

Modeling Vulnerability and Recoverability in the Mojave Desert

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Development of Geospatial Models of Recoverability and Vulnerability

**Geospatial maps of
physical and/or
biological conditions**

+

**Geologic, hydrologic
and ecosystem
process
understanding**



**Derived maps of
Recoverability/vulnerability**

Progress on Models to Date

Models currently in development

- **Vegetation recovery**
- **Soil compaction vulnerability and recovery**
- **Wind erosion vulnerability**
- **Soil crust prediction**

Application to Land Management

- **Select location or time activities to:**
 - **Minimize disturbance**
 - **Minimize recovery times once disturbed**
- **Support decisions on active vs. passive restoration**

Application to Land Management

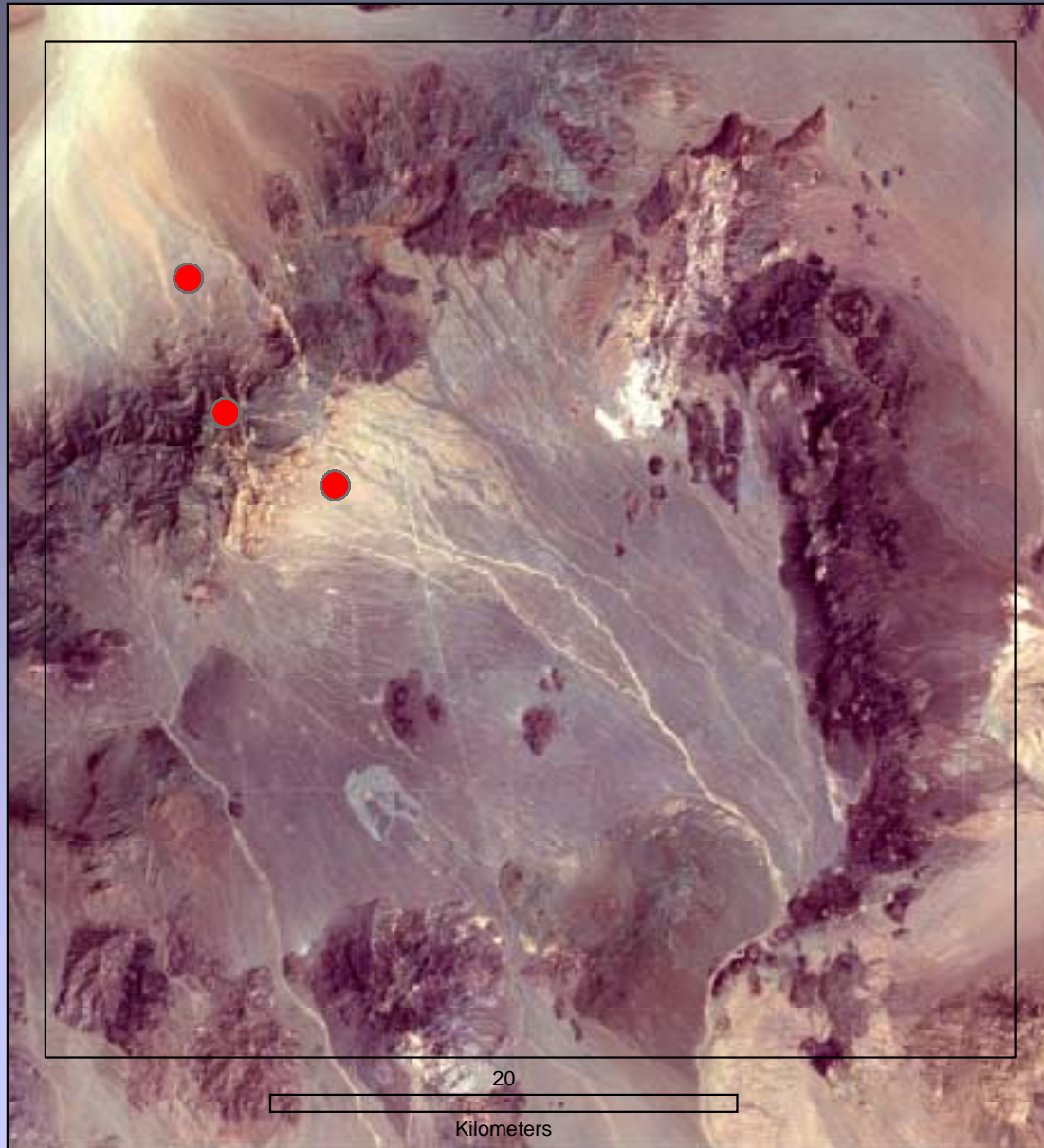
Needs for modeling tools:

- Can address a range of land management issues
- Can be used at various scales
- Allow user to vary input data, conditions, weighting

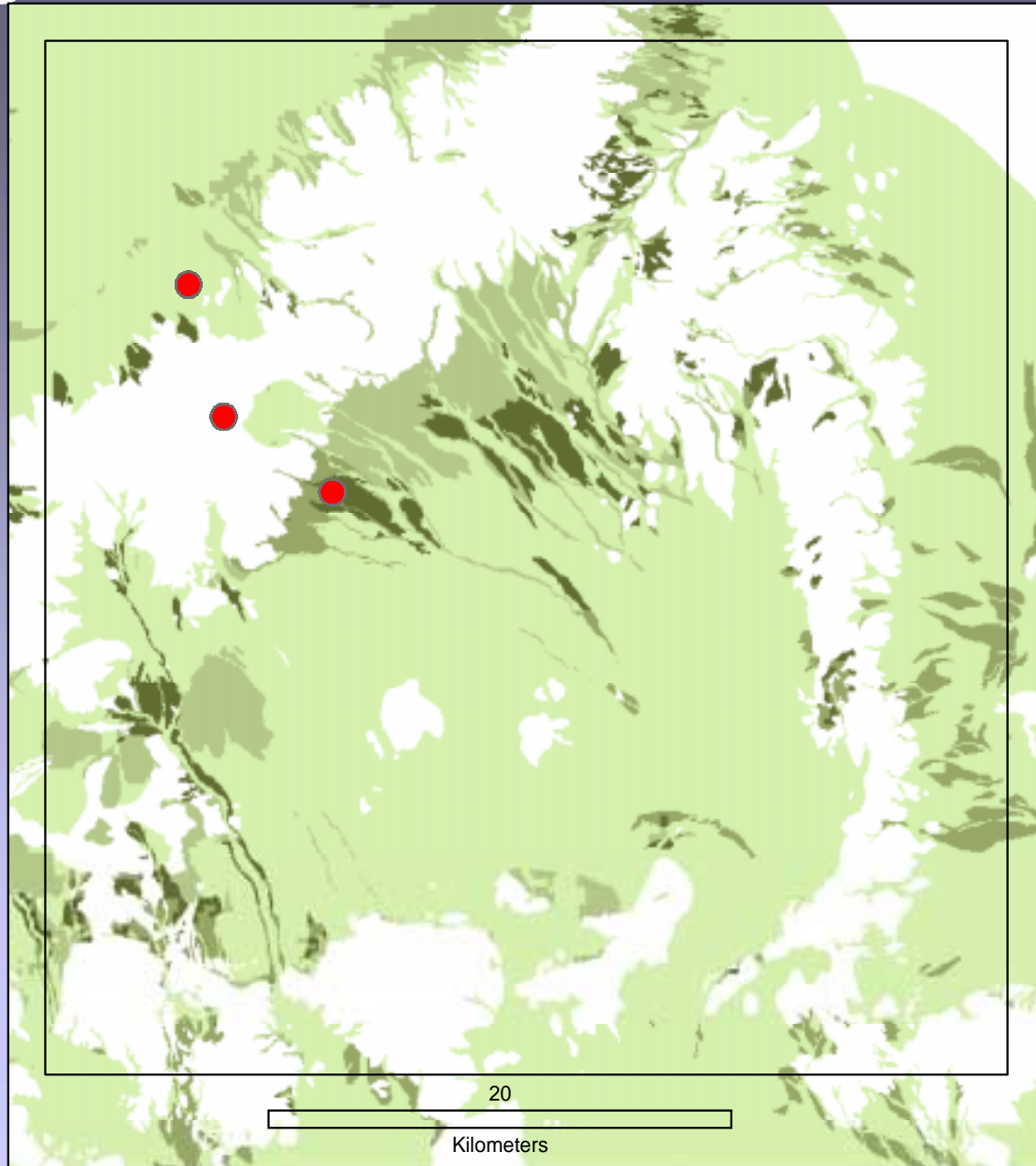
Example Scenario for Using Model

- **New gold mine to be developed, with leach pit area, expected 3 year lifetime**
- **Two potential sites for leach area**
- **Want to select site and access roads to minimize disturbance to crust and wind erosion, and minimize soil compaction and vegetation recovery times once mine is closed**

Location of scenario sites



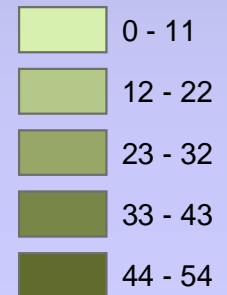
Biological Soil Crust



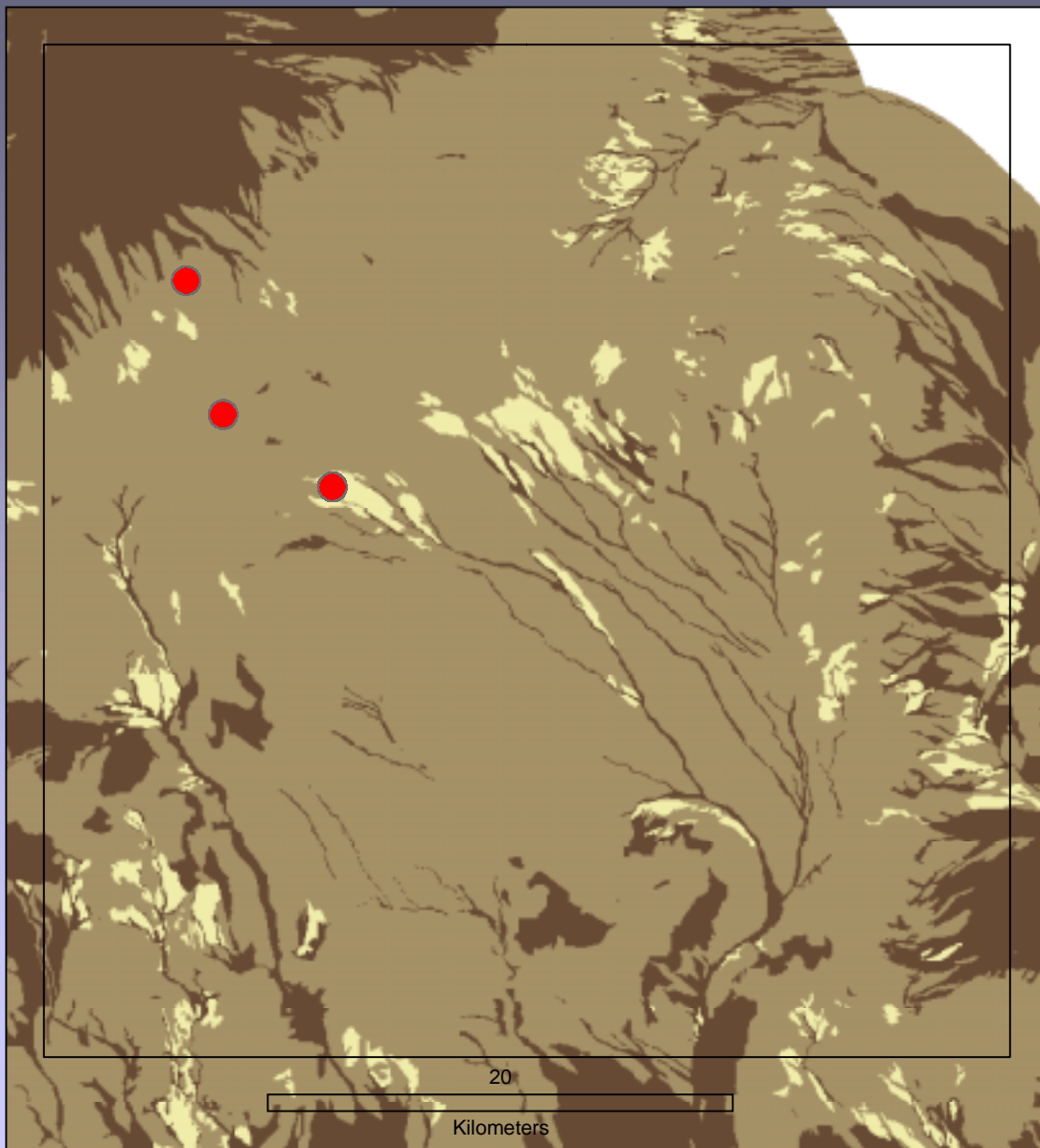
**Biological soil crust
predicted % cover**

Legend

Percent



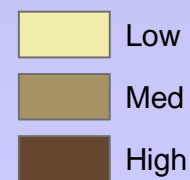
Wind Erosion Vulnerability



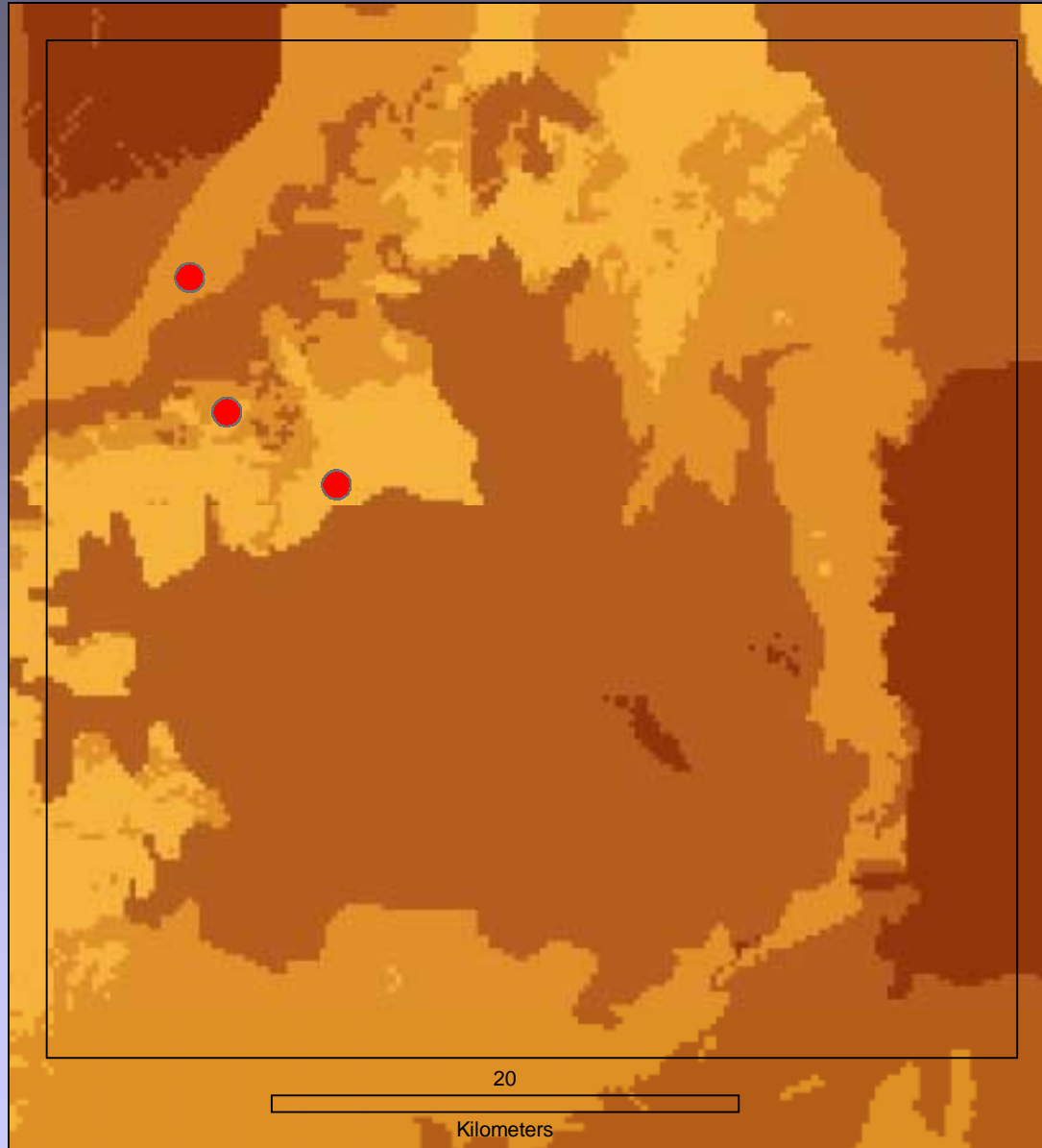
**Sediment
Production**

Legend

Sediment production



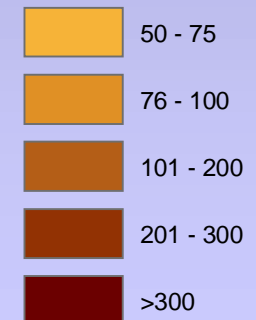
Recovery Times from Soil Compaction



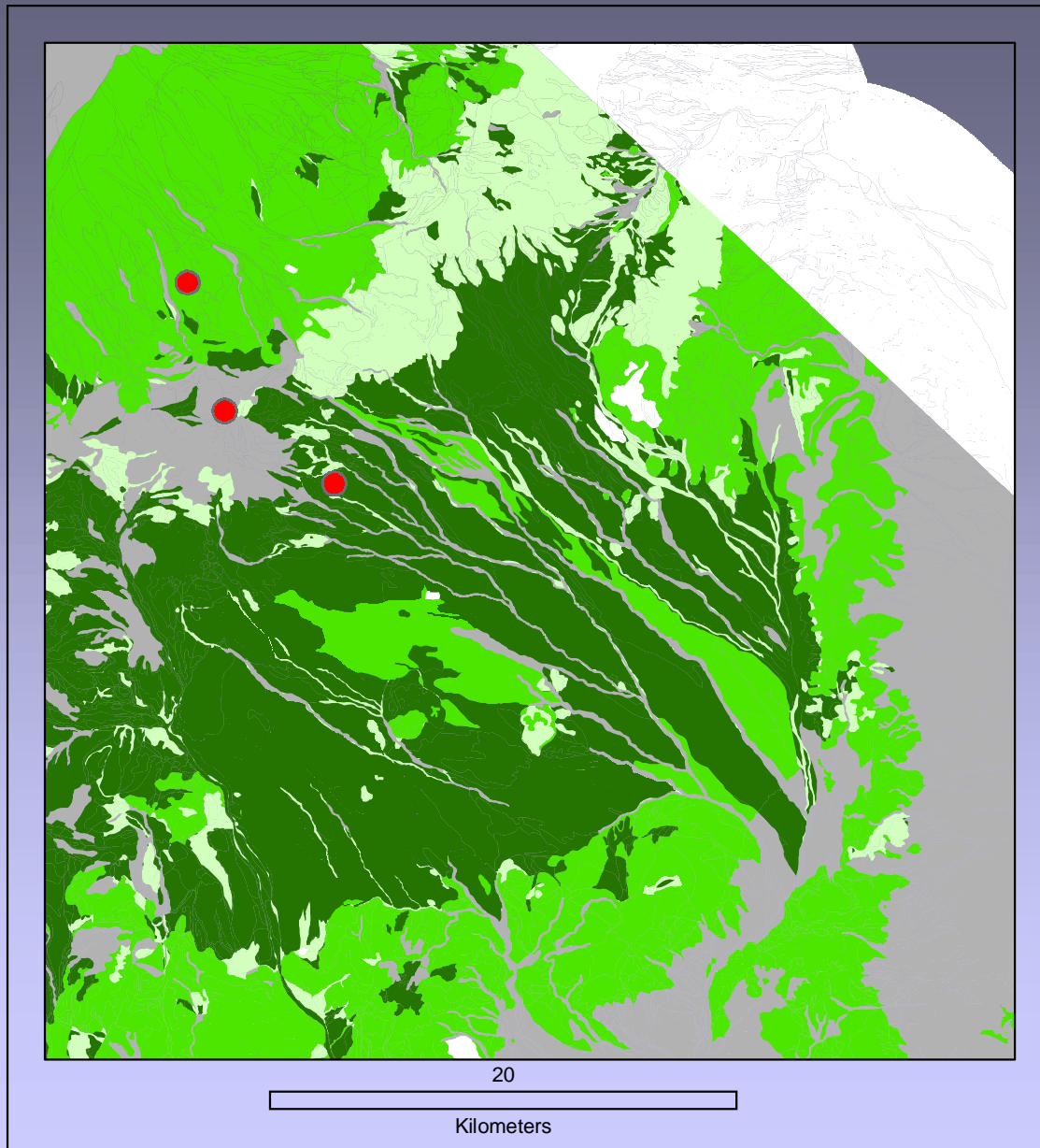
Soil Recovery

Legend

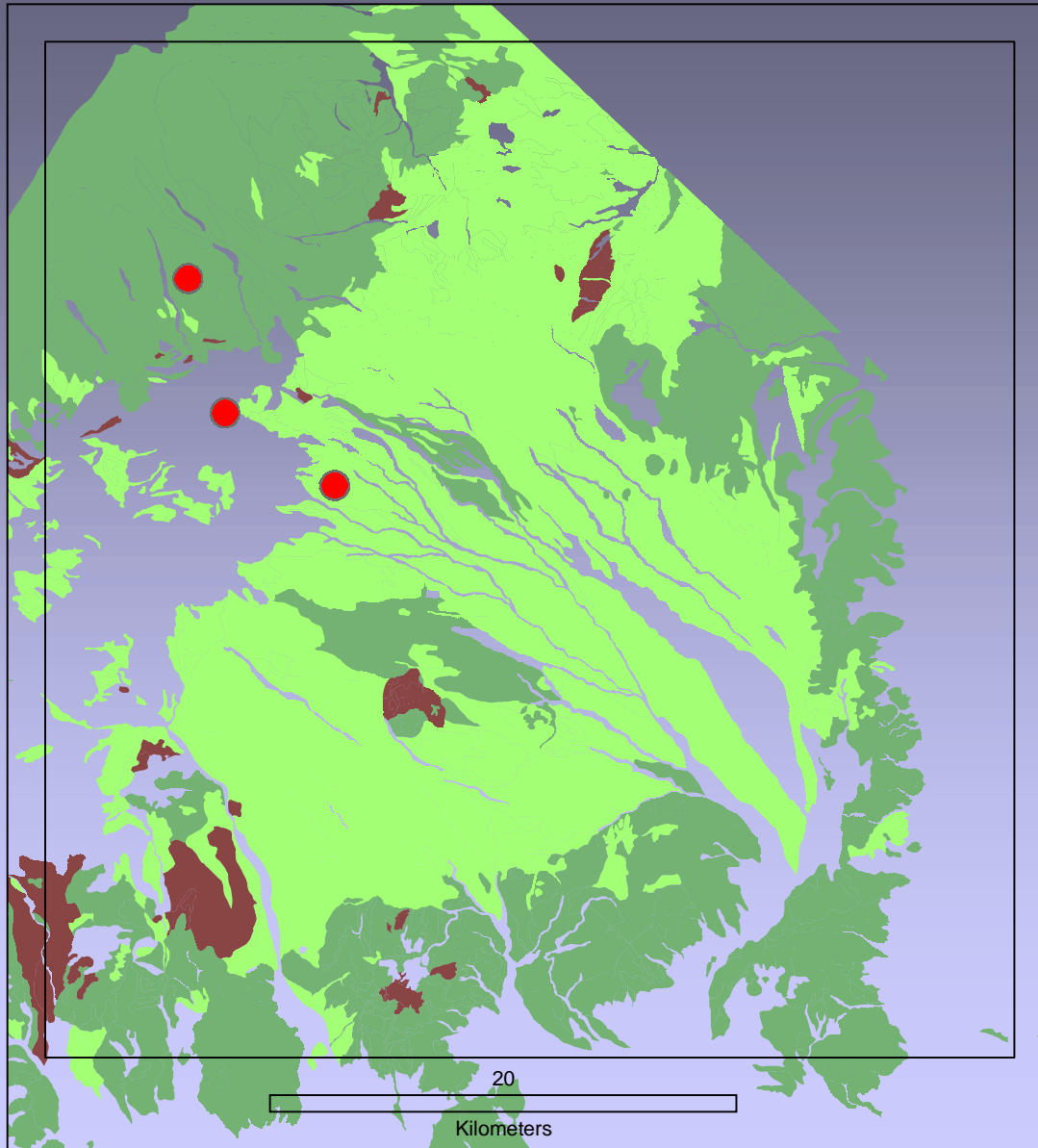
Years



Vegetation Recovery






Vegetation Considerations



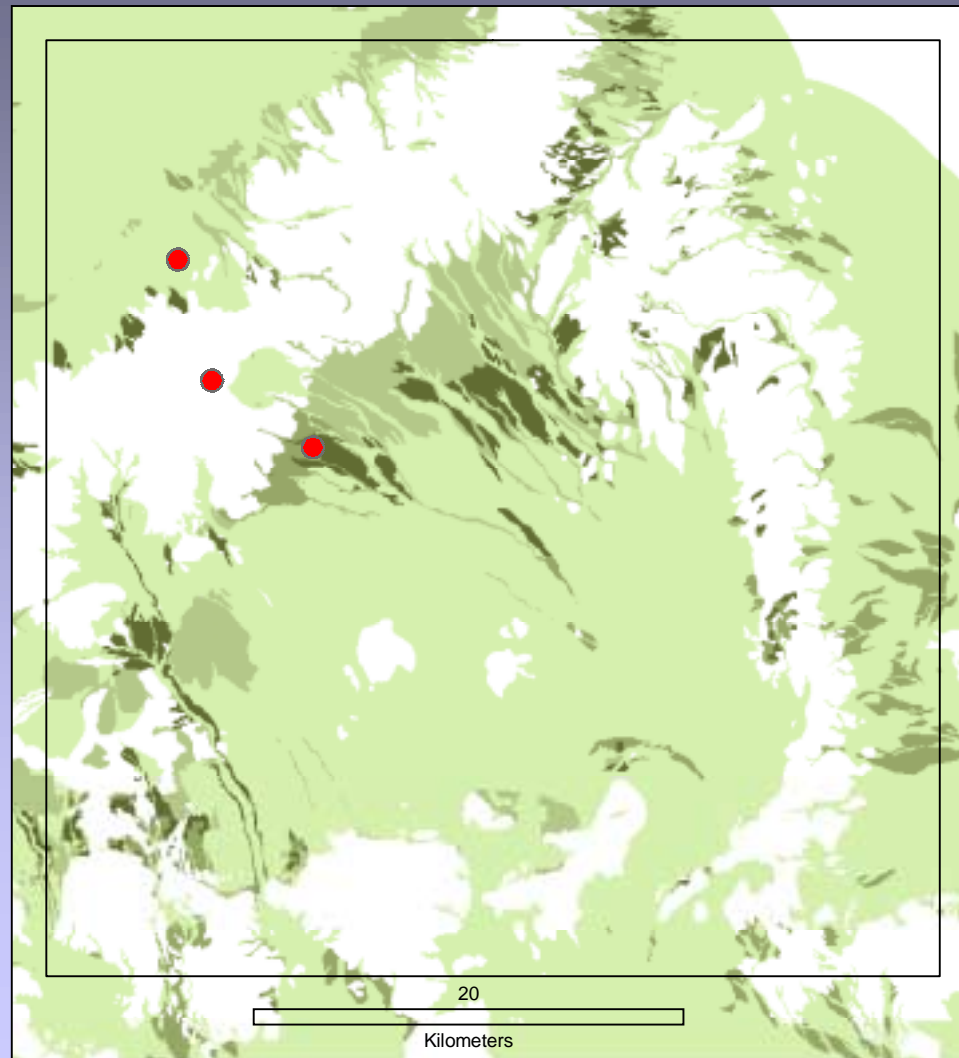
**Vegetation
considerations**

Legend

-  Blackbrush
-  Joshua Tree
-  Mojave Yucca

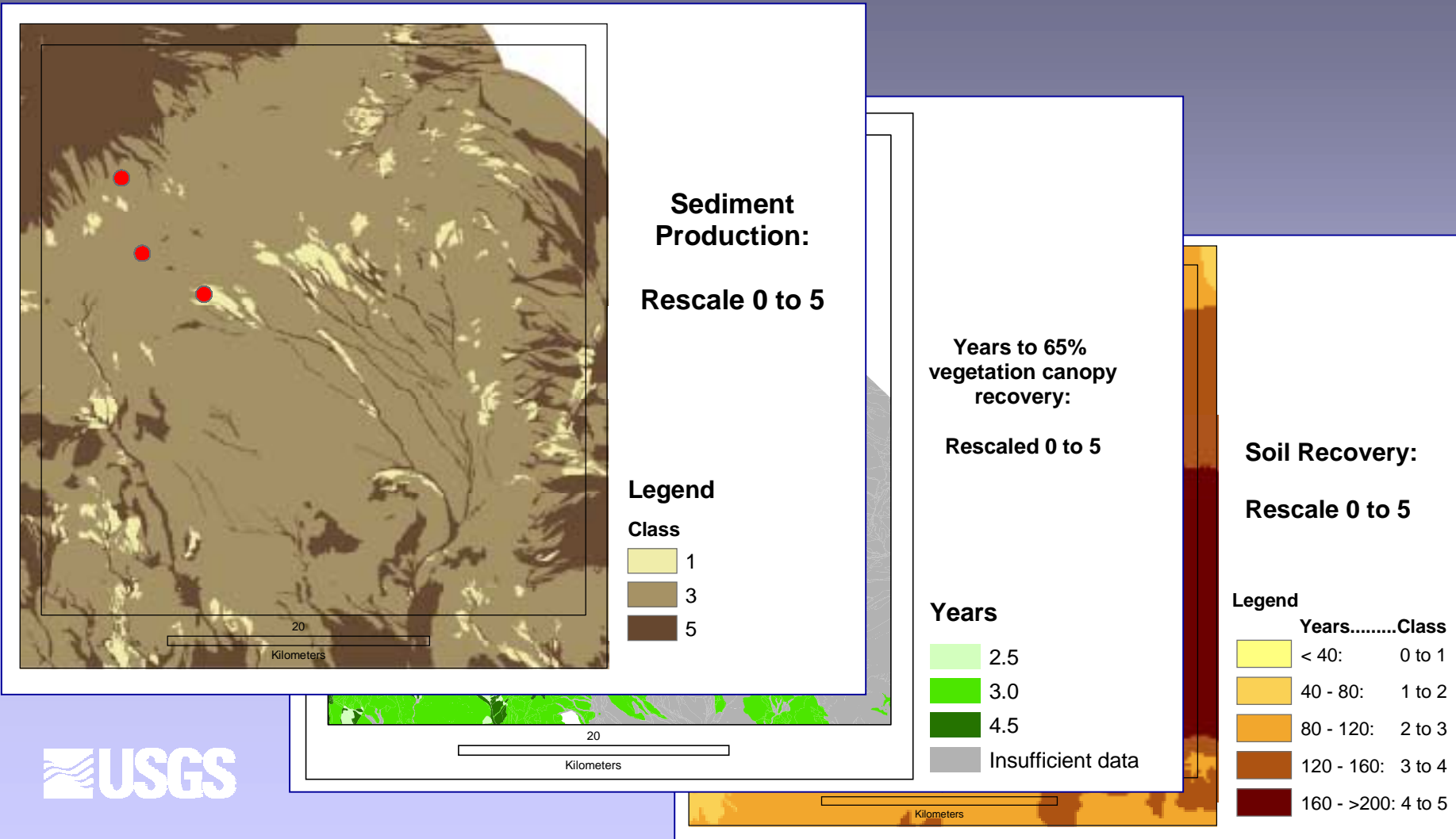
Combining Layers

To combine layers, convert all scales to ranking of 1 to 5.

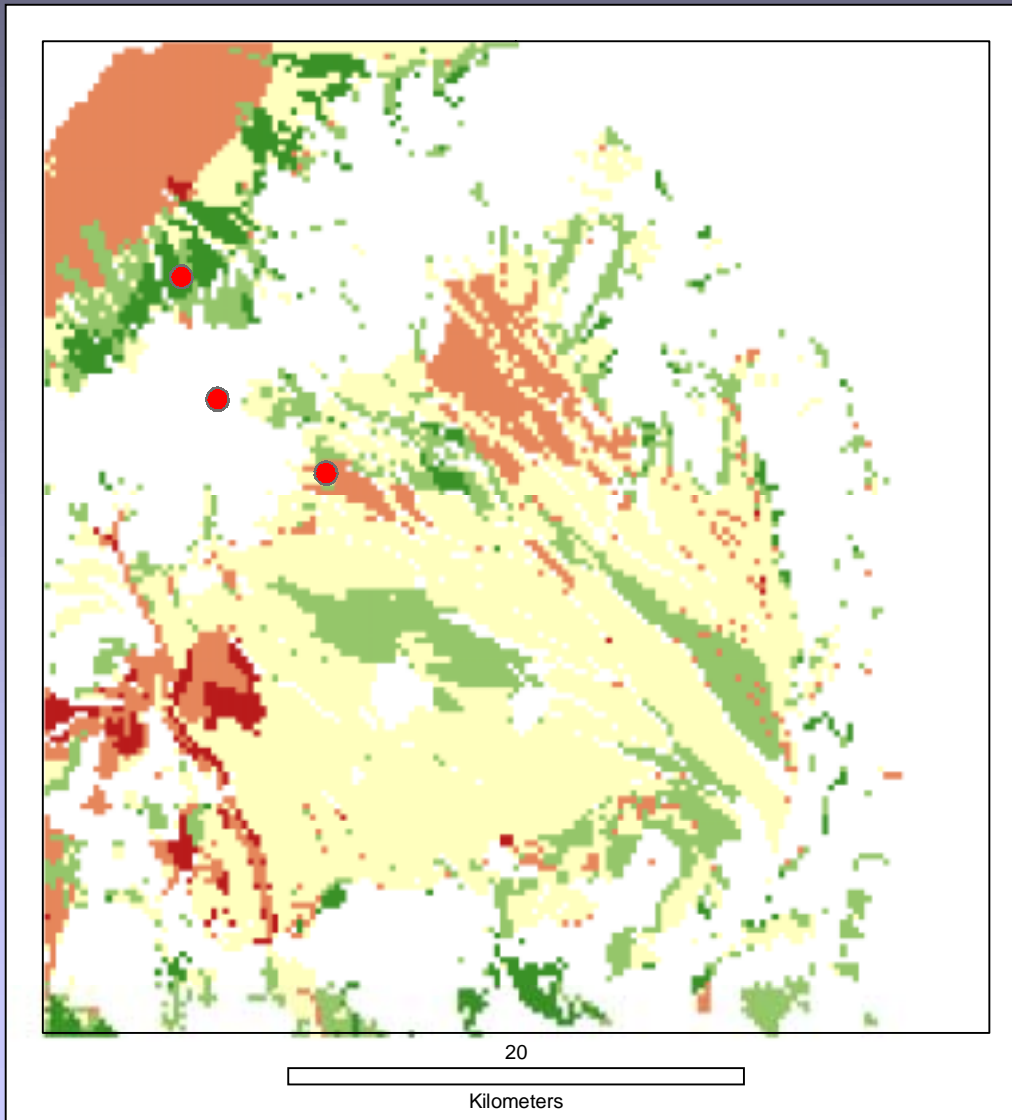


Combining Layers

To combine layers, convert all scales to ranking of 1 to 5.



Overall Ranking, Equal Weighting



Weights:

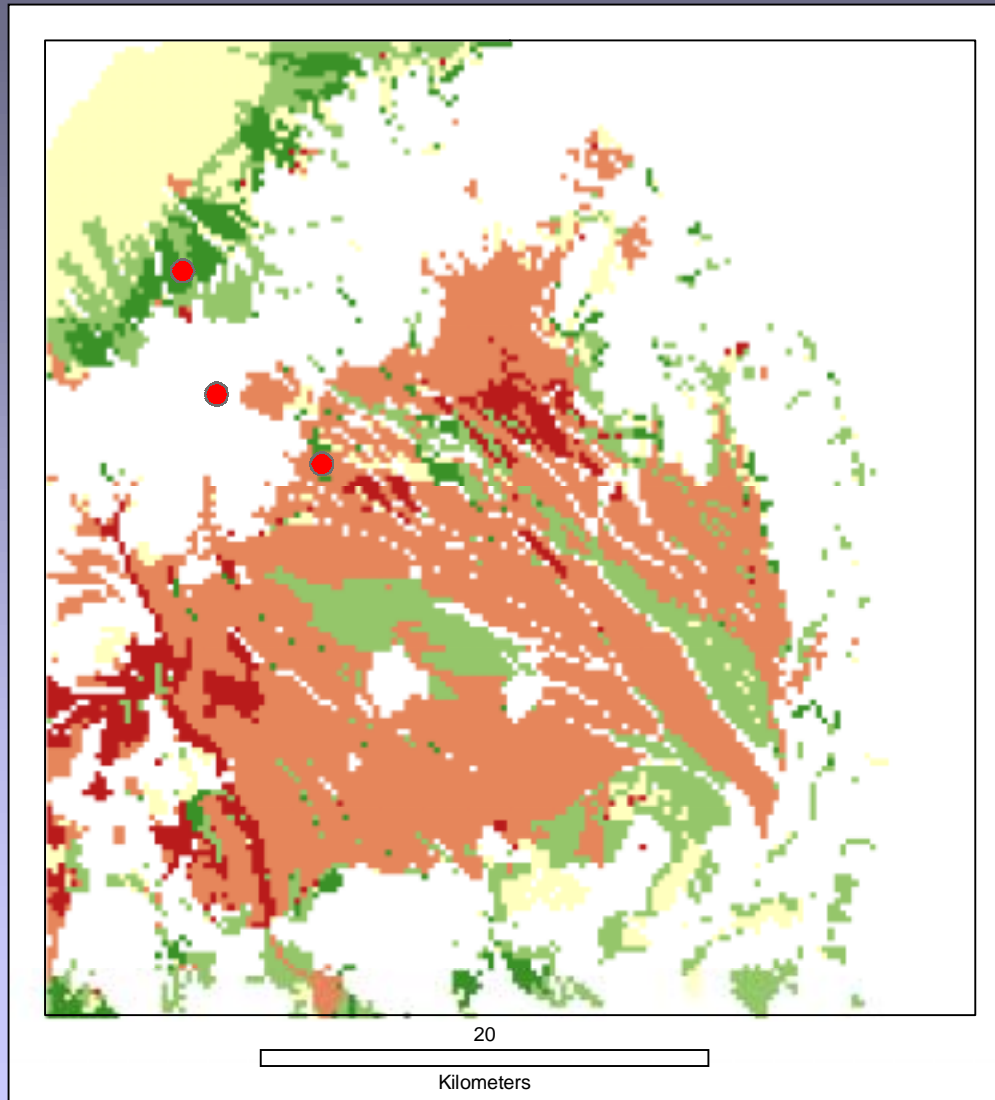
- 1x crust
- 1x soil recovery
- 1x sediment production
- 1x vegetation recovery

Legend

rating

- best
-
-
-
- worst

Weighting to Emphasize Vegetation Recovery

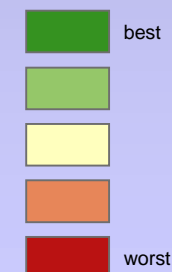


Weights:

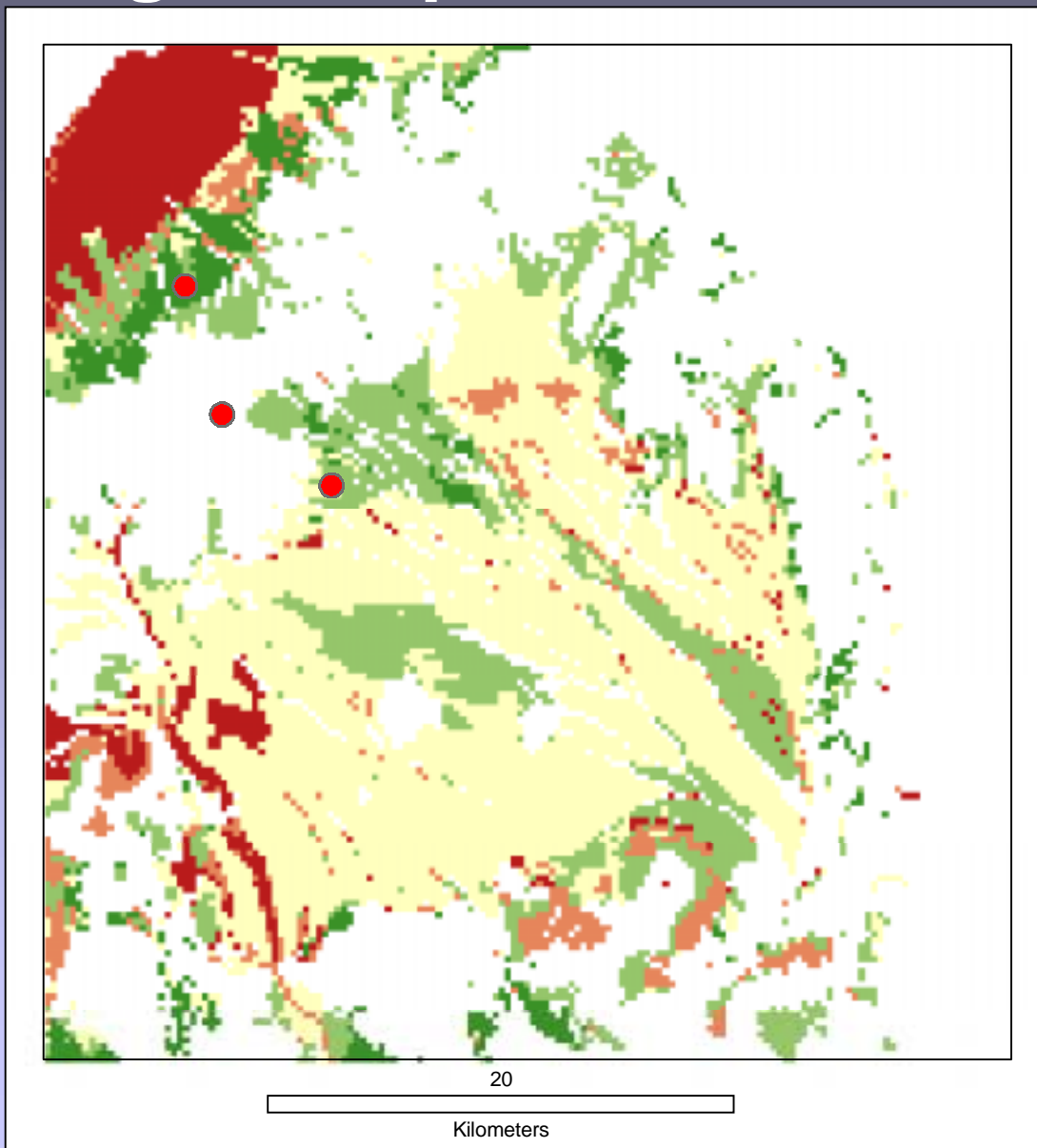
- 1x crust
- 1x soil recovery
- 1x sediment production
- 4x vegetation recovery

Legend

rating



Weighting to Emphasize Soils

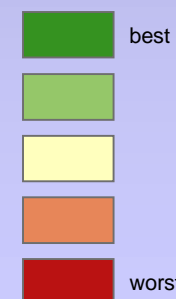


Weights:

- 1x crust
- 2x soil recovery
- 2x sediment production
- 1x vegetation recovery

Legend

rating



Future Research

- **Refine models**
- **Develop process models for restructuring and combining input data layers into recovery/vulnerability data layers**
- **Incorporate into a user-friendly tool**