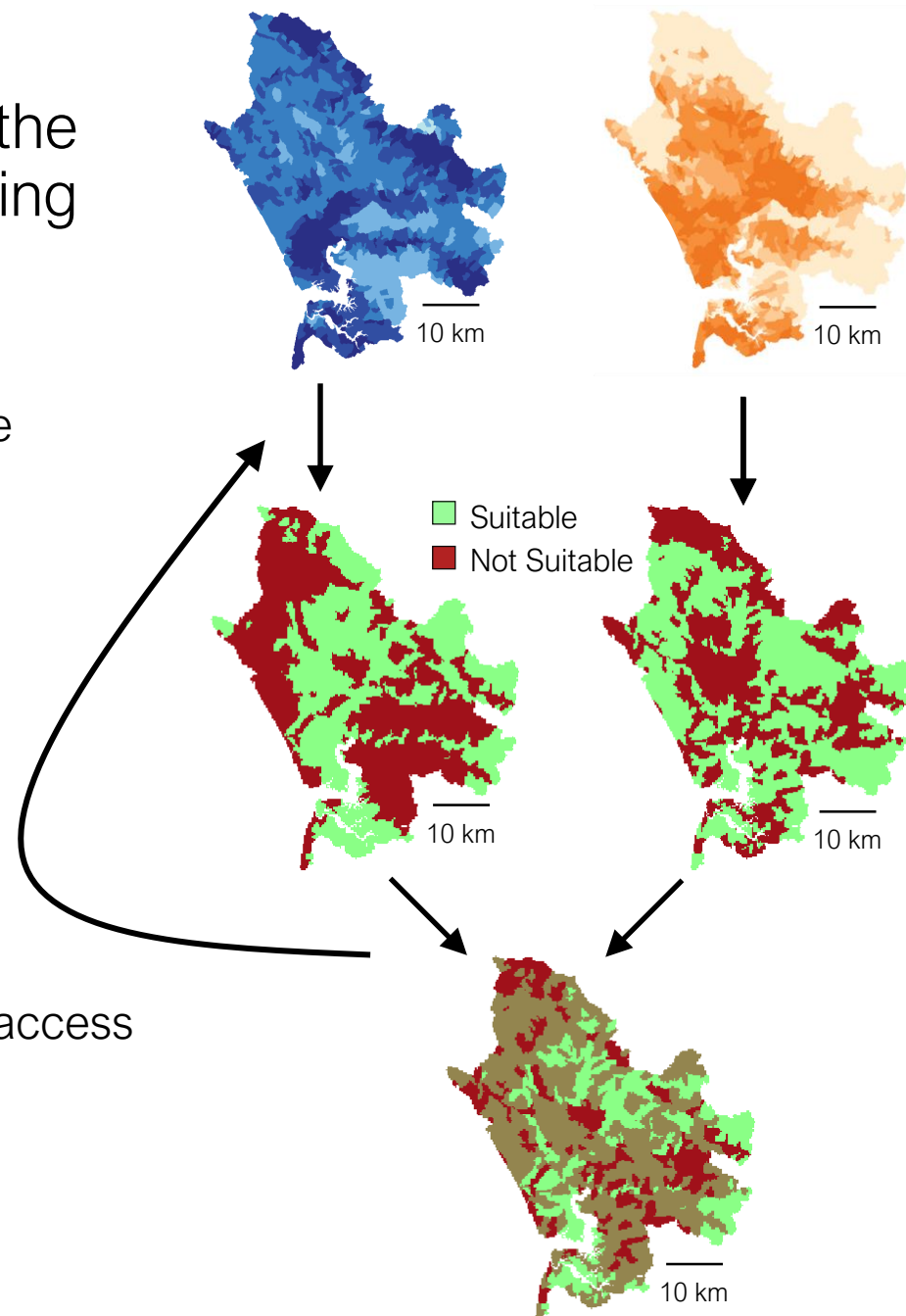# A tool for dynamically visualizing the decision making process in creating suitability maps

Open source, sharable

Written in R using the Shiny web app development platform

Intended as a compliment not substitute to other mapping software

Aimed at users with limited expertise in or access to more sophisticated mapping software

A tool for dynamically visualizing the decision making process in creating suitability maps
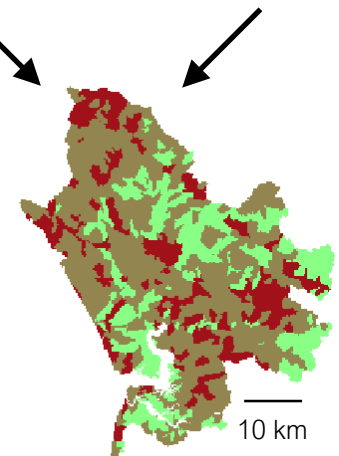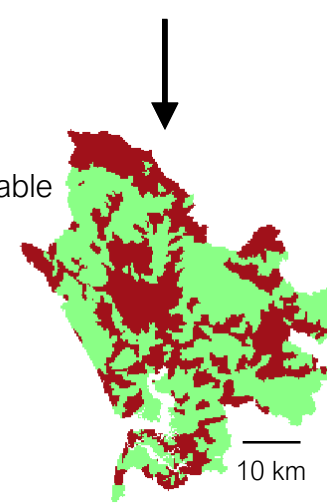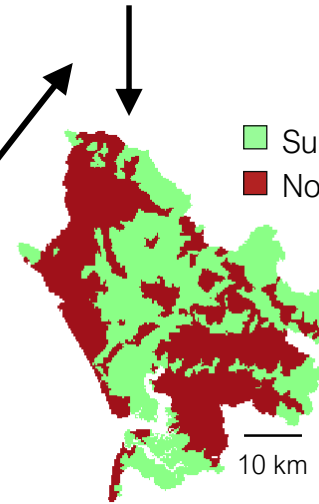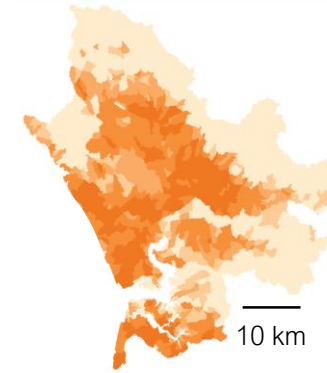
SIMPLE

INTUITIVE

INTERACTIVE

COLLABORATIVE

Suitable
Not Suitable

10 km
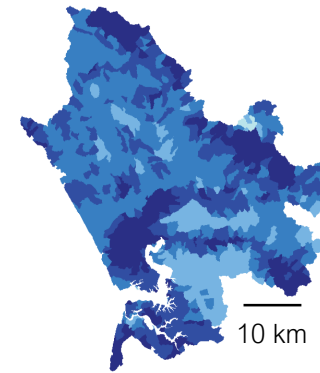
An example from California
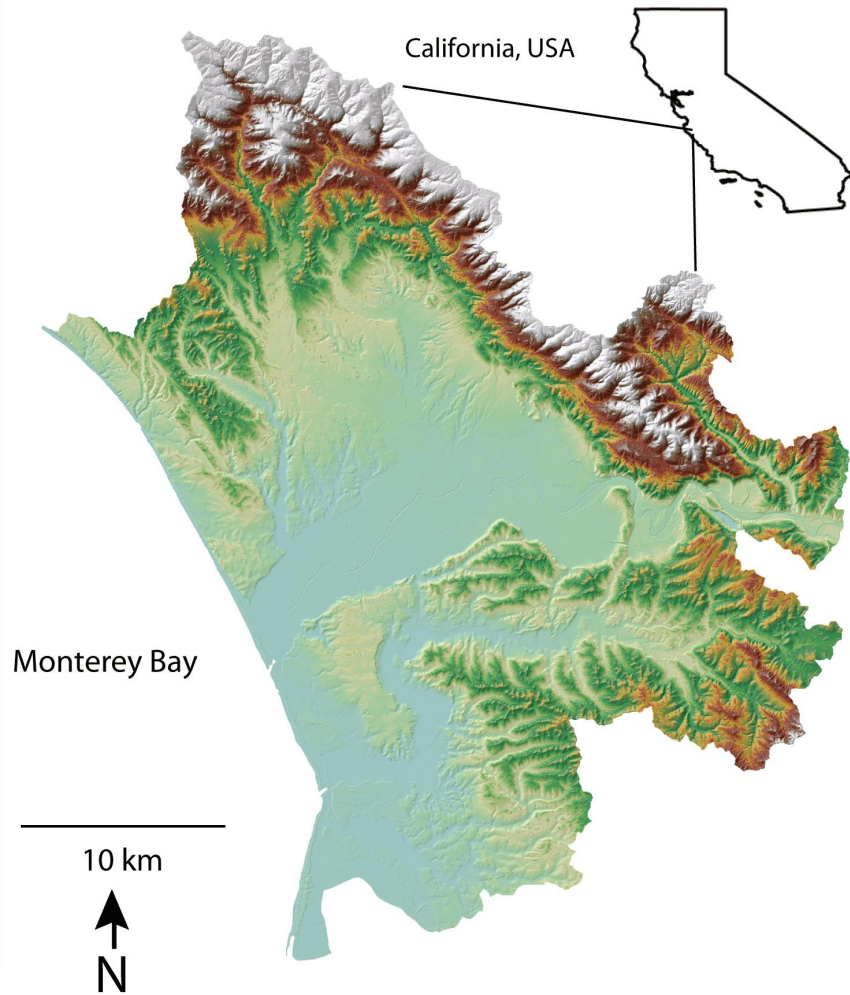
Three Input Datasets

SOIL INFILTRATION CAPACITY — m/day (2.2, 0.4, 0.0)

RUNOFF AVAILABILITY — cm/yr (13, 0.8, 0.0)

LANDUSE — Water, Agri., Barren, Urban, Forest

California, USA

Monterey Bay

10 km

N

Factor Suitability Ranking   Weighting and Composite Mapping   Factor Metadata
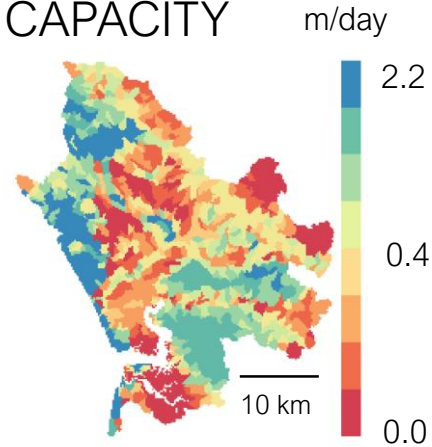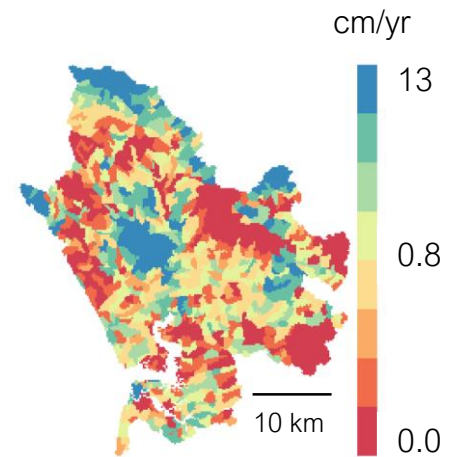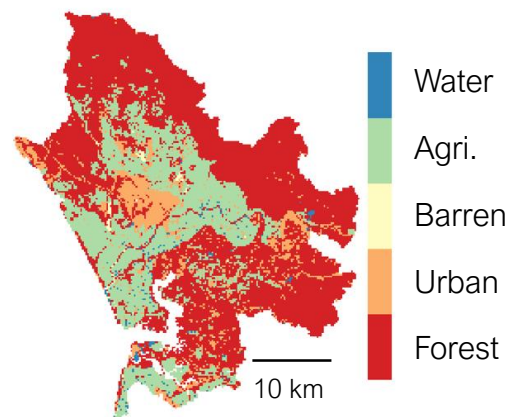
First Factor

Upload GeoTiff File

Browse...   01_Soil_IC.tif

Upload complete

Upload Raster Codes

Browse...   No file selected

Name

Soil IC

Units
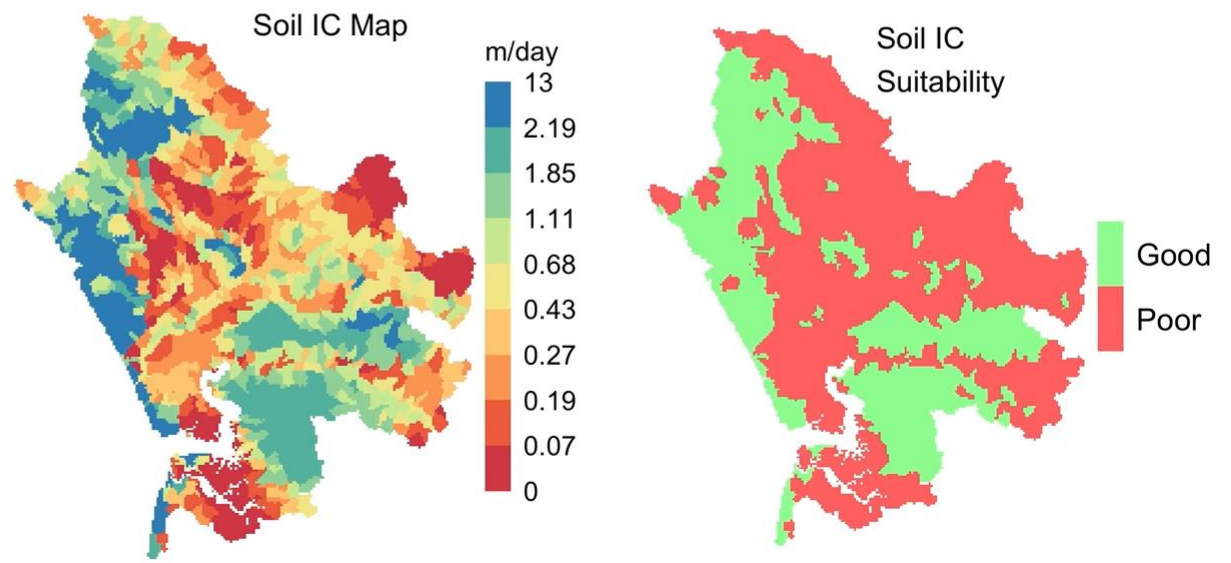
m/day

Good Range m/day

0   1   13

0 0.1 0.2 0.3 0.4 0.5 0.7 1 1.1 1.9 2.2 13

Add New Range   Classify

Soil IC Map

m/day

13
2.19
1.85
1.11
0.68
0.43
0.27
0.19
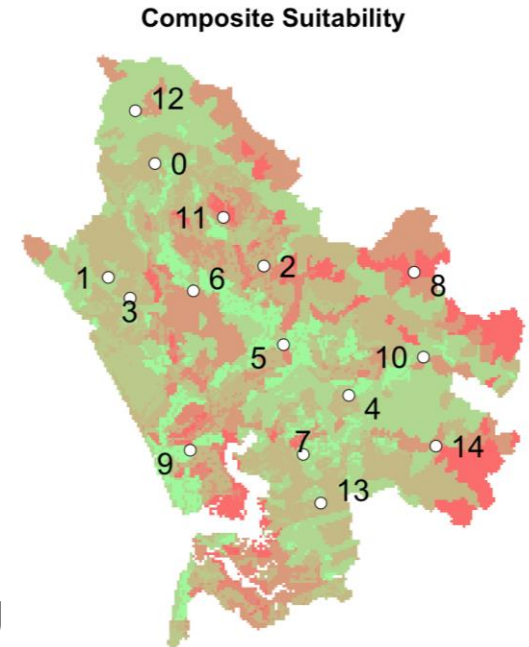0.07
0

Soil IC
Suitability

Good

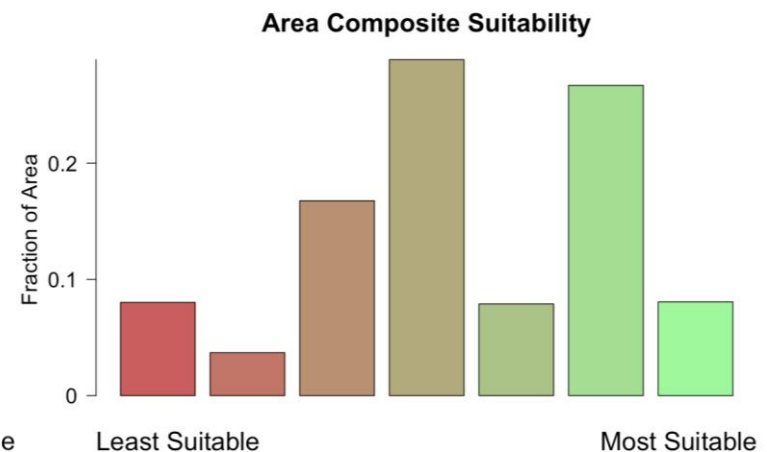Poor

A COLLABORATIVE TOOL

Build intuition in real time

Demonstrate the complexity of the
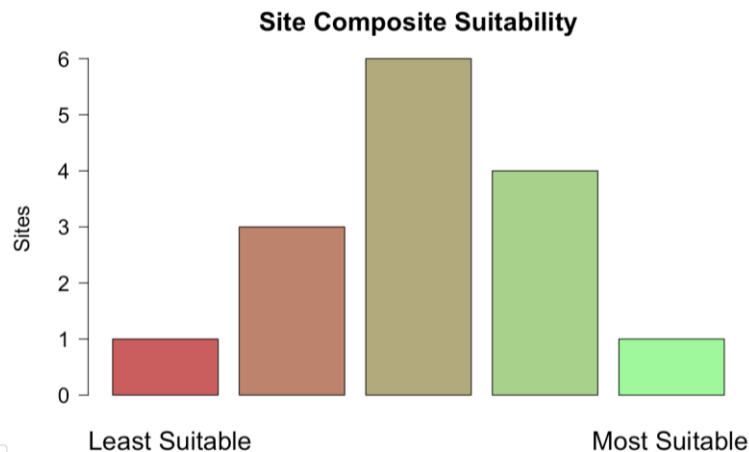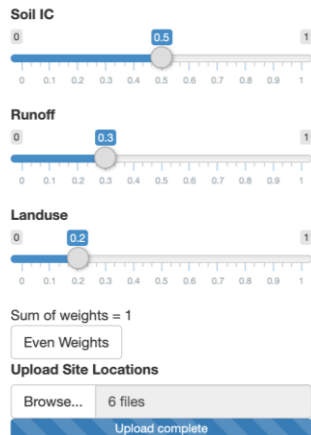map making process

Illustrate the effect of decisions on ultimate suitabilit
map

Serve as a means for communicating suitability mapping

Composite Suitability

Factor Weights

Soil IC
0   0.5   1

Runoff
0   0.3   1

Landuse
0   0.2   1

Sum of weights = 1
Even Weights
Upload Site Locations
Browse...   6 files
Upload complete

Download Map   Download Suitability Report

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- Effective display and communication of results

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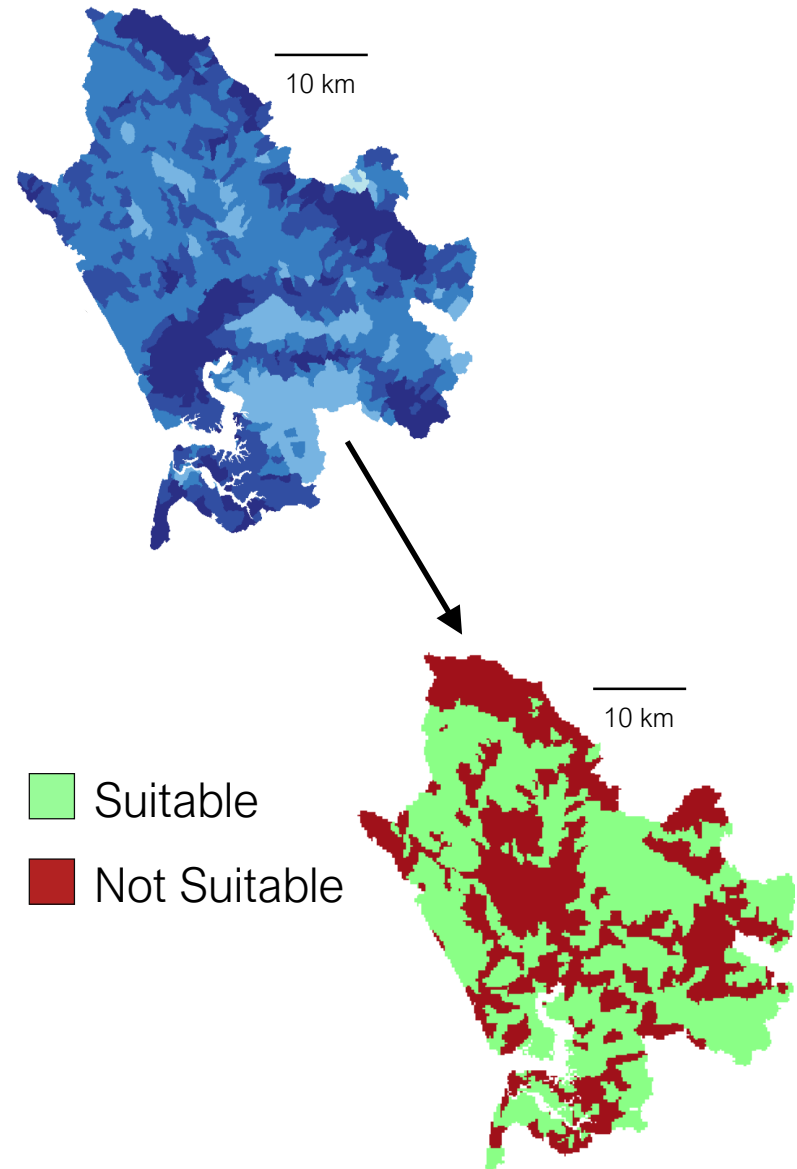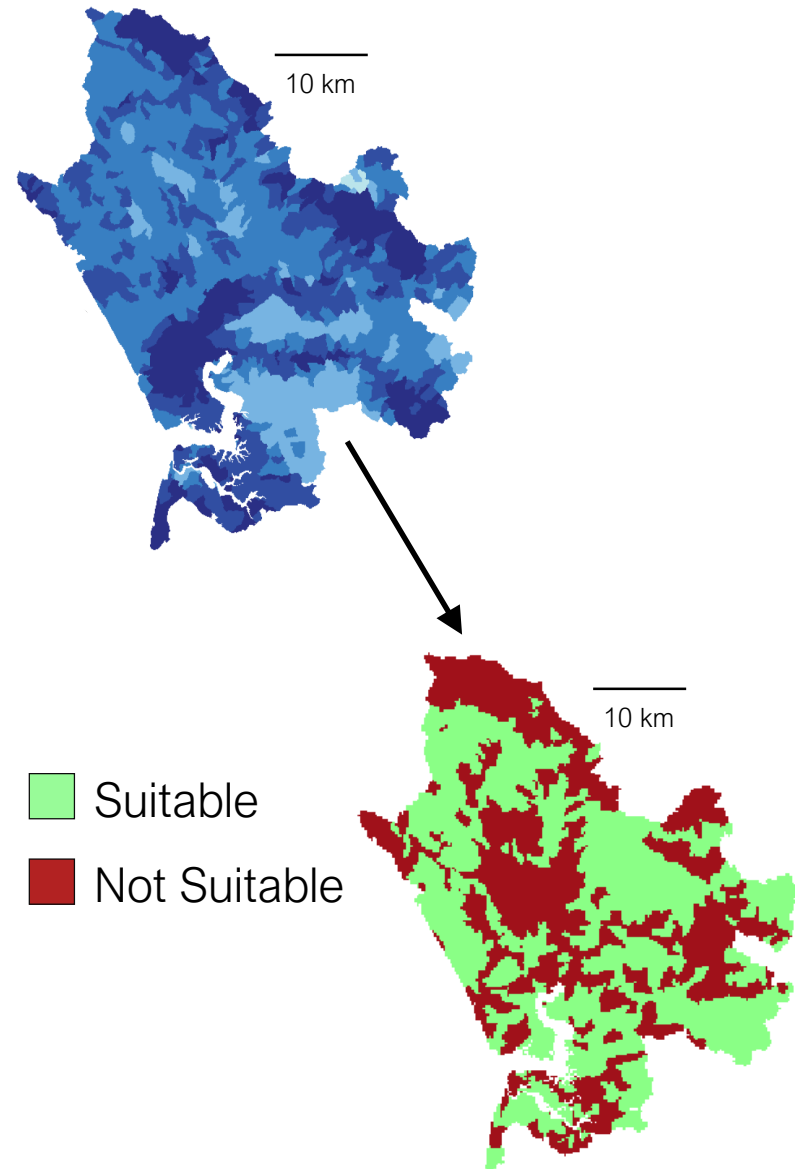
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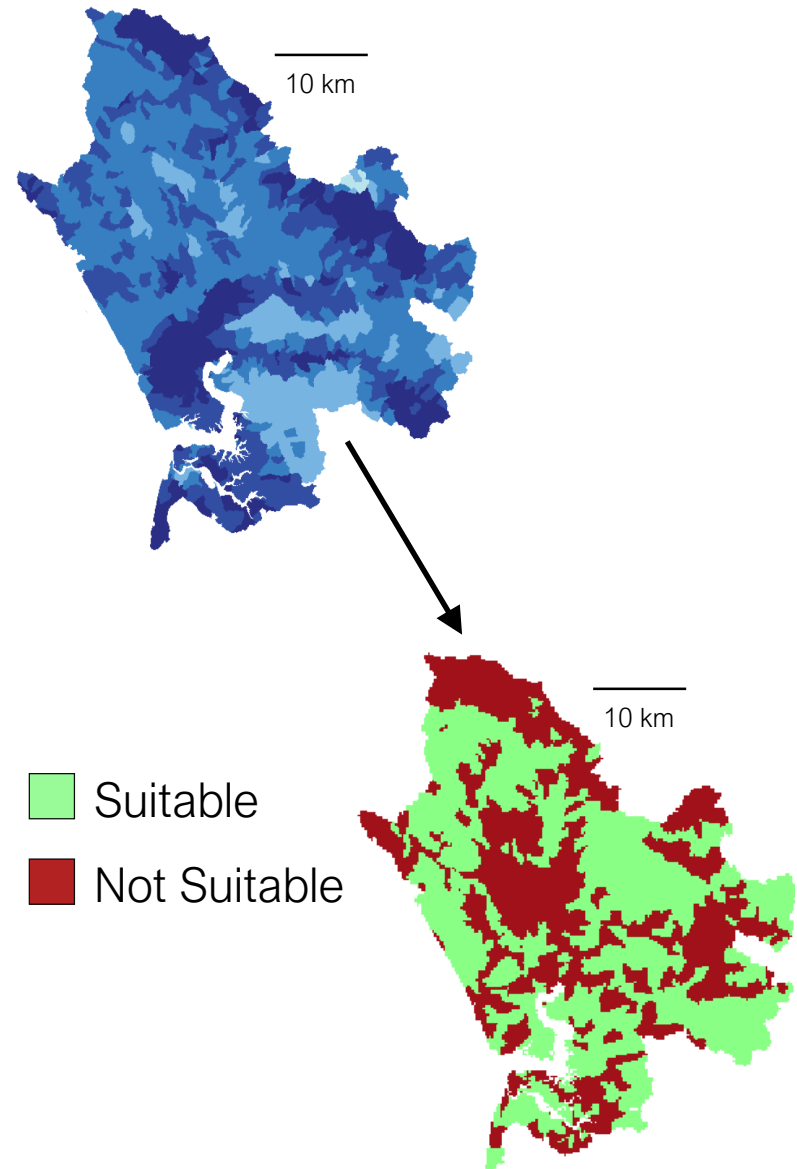
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FUTURE DIRECTIONS

Solicit input and feedback from the community

Online hosting/access

More examples from other areas and groups

Suitable

Not Suitable

THANK YOU!

CONTACT: ggorski@ucsc.edu

Suitable
Not Suitable

10 km