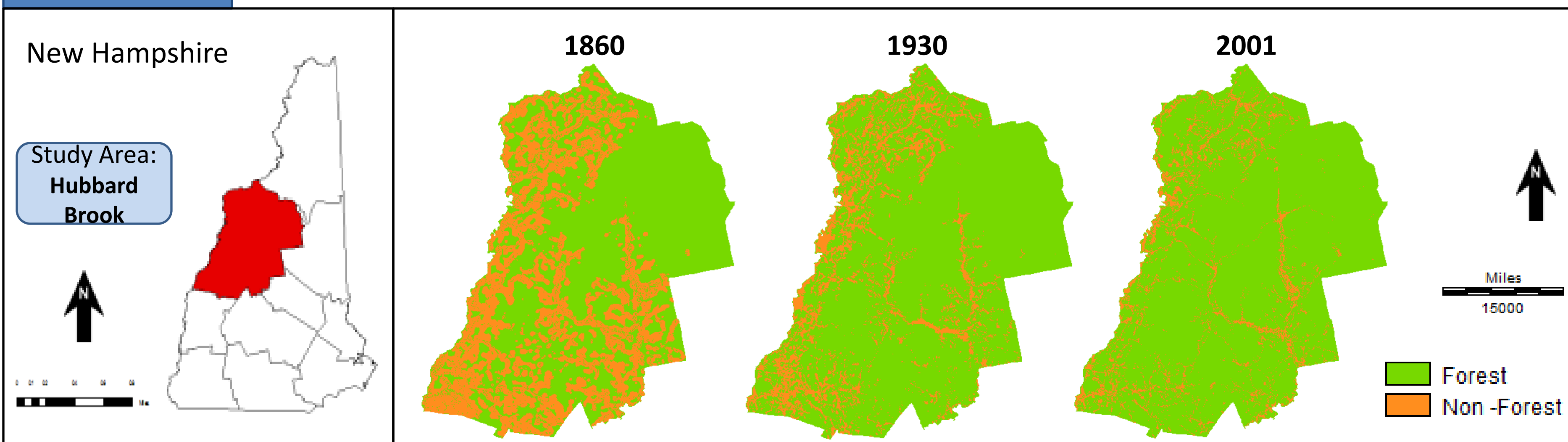


Introduction

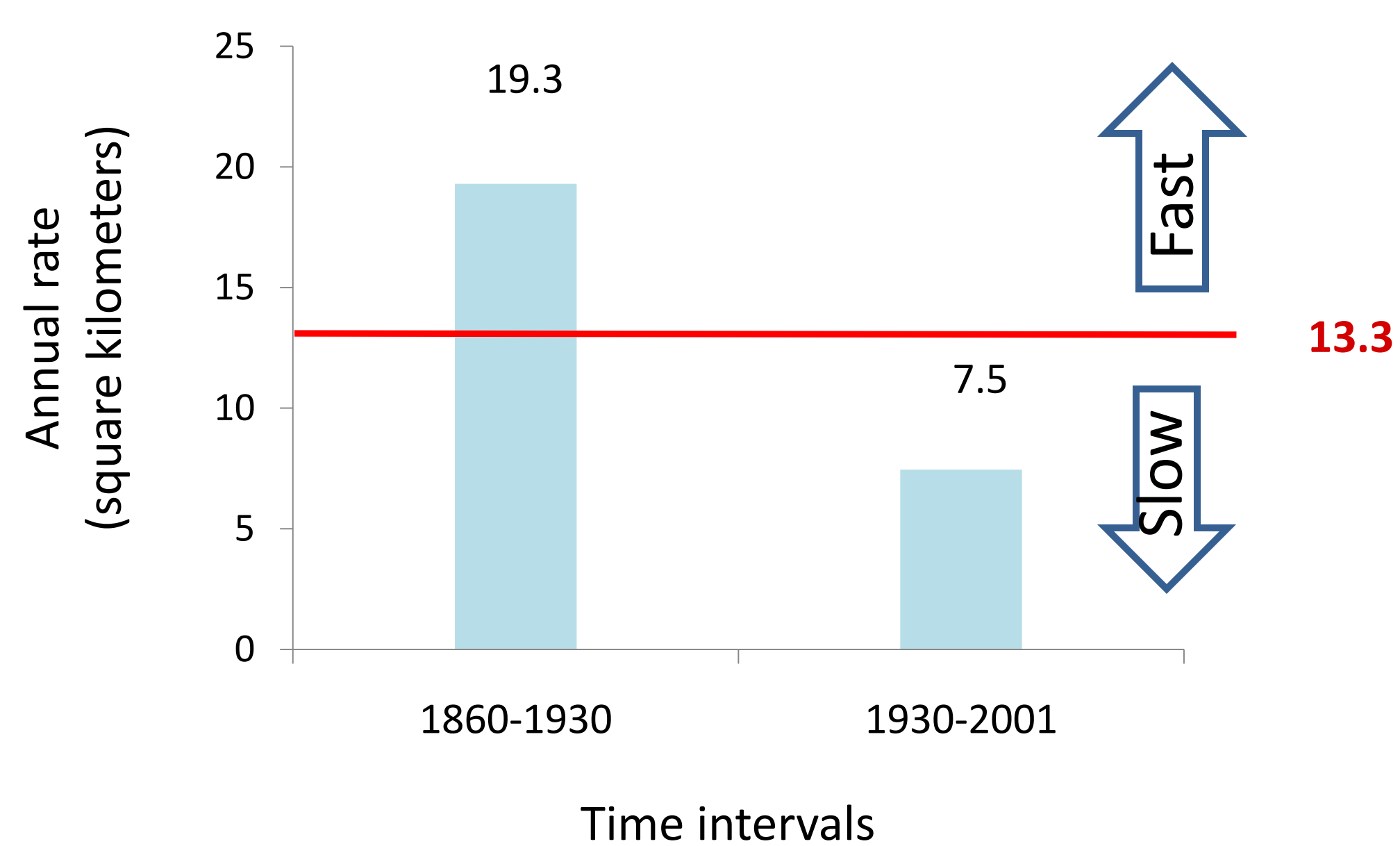
Gradient sometimes has a great impact on land transformation, such as topographic slope or distance to road. This paper illustrates the procedure with maps of forest versus non-forest for three points in time 1860, 1930, and 2001. The study area is Hubbard Brook, New Hampshire, where there has been substantial forest clearing before 1860 and substantial forest regrowth after 1860. The method reclassifies a continuous gradient into several bins as in a histogram, and then computes gross gains and gross losses of forest within each bin to analyze the stationarity of the land transition process between the two time intervals: from 1860 to 1930 and from 1930 to 2001.

Reference Map

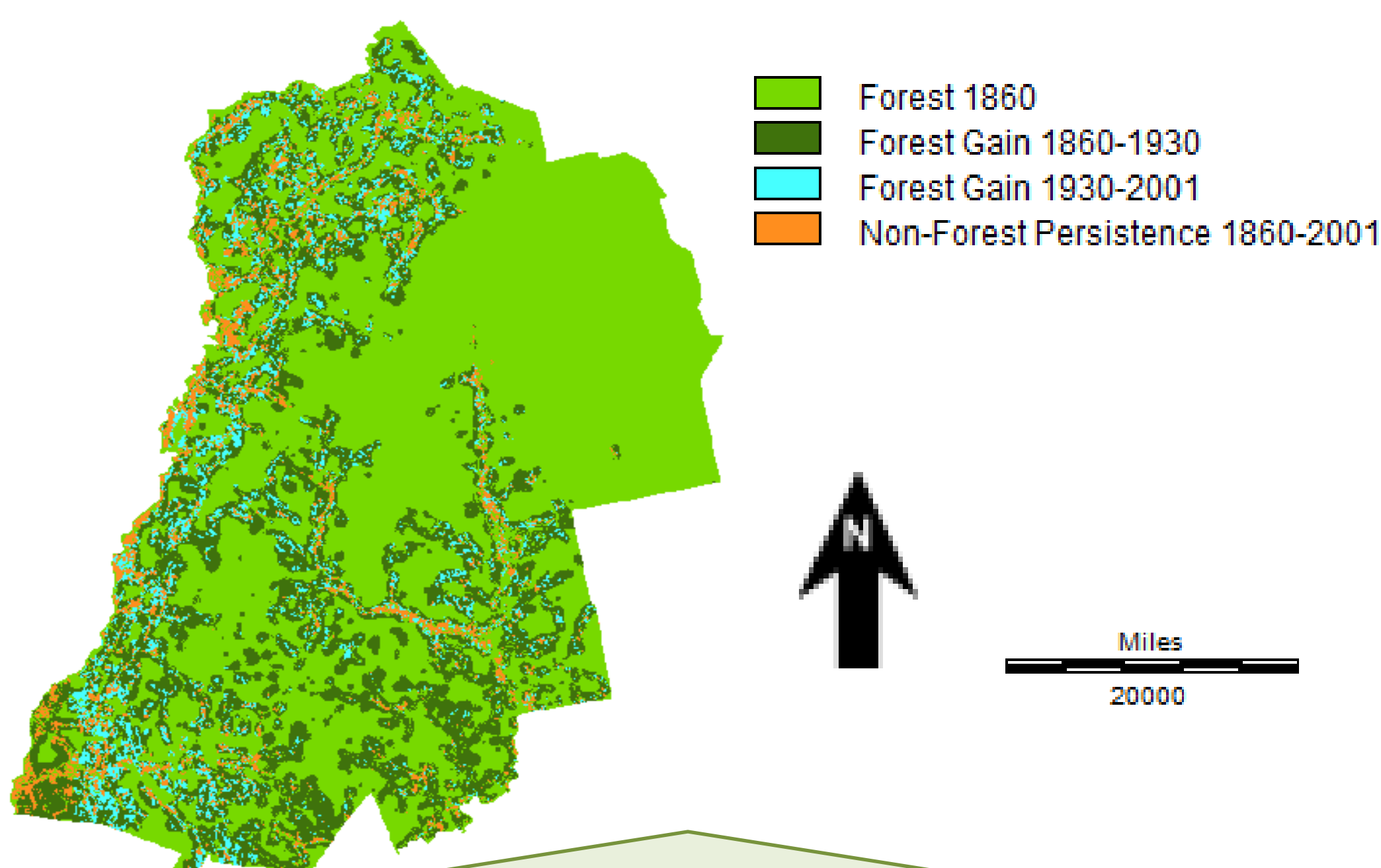


Result 1

Intensity of Annual Change



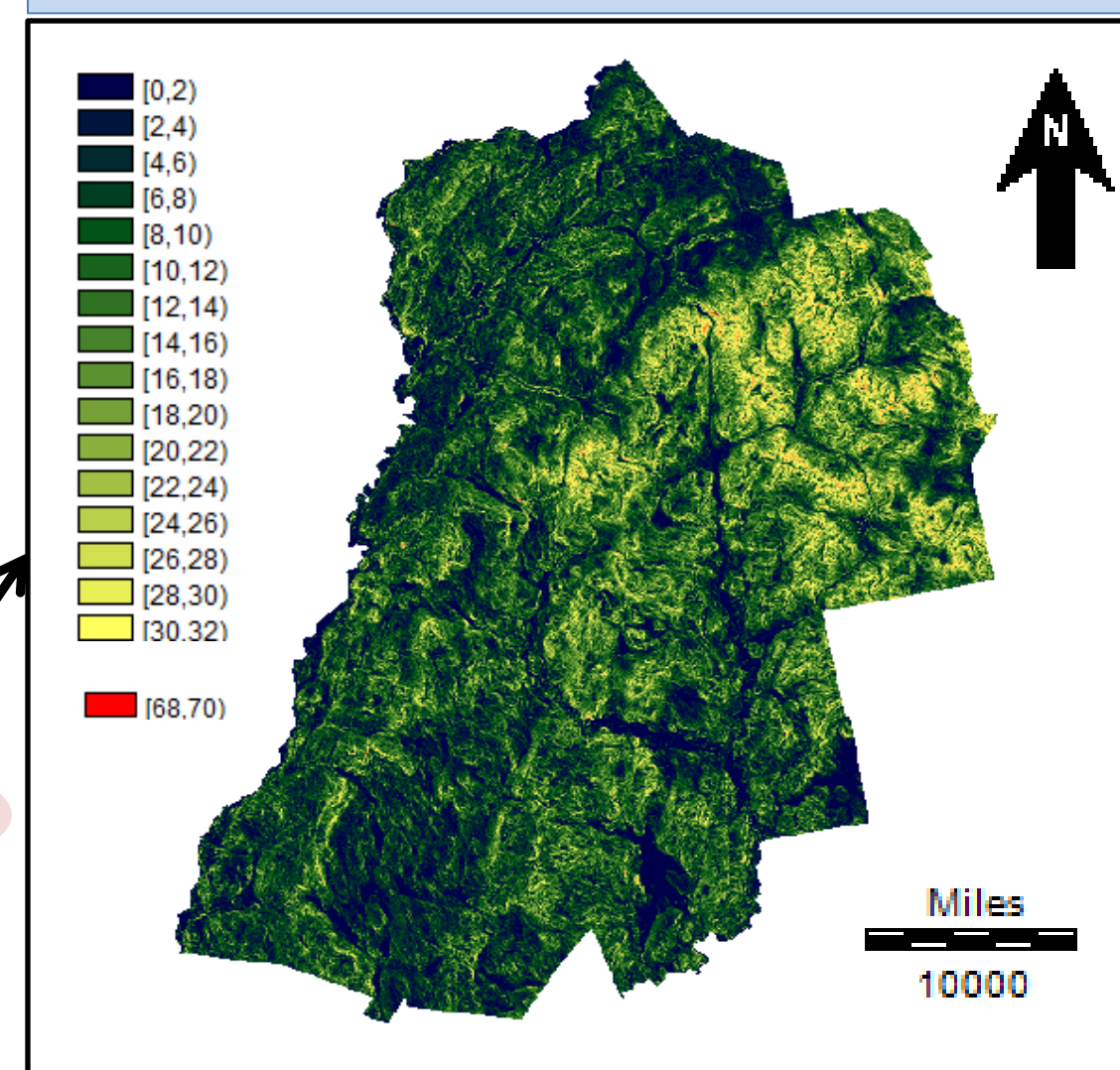
Combination of the Three Maps --- Gain of Forest



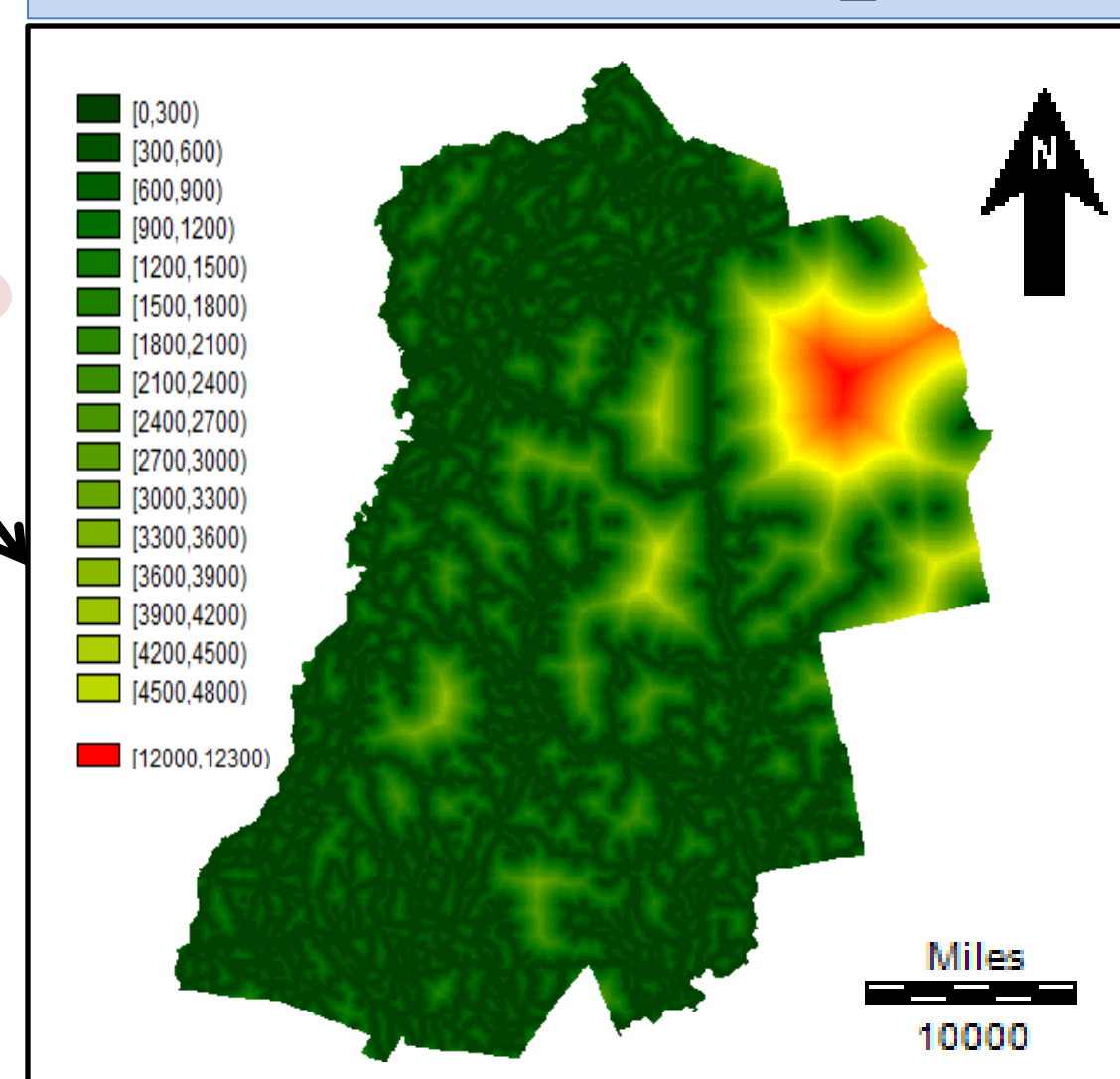
- Forest 1860: composed of the following five categories: Forest Persistence 1860-2001, Forest Loss 1860-1930, Forest Loss 1930-2001, Forest Change from 1860-2001 but still forest in 1860, Non-Forest Change from 1860-2001 but still Non-Forest in 1860
- Forest Gain 1860-1930: Forest Regrowth from 1860- 1930 (the first time interval)
- Forest Gain 1930-2001: Forest Regrowth from 1930-2001 (the second time interval)
- Non-Forest Persistence 1860-2001: Non-Forest does not change during the two time intervals

This slope map is obtained from a DEM map, and this distance to road map is obtained from 1930 road map, both of those two maps were transformed in the IDRISI Taiga software. In this part, slope is separated into 35 bins, that is, two degrees for each bin, and the distance to road is separated into 41 bins, that is, 0.3 kilometers per bin.

Part1 --- Land transformation along a topographic slope



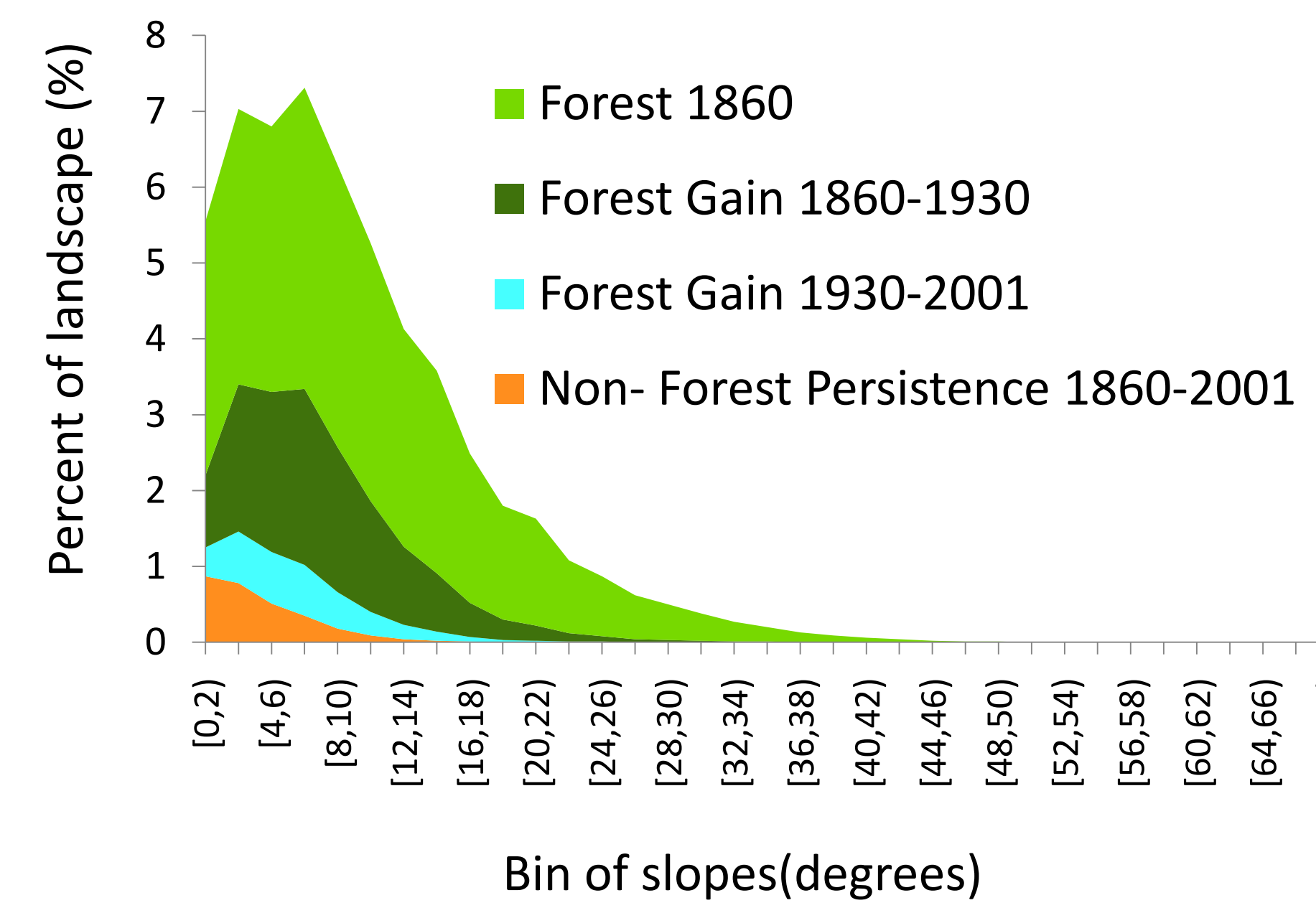
Part2 --- Land transformation based on distance to road_1930



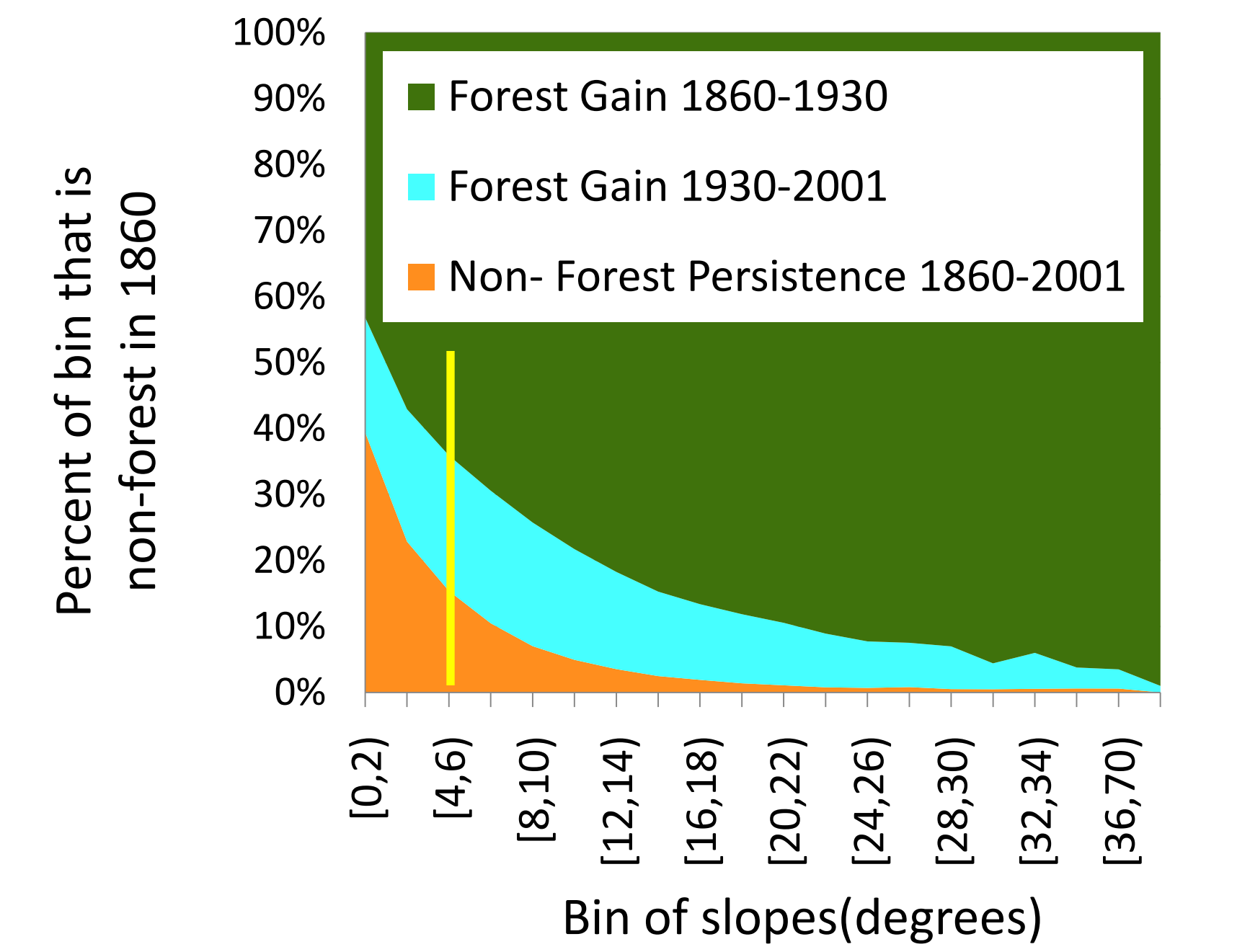
Results 2

Part 1

Actual land change in **percent of landscape** along the gradient of slope during 1860-2001

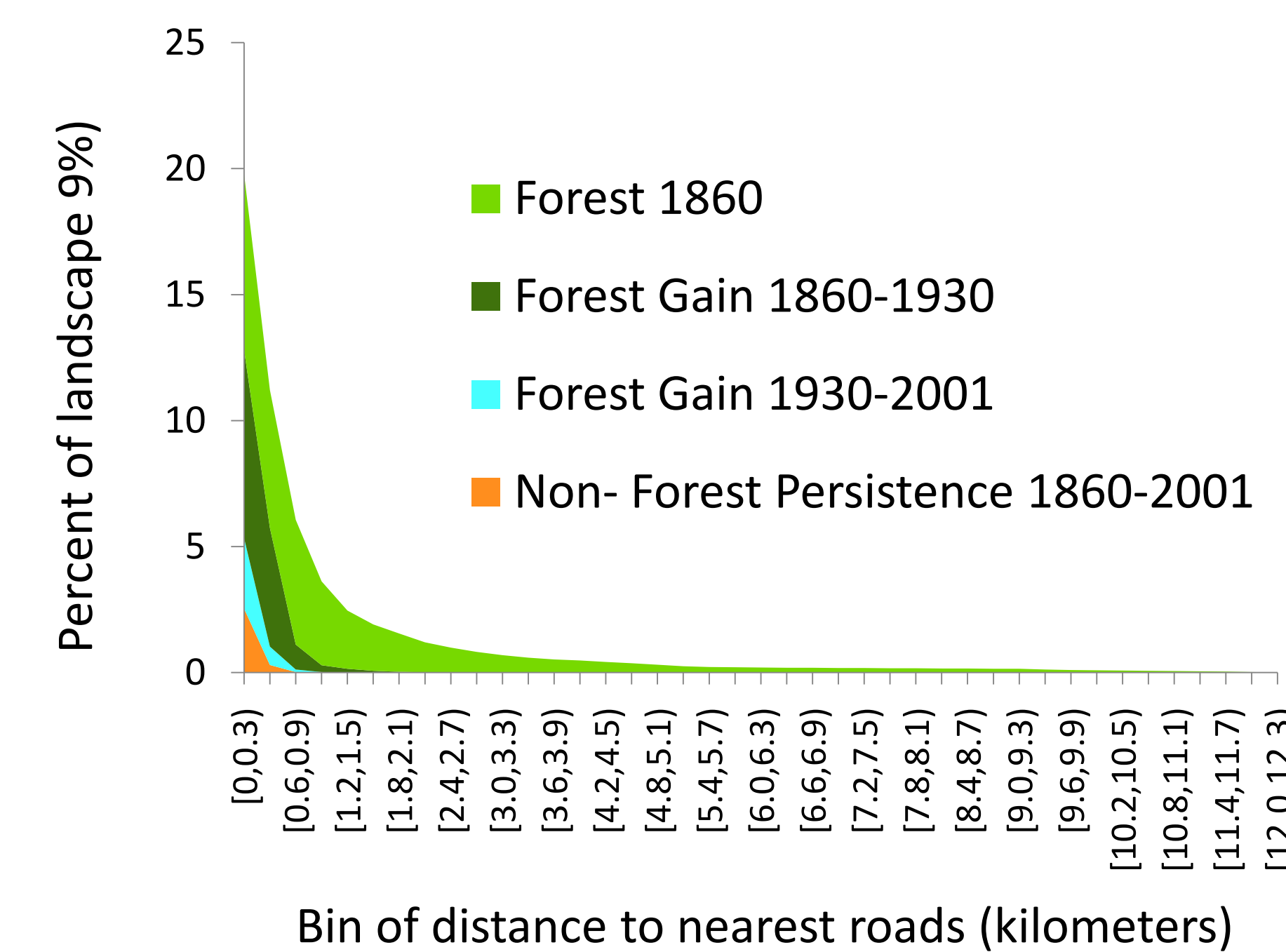


Actual land change in **percent of bin** along the gradient of slope during 1860-2001

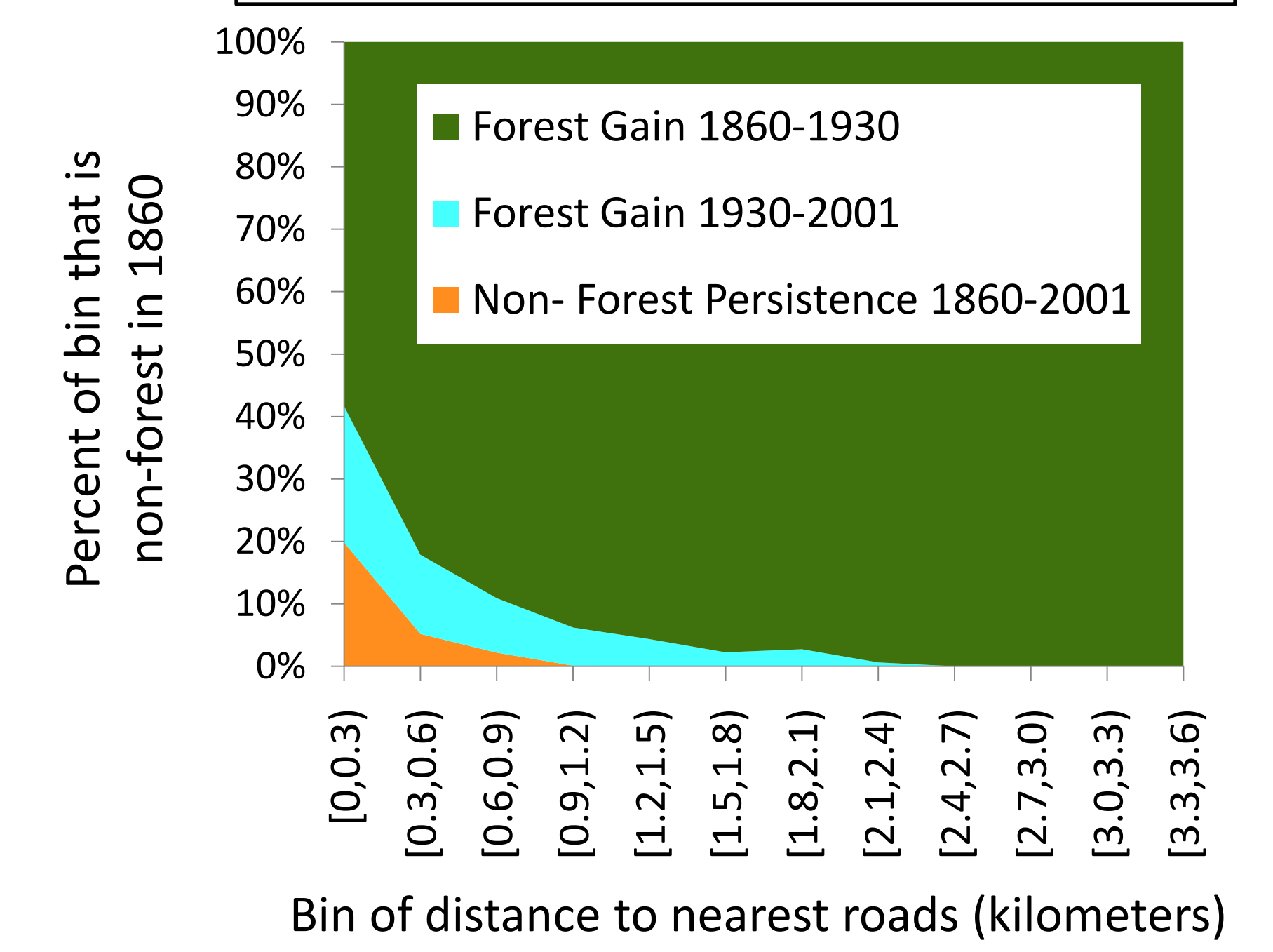


Part 2

Actual land change in **percent of landscape** along different distance to road during 1860-2001



Actual land change in **percent of bin** along different distance to road during 1860-2001



Conclusions

- From part 1 analysis in the results 2, it reveals that Forest Gain was concentrated on relatively flat slopes during two time intervals. However, less than about 6 degrees, Forest Gain 1930-2001 becomes more as the slopes increases; More than 6 degrees, Forest Gain 1930-2001 becomes less as slopes increases. So there is **no** stationary relationship between Forest Gain (forest regrowth) and slope. That means, people do not systematically target relative flat slopes.
- From part 2 analysis in the results 2, Forest Gain in the first time interval shows concentration on the distance that is relatively close to the roads, and this propensity continues in the second time interval. So there is a stationarity of land transitions based on distance to road. That means, people systematically target the areas that are near the roads.

Future Work

- The current gradient analysis is based on the observation of histograms above, if there is an equation or another more accurate arithmetic, it would be helpful.

Reference

- Hao Chen & Robert Gilmore Pontius, Jr..(2009). Diagnostic tools to *evaluate a land change prediction* along a gradient, Massachusetts, USA.

Acknowledgement

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