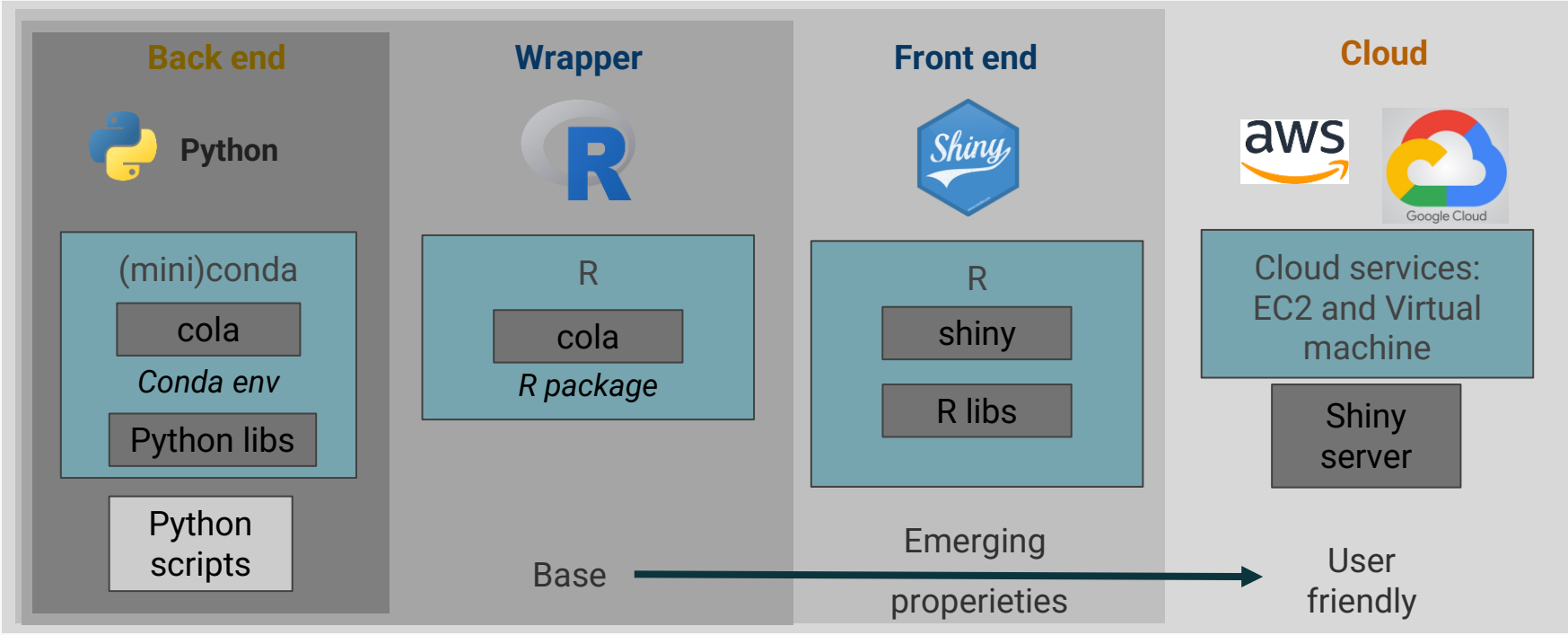
CoLa - Connecting Landscapes Decision Support System

Vientiane, Laos
November 20th, 2024

Funded by:

Developed by:

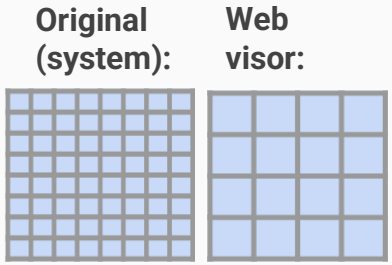
4. DSS Overview

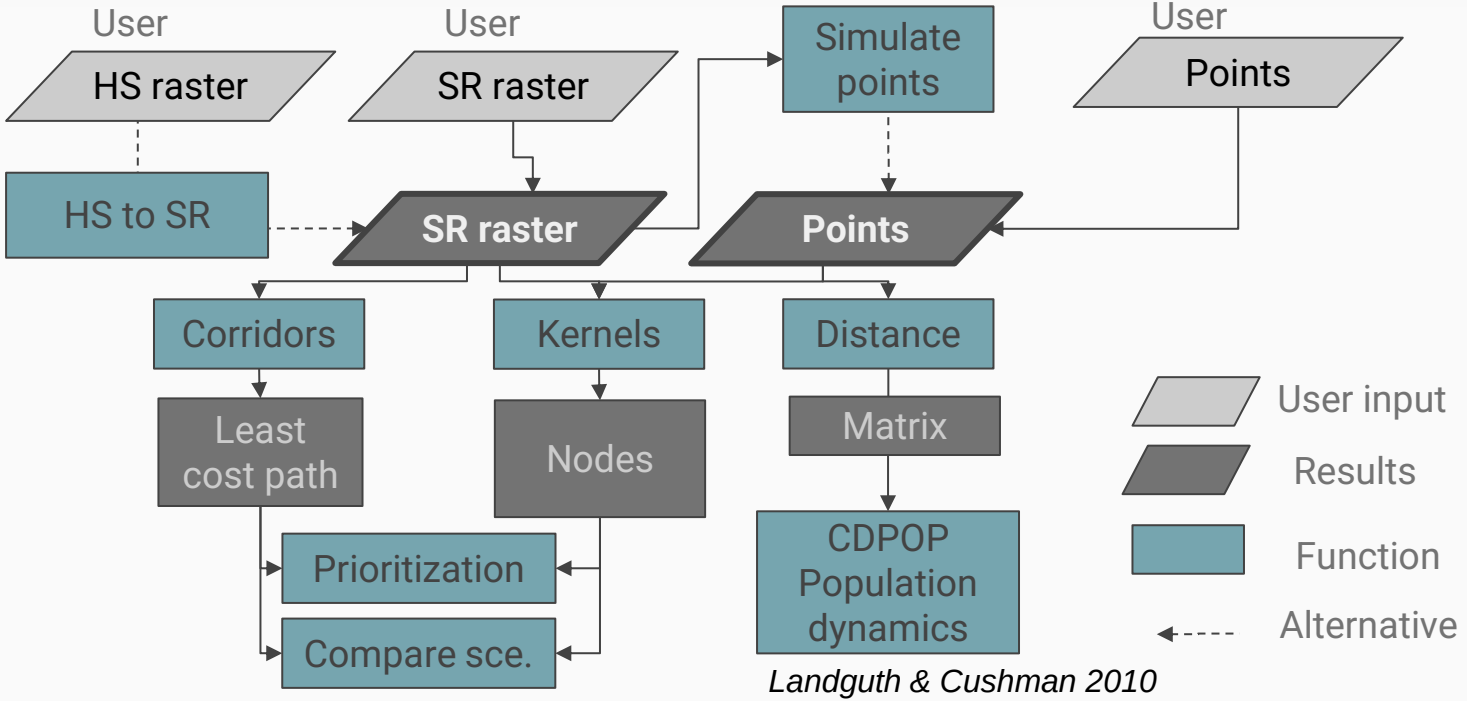


Complete workflow

HS: Habitat suitability

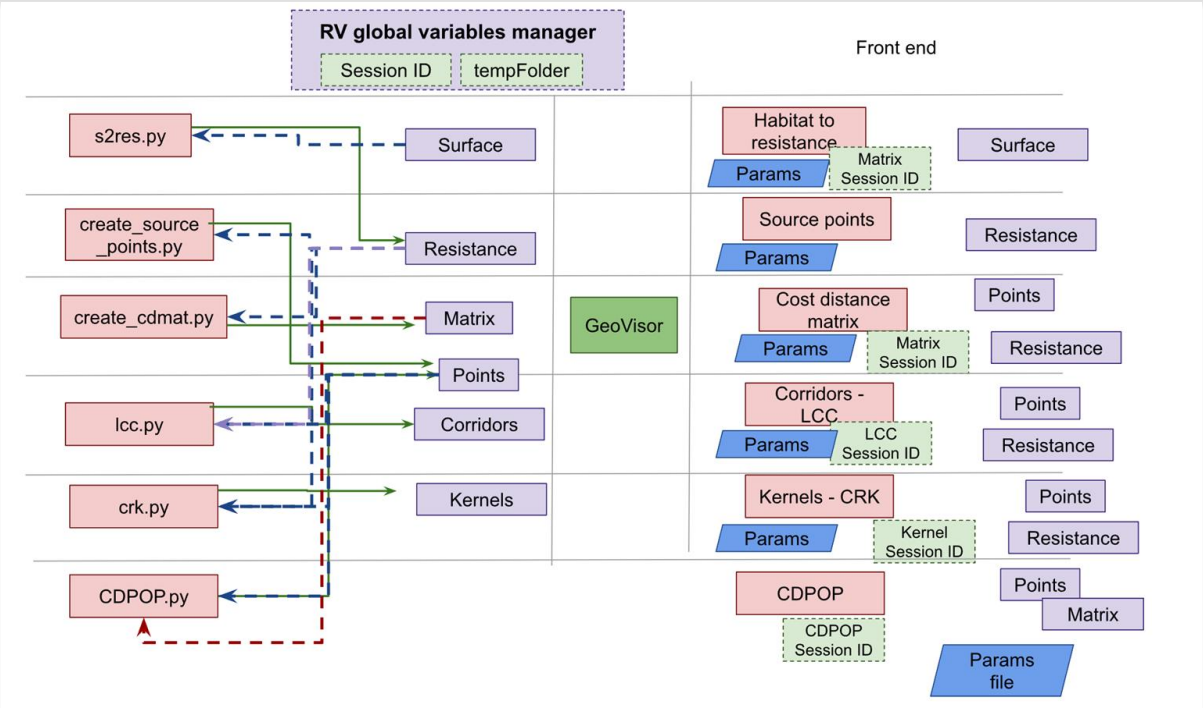
SR: Surface resistance



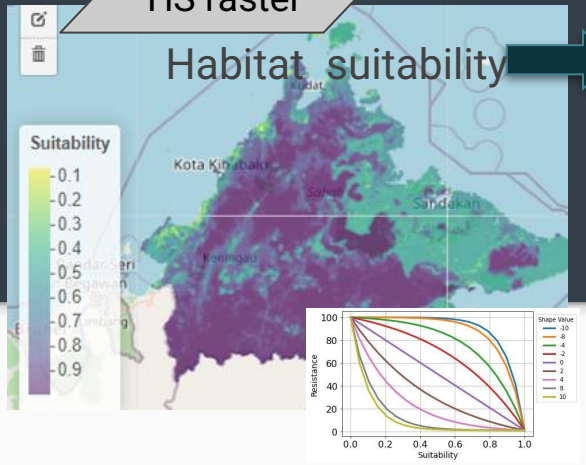


Landguth & Cushman 2010

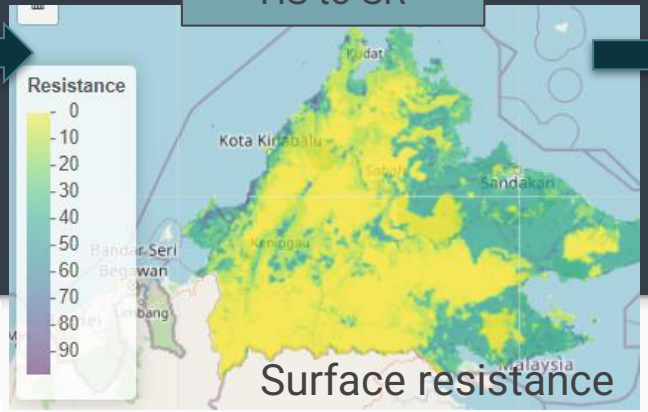
DSS Overview



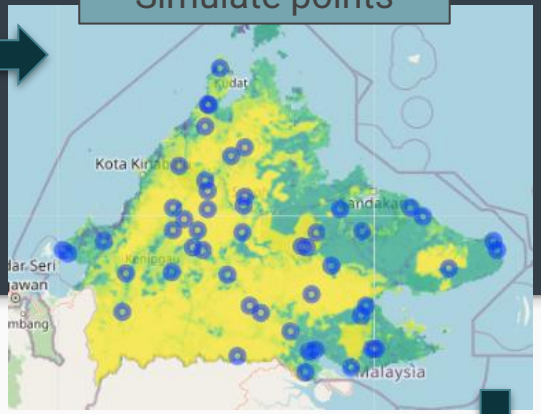
HS raster



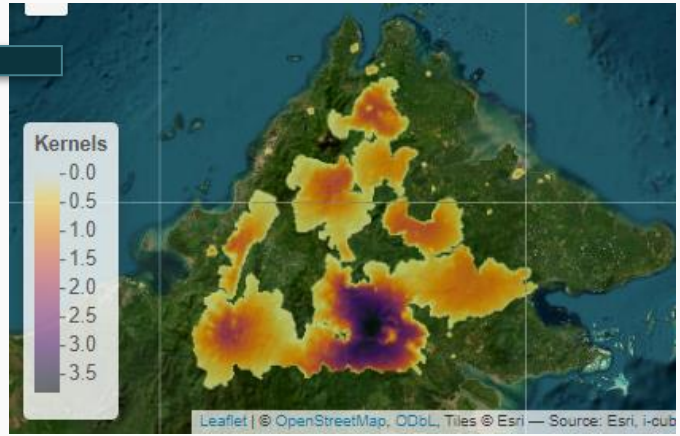
HS to SR



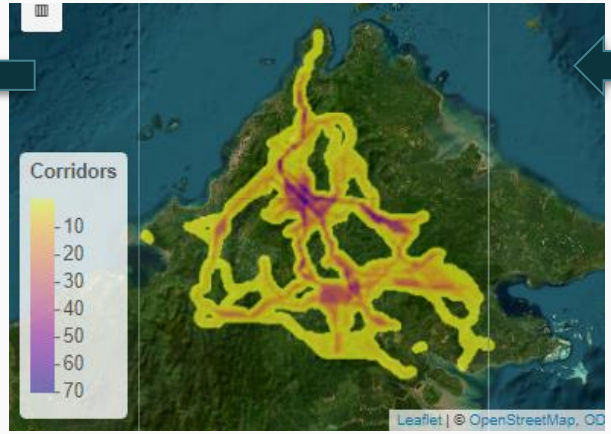
Simulate points



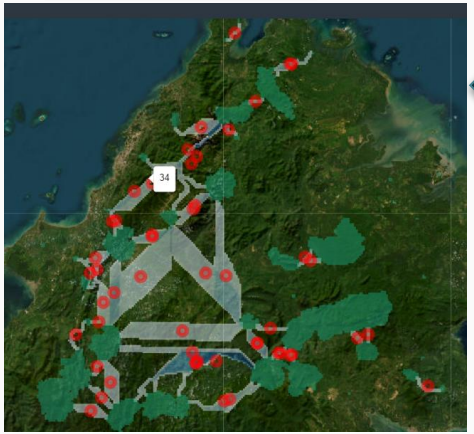
Kernels



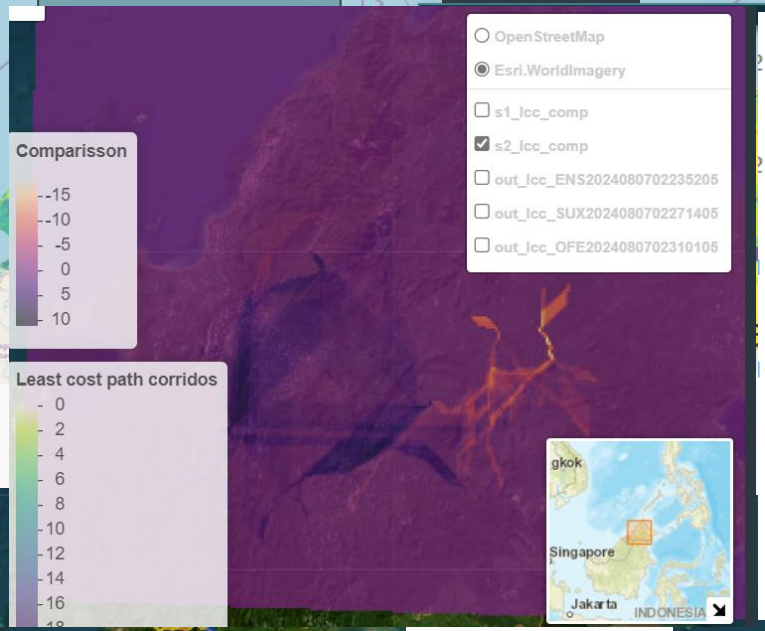
Corridors

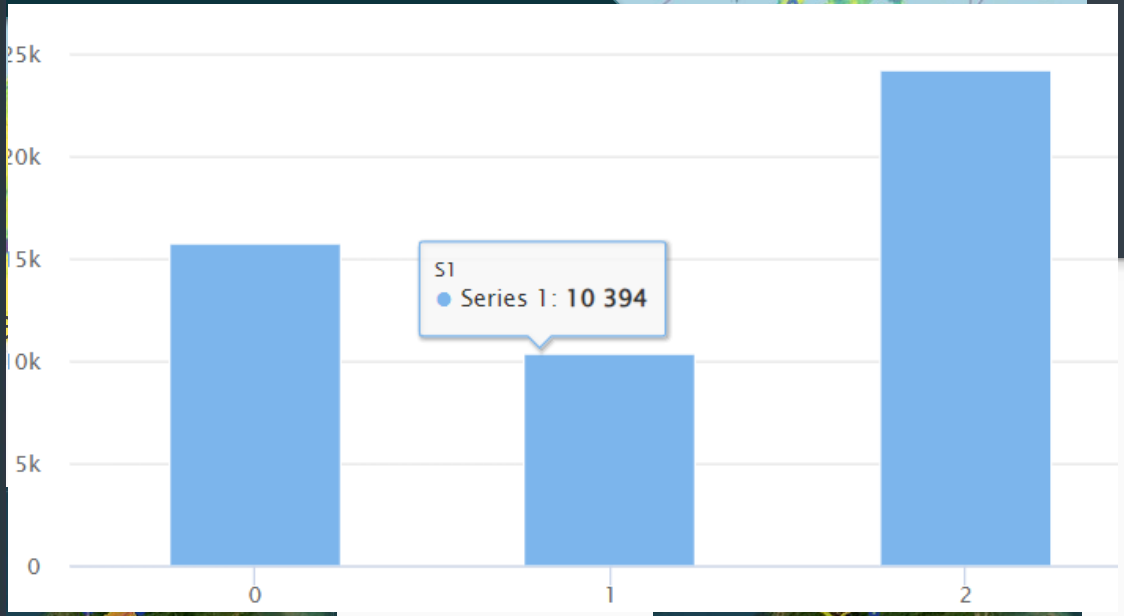


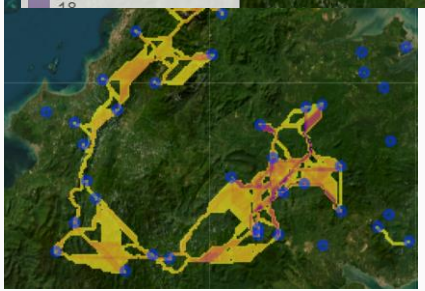
Prioritization



SR +PTS





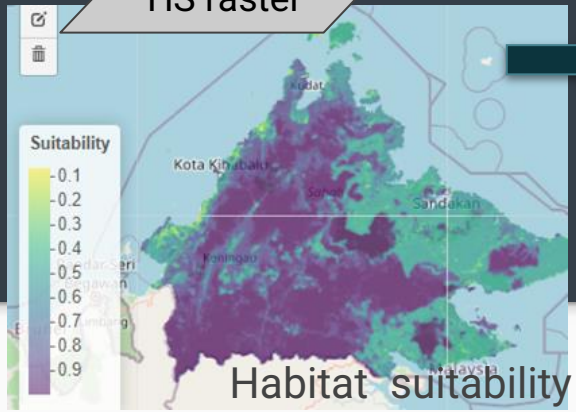


Corridors

Corridors

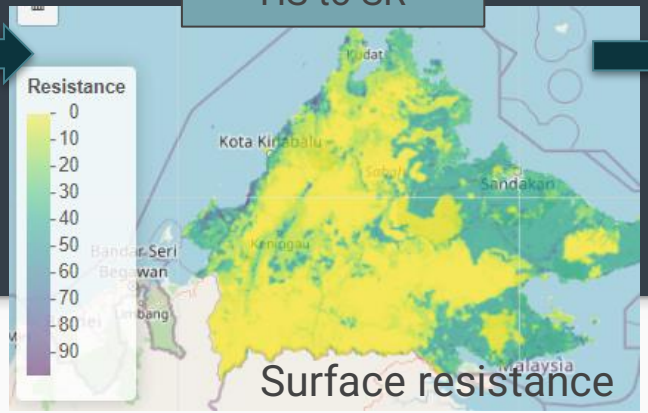
Corridors

HS raster



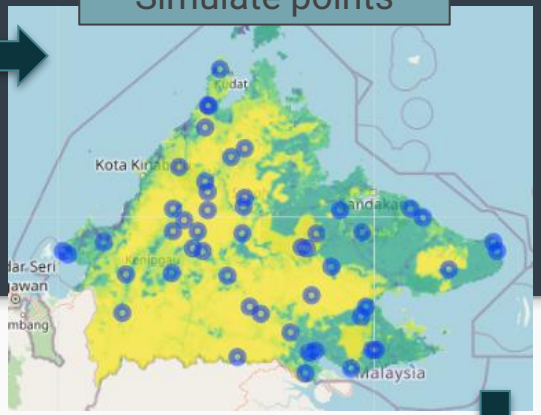
Habitat suitability

HS to SR



Surface resistance

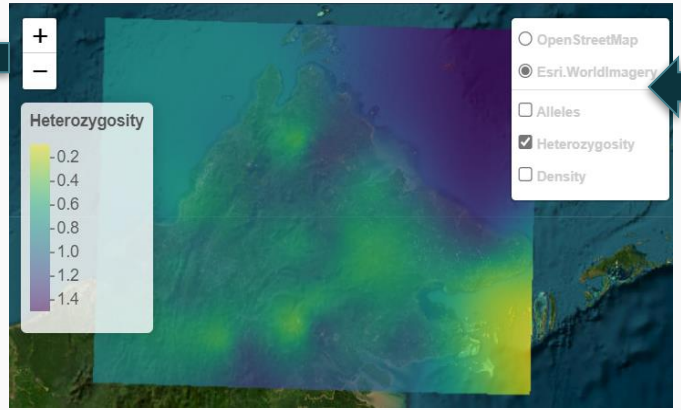
Simulate points



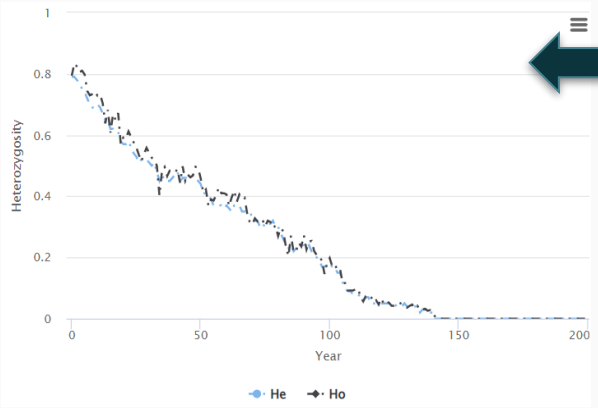
Cost distance matrix

	1,2	1,3	4,n
2,1		2,3	2,n
3,1	3,2		3,n
n,1	n,2	n,3	

Heterozygosity



Heterozygosity



Landguth & Cushman 2010

Decision support system (DSS)

Project

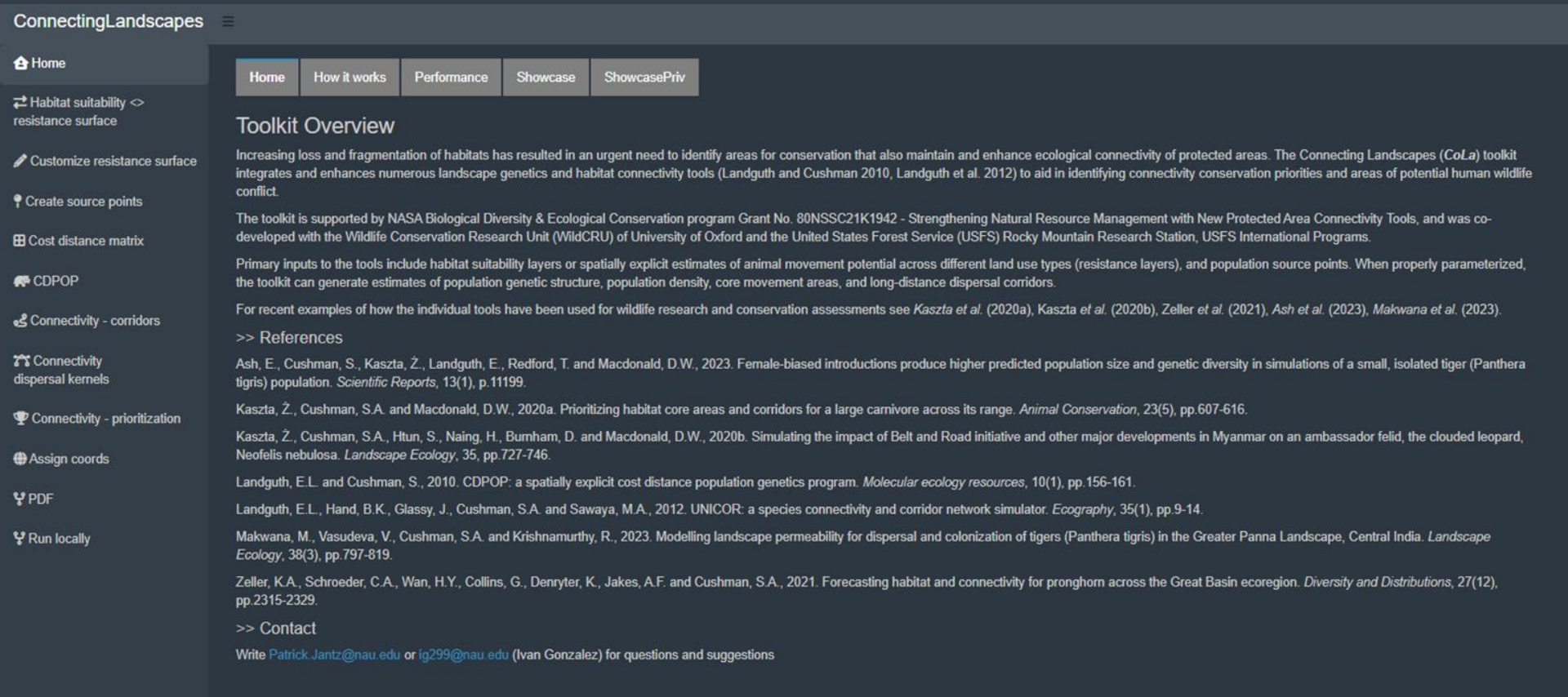
Run each of the previous steps using the sample data (or yours) and provide a screenshot and brief explanation of your results. Include:

a) Surface resistance
b) Points
c) Resistant kernels
d) Corridors

Make a Word or PDF document and upload it **here**

Fill this form (5mins)

Overview


ConnectingLandscapes
Home
Habitat suitability <> resistance surface
Customize resistance surface
Create source points
Cost distance matrix
CDPOP
Connectivity - corridors
Connectivity dispersal kernels
Connectivity - prioritization
Assign coords
PDF
Run locally
Home
How it works
Performance
Showcase
ShowcasePriv
Toolkit Overview
Increasing loss and fragmentation of habitats has resulted in an urgent need to identify areas for conservation that also maintain and enhance ecological connectivity of protected areas. The Connecting Landscapes (CoLa) toolkit integrates and enhances numerous landscape genetics and habitat connectivity tools (Landguth and Cushman 2010, Landguth et al. 2012) to aid in identifying connectivity conservation priorities and areas of potential human wildlife conflict.
The toolkit is supported by NASA Biological Diversity & Ecological Conservation program Grant No. 80NSSC21K1942 - Strengthening Natural Resource Management with New Protected Area Connectivity Tools, and was co-developed with the Wildlife Conservation Research Unit (WildCRU) of University of Oxford and the United States Forest Service (USFS) Rocky Mountain Research Station, USFS International Programs.
Primary inputs to the tools include habitat suitability layers or spatially explicit estimates of animal movement potential across different land use types (resistance layers), and population source points. When properly parameterized, the toolkit can generate estimates of population genetic structure, population density, core movement areas, and long-distance dispersal corridors.
For recent examples of how the individual tools have been used for wildlife research and conservation assessments see Kaszta et al. (2020a), Kaszta et al. (2020b), Zeller et al. (2021), Ash et al. (2023), Makwana et al. (2023).
>> References
Ash, E., Cushman, S., Kaszta, Ż., Landguth, E., Redford, T. and Macdonald, D.W., 2023. Female-biased introductions produce higher predicted population size and genetic diversity in simulations of a small, isolated tiger (Panthera tigris) population. Scientific Reports, 13(1), p.11199.
Kaszta, Ż., Cushman, S.A. and Macdonald, D.W., 2020a. Prioritizing habitat core areas and corridors for a large carnivore across its range. Animal Conservation, 23(5), pp.607-616.
Kaszta, Ż., Cushman, S.A., Htun, S., Naing, H., Burnham, D. and Macdonald, D.W., 2020b. Simulating the impact of Belt and Road initiative and other major developments in Myanmar on an ambassador felid, the clouded leopard, Neofelis nebulosa. Landscape Ecology, 35, pp.727-746.
Landguth, E.L. and Cushman, S., 2010. CDPOP: a spatially explicit cost distance population genetics program. Molecular ecology resources, 10(1), pp.156-161.
Landguth, E.L., Hand, B.K., Glassy, J., Cushman, S.A. and Sawaya, M.A., 2012. UNICOR: a species connectivity and corridor network simulator. Ecography, 35(1), pp.9-14.
Makwana, M., Vasudeva, V., Cushman, S.A. and Krishnamurthy, R., 2023. Modelling landscape permeability for dispersal and colonization of tigers (Panthera tigris) in the Greater Panna Landscape, Central India. Landscape Ecology, 38(3), pp.797-819.
Zeller, K.A., Schroeder, C.A., Wan, H.Y., Collins, G., Denryter, K., Jakes, A.F. and Cushman, S.A., 2021. Forecasting habitat and connectivity for pronghorn across the Great Basin ecoregion. Diversity and Distributions, 27(12), pp.2315-2329.
>> Contact
Write Patrick.Jantz@nau.edu or ig299@nau.edu (Ivan Gonzalez) for questions and suggestions

Overview

Home | How it works | Performance | Showcase | ShowcasePriv

User guide

Depending on the function you want to run you will need different set of inputs.

Each tab have the following goal:

Home:

- Project description
- Performance
- Examples and showcase

Habitat suitability (HS) to surface resistance (SR): Converts HS into SR using user parameters Inputs:

- HS georreferenced raster
- User parameters

Outputs: SR raster (TIF)

Create source points: Inputs:

- SR georreferenced raster
- User parameters

Outputs: Points (SHP)

Cost distance matrix: Inputs:

- SR georreferenced raster
- Coordinates or spatial points
- User parameters

Outputs: Matrix (CSV)

CDPOP: Inputs: SR raster Coordinates or spatial points Distance matrix User parameters

Outputs: Population data (xy)

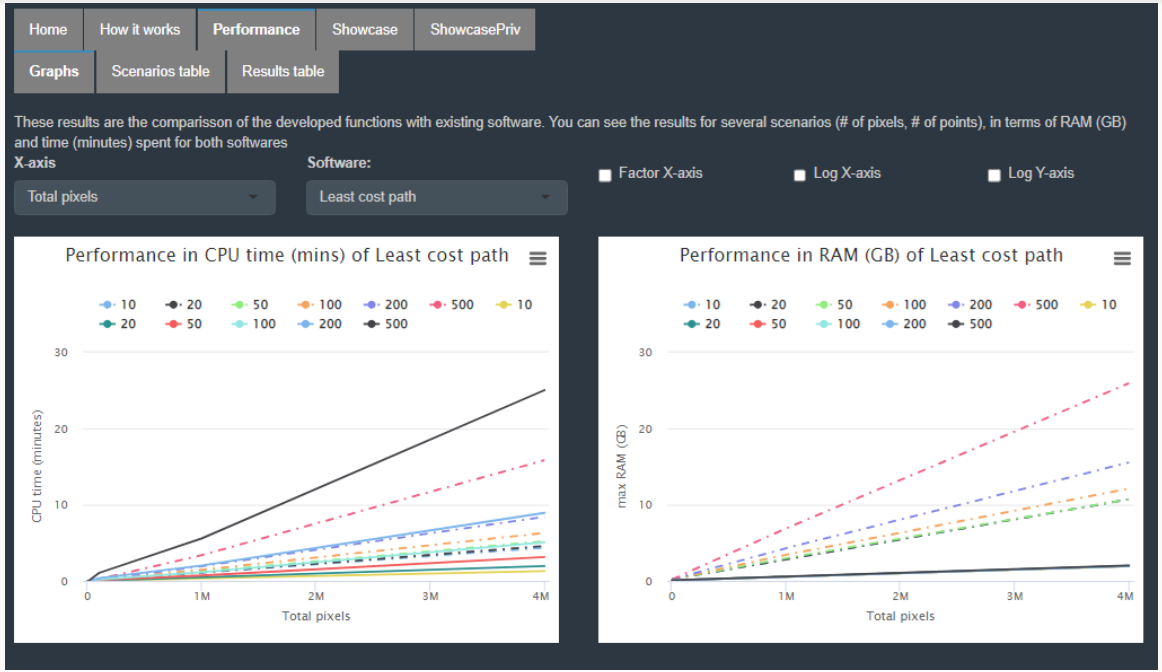
Landscape genetics: Inputs: Outputs: SR raster (TIF)

Corridors: Inputs:

- SR georreferenced raster
- Coordinates or spatial points
- User parameters

Outputs: Corridors (TIF)

Performance



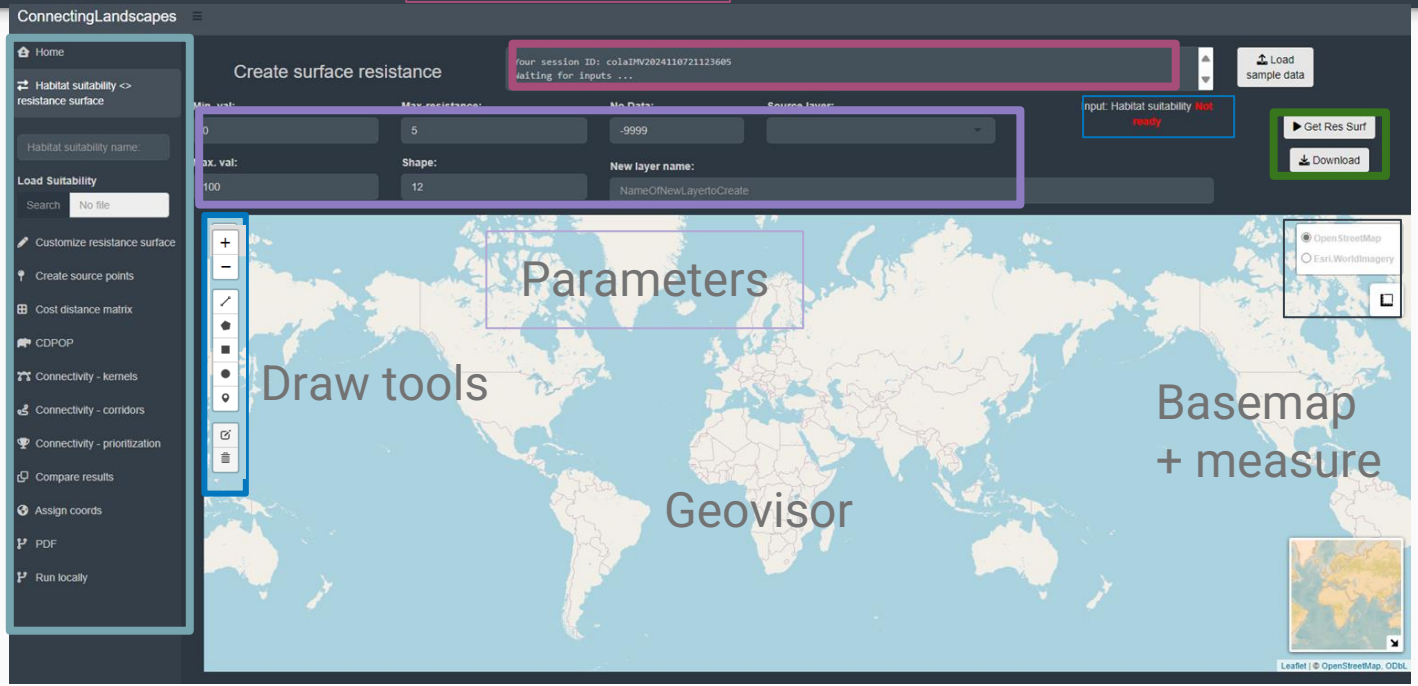
The visuals

Log box + session ID

Ready / Not ready label

Run / download

Functions

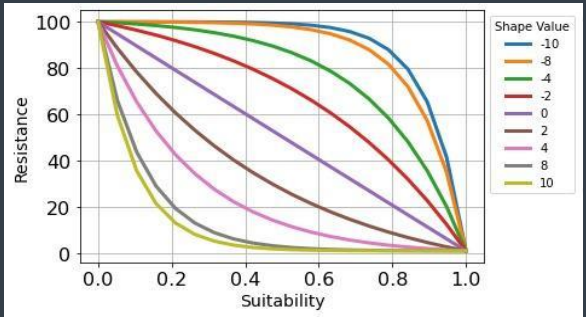


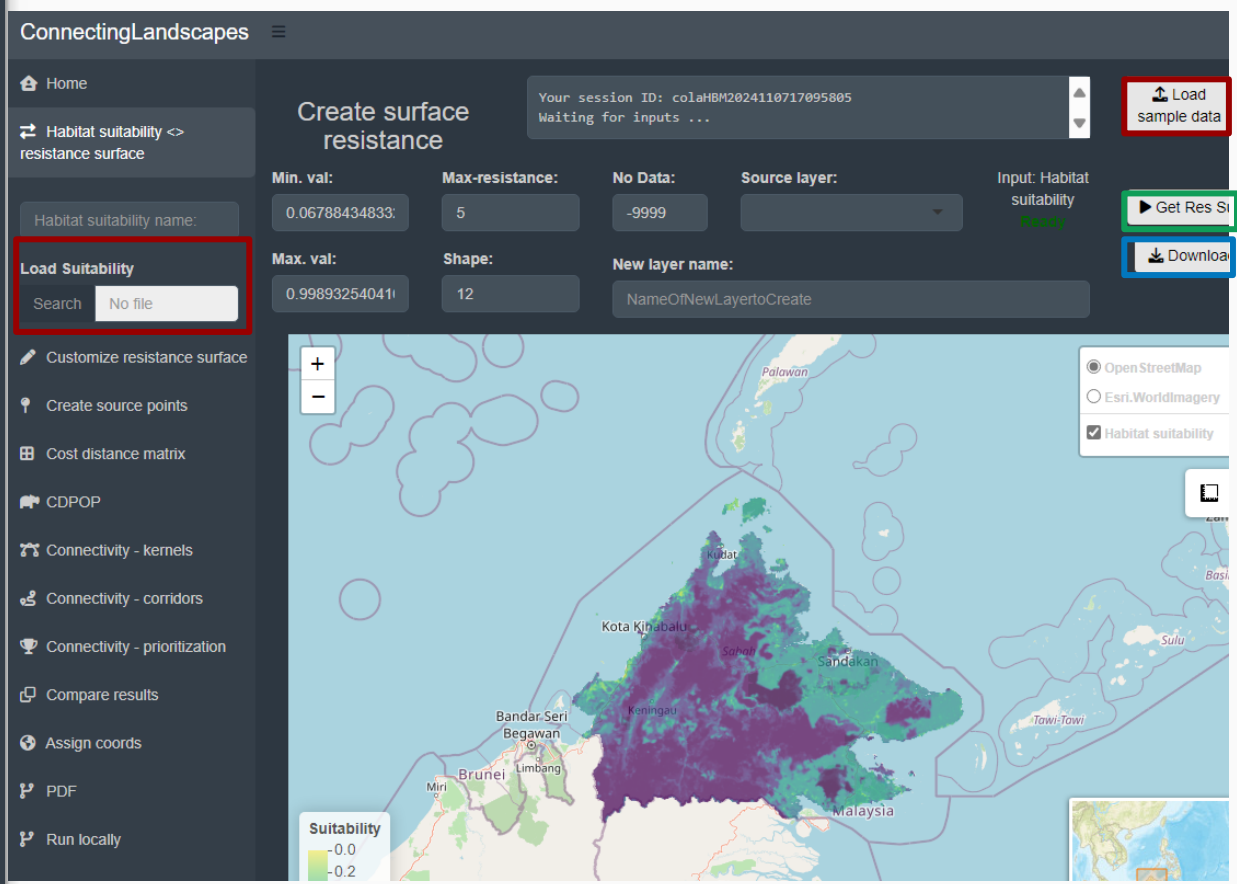
Save your session ID for questions or bugs

1. Suitability to resistance

For running:

1. **Load a valid TIF raster with continuous values**
2. Define the parameters. They are calculated from your raster by default. Modify as needed.
3. Look for the green Ready labels
4. Click on "**Get resistance surface**"
5. Download the resulting raster in TIFF format



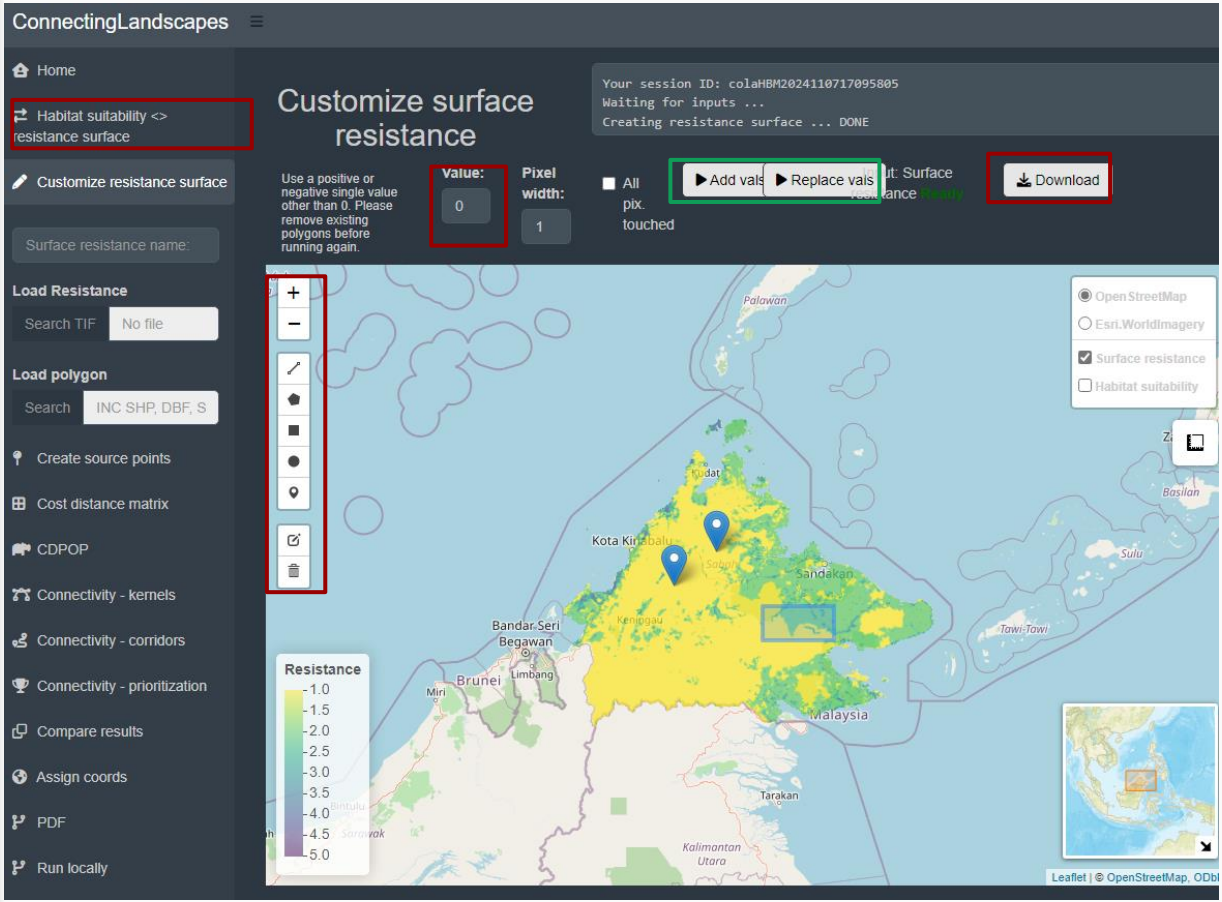


No data? Load the sample dataset

2. Customize resistance surface

For running:

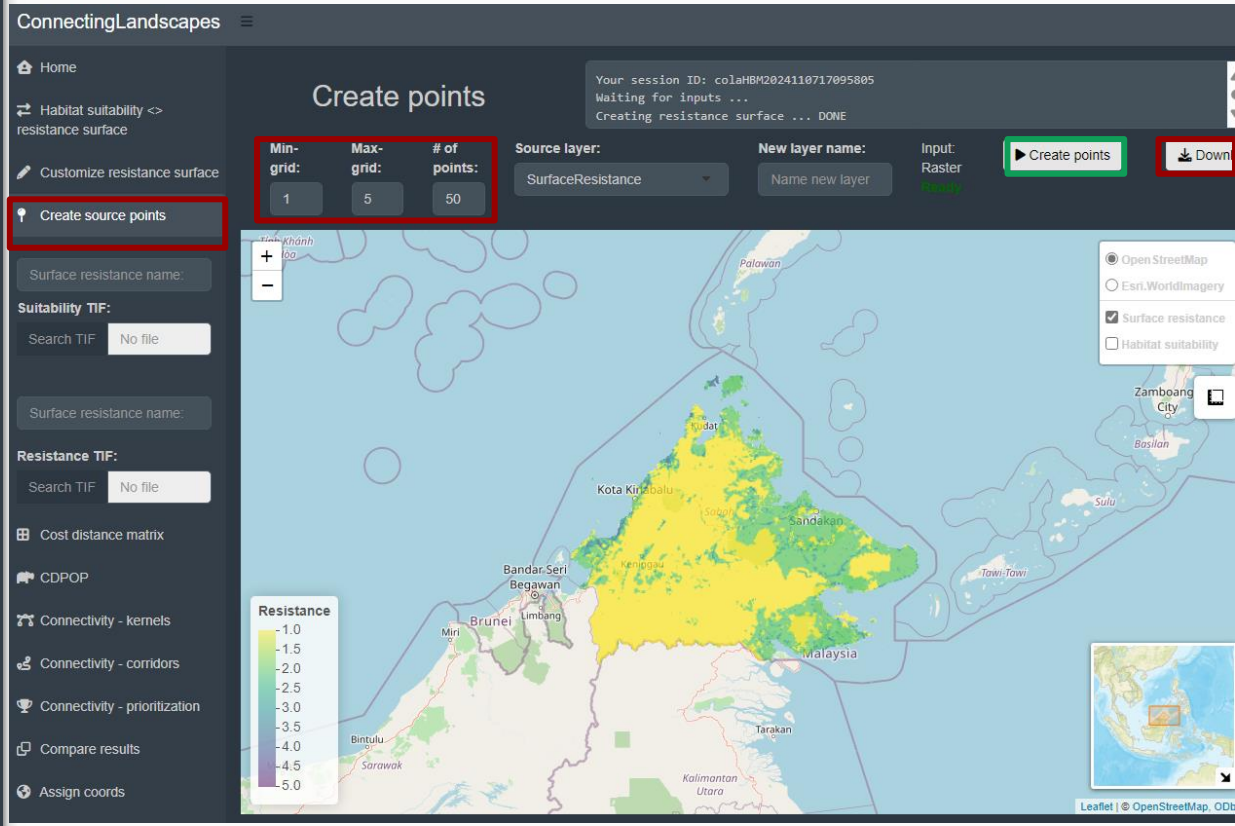
1. Load a valid TIF raster with continuous values if skipping last step. No extra SR required
2. Draw figures you want to “burn” in. Multiple geometry types allowed
3. Provide a “value to add”. Number positive or negative
4. Look for the green Ready labels
5. Click on “**Add values to raster**”
6. Download the resulting raster in TIFF format



3. Create source points

For running:

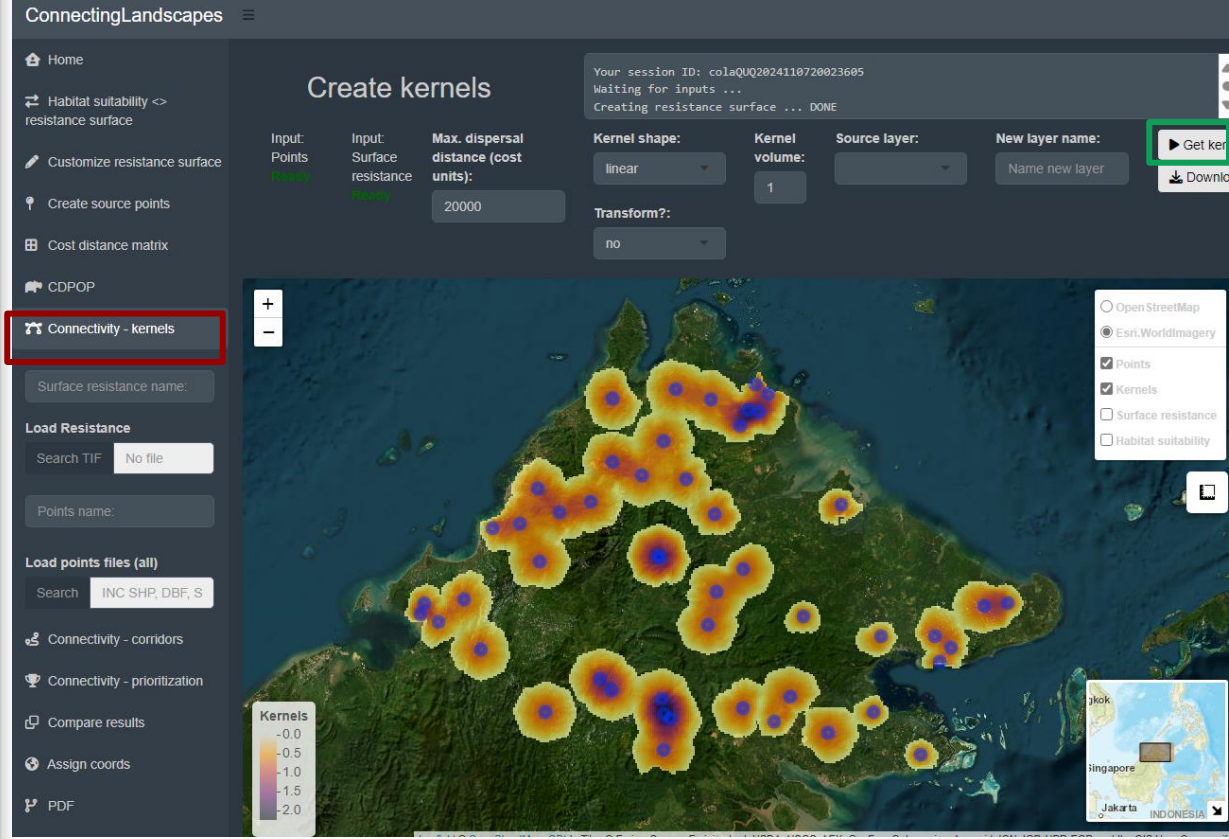
1. Load a valid TIF raster with continuous values if skipping previous steps. Can use HS or SR
2. Select the min-max range on the raster to simulate the points, and the total number of points
3. Look for the green Ready labels
4. Select which (available) layer to base the analysis on.
5. Click on “**Create points**”
6. Download the resulting raster in TIFF format



4. Kernels

For running:

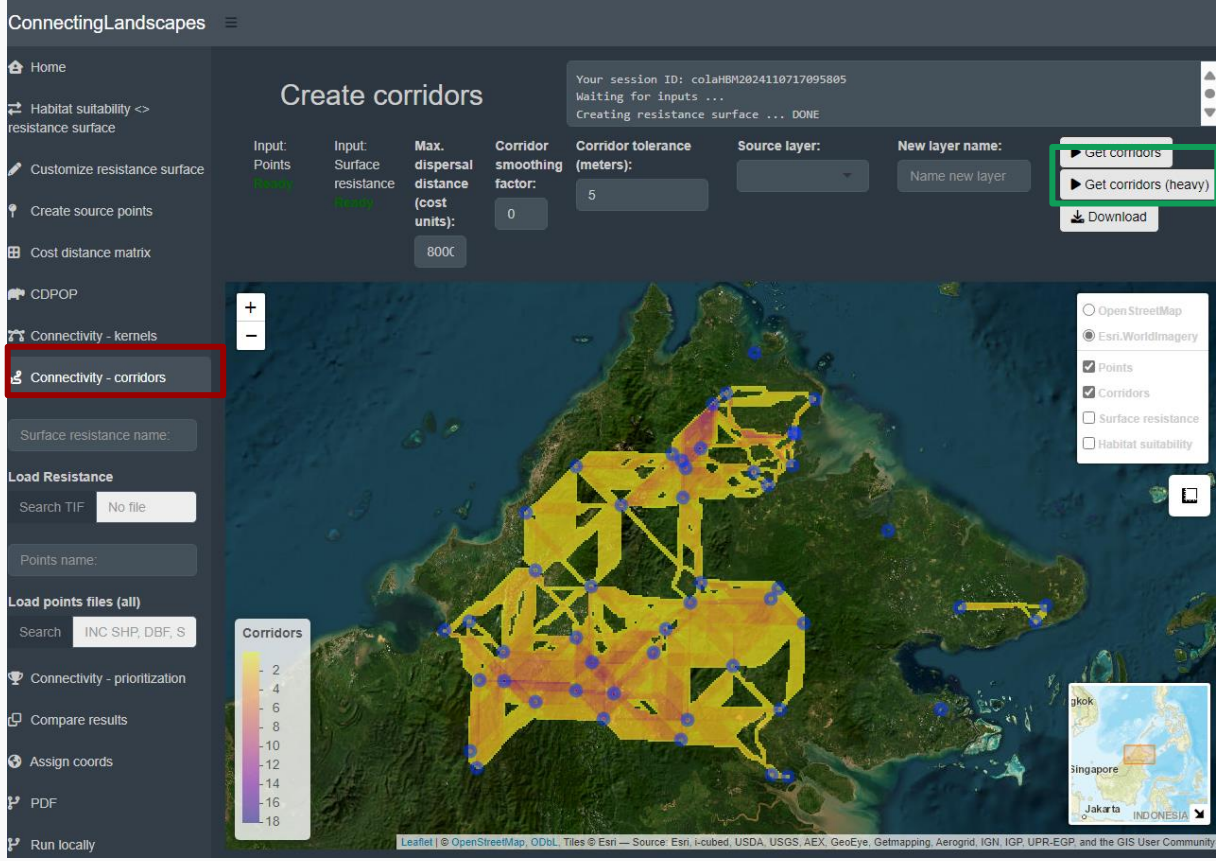
1. Load a valid TIF raster with continuous values if skipping previous steps. No required to upload SR again. TIF before points.
2. Load a valid point shapefile if skipped previous steps
3. Look for the green Ready labels
4. Select parameters
5. Click on “**Get kernels**”
6. Download the resulting raster in TIFF format



5. Corridors

For running:

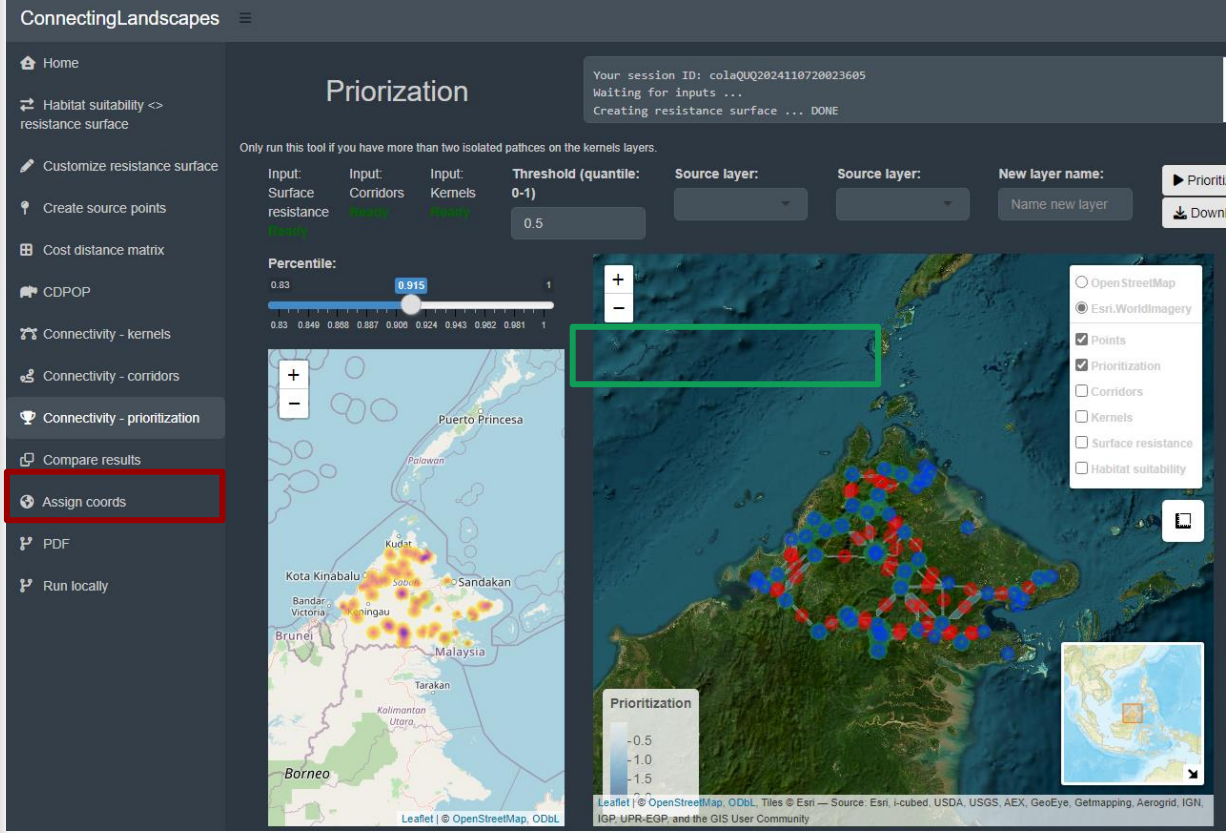
1. Load a valid TIF raster with continuous values if skipping previous steps. No required to upload SR again
2. Load a valid point shapefile if skipped previous steps
3. Look for the green Ready labels
4. Select parameters
5. Click on “**Get corridors**” or “**heavy**” for big rasters.
6. Download the resulting raster in TIFF format



6. Prioritization

For running:

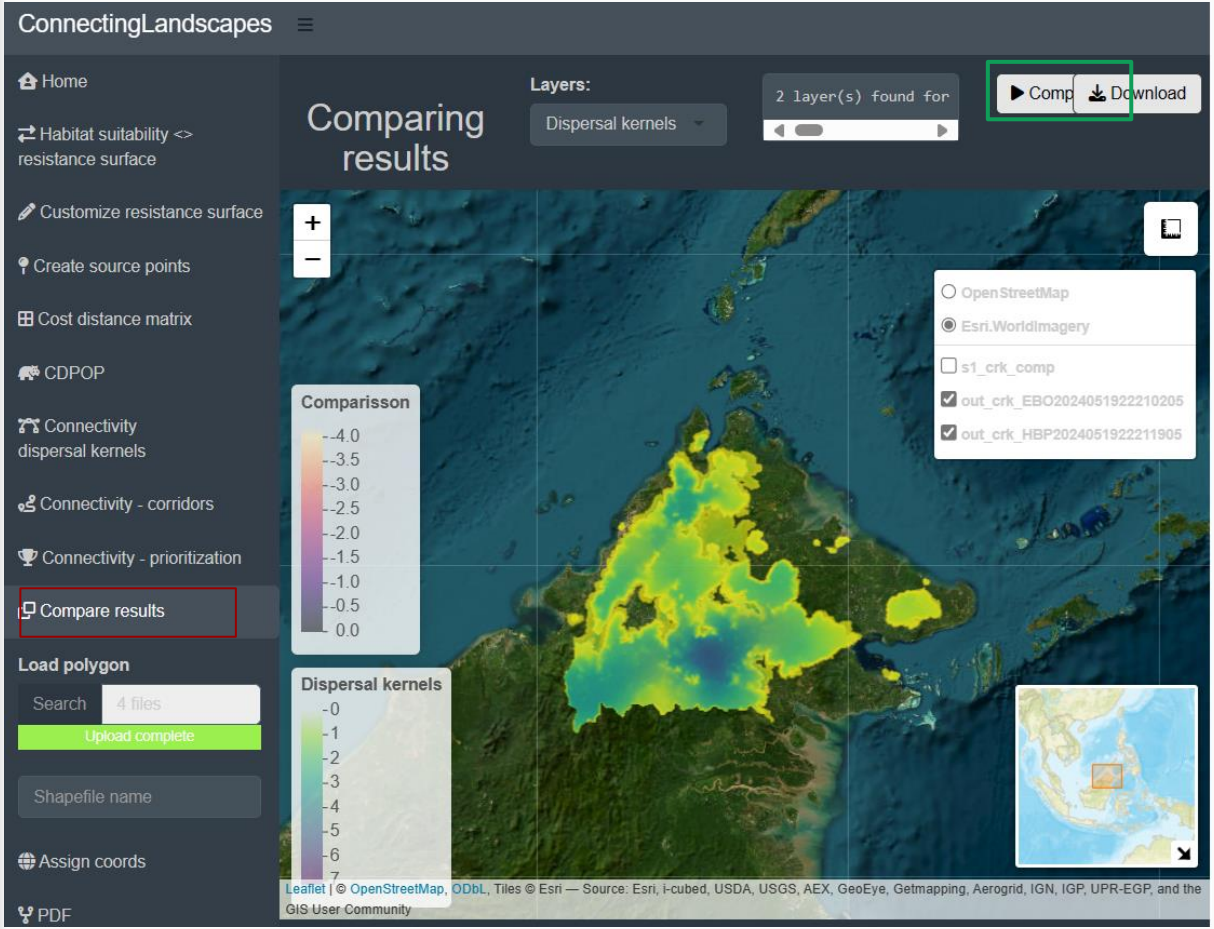
1. Must have corridors and kernels developed on the app
2. Select parameters
3. Look for the green Ready labels
4. Click on “**Prioritize**”
5. Download the resulting raster in TIFF format



7. Compare

For running:

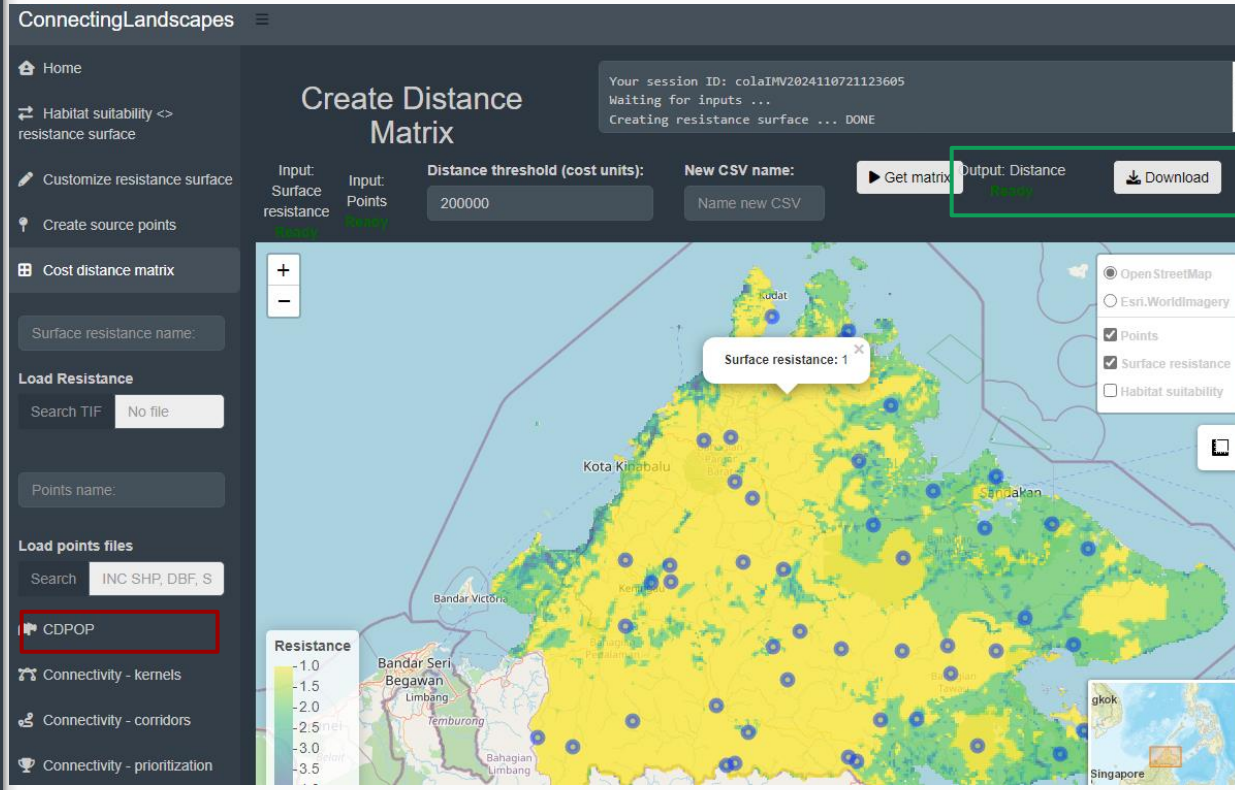
1. Must have at least two (2) corridors or kernels developed on the app
2. Choose layer to compare
3. Click on “**Compare**”
4. Download the resulting files on a compressed file



8. Distance matrix

For running:

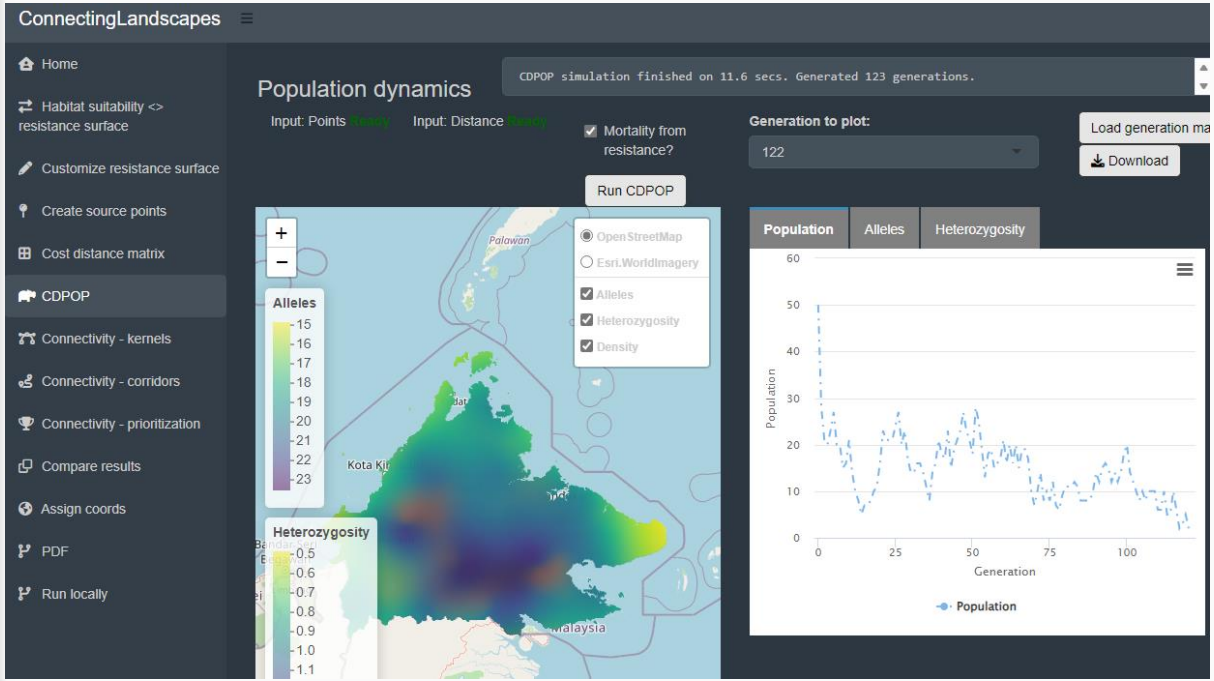
1. Load a valid TIF raster with continuous values if skipping previous steps. No required to upload SR again
2. Load a valid point shapefile if skipped previous steps
3. Look for the green Ready labels
4. Select parameters
5. Click on “**Get matrix**”.
6. Download the resulting matrix in CSV format



9. CDPOP

For running:

1. Must have a distance matrix generated on the app.
2. load a valid point shapefile if skipped previous steps
3. Look for the green Ready labels
4. Select if the mortality should be 0 for all points or extracted from the surface resistance layer.
5. Click on “**Run CDPOP**”.
6. Download the resulting files in ZIP format



Known issues

They will not stop the algorithm but is good to keep this in mind:

1. Use a valid NODATA value in your raster, and be aware of which it is
2. Use PROJECTED rasters
3. Assign a coordinate reference system
4. Your TIFs are big