MILLING IN THE NORTHEAST

In the early 19th century, practically every neighborhood in the U.S. had its own mill, grinding one or more different kinds of grain. Now the milling industry is intensely concentrated in the upper Midwest where the majority of grain is grown. Rather than celebrating diversity within the U.S. food system, monoculture and small genetic variation create a large amount of risk in terms of food security, environmental health, and regional economic security. Spreading out the production of grain from consolidated centers would improve national food security and strengthen a market for regional grains that celebrates flavor particular to a landscape i.e. a grain’s terroir. Despite the benefits of this model and the growing interest in artisanal baking, a lack of mills and the loss of variation create a large amount of risk in terms of food security, environmental health, and regional economic security.

In order to identify the most suitable locations for new mills in the Northeast a suitability analysis was conducted. The analysis included variables important in considering mill construction and location such as access to transportation networks (rail and road), density of existing mills and farms, the farm demand placed on existing mills, and finally the type of land cover.

Eighty-three existing small grain and wheat farms were identified using the NAICS business code (11140, 11199) from the Reference USA Database. Along with farms, 138 existing mill sites were also collected from the database (311211). All locations were geocoded and spatially joined to the county dataset. Next, the farm density (Figure 2) and mill density (Figure 3) by county were rasterized and reclassified from very low, where no facilities exist, to very high, where approximately 4-5 facilities exist. Further, the road and rail density input maps were created using primary and secondary road data from the US Census Bureau and rail data from the National Transportation Research Center (Figure 4, Figure 5). Roads and rail line density per county were calculated and then reclassified from low to high density.

The last two suitability input maps were created using the 2011 National Land Cover Dataset and then reclassified from very low to very high. Where 0 represents land cover types less suitable from mill demand placed on existing mills and finally the type of land cover. The land cover map was created using the 2011 National Land Cover Dataset and then reclassified from 0 to 4, where 0 represents land cover types less suitable from mill development, including open water and forested land, and 4 represents areas already classified as developed. Finally, cultivated cropland was reclassified as an intermediate score of 2. Demand on existing mills was determined using the raster calculator to divide the existing farm density by the existing mill density. Counties were deemed “overburdened” when there were many more farms per county than mills, while other counties were identified as having underutilized mills.

Finally, all six layers were combined using appropriate weights determined using analytical hierarchy processes to create the ultimate suitability map for new mill identification. Based on the suitability outcome, potential mill sites were identified and added to the map. Using ArcGIS Pro, a network analysis was conducted using the location allocation tool to determine the ten most efficient existing and potential mills in terms of distance from existing farms.

WHAT IS SUITABLE?

The potential mill locations identified through the location allocation solver tell different stories. Some potential sites (sites 7 and 8) fill a much needed gap in the market, supporting farms that before the hypothetical creation of new mills would have had no mills within a 50-mile driving network distance. There are also examples (sites 1-6) that show reductions in driving time and distance for farms after the creation of potential mills. The largest reduction in time and distance found would occur at Gary Cronk Farm (site 4) where travel time would be reduced by 50 minutes and distance by over 40 miles. Some of the limitations to this analysis are related to mill and grain farm identification using the NAICS codes. The NAICS data may have misclassified certain businesses as mills while excluding smaller mills and farms that sell grain grown as a cover crop that is not their primary cash crop. Without collecting data first-hand it is unknown whether all mills included in the data set are functioning.

To deepen this analysis, a follow-up study identifying farms of varying scale that grow grain along with suitable locations for additional grain farms would be useful.

DISCUSSION

The project is a collaboration with the Friedman School of Nutrition Science and Policy, Tufts University, and the National Resources Conservation Service (NRCS). The NRCS has identified over 8000 small grain and wheat farms in the U.S. Food System, and is the principal identifier of mills for smaller-scale operations. The study included 138 existing mill sites and 83 existing small grain and wheat farms identified using the NAICS codes. The NAICS data may have misclassified certain businesses as mills while excluding smaller mills and farms that sell grain grown as a cover crop that is not their primary cash crop. Without collecting data first-hand it is unknown whether all mills included in the data set are functioning.

To deepen this analysis, a follow-up study identifying farms of varying scale that grow grain along with suitable locations for additional grain farms would be useful.

SOURCES

FRIEDMAN SCHOOL OF NUTRITION SCIENCE AND POLICY, TUFTS UNIVERSITY; ADVANCED GIS, FALL 2018

1) Northeast Region, National Resources Conservation Service: regional boundaries, accessed Nov. 2018
2) Grain Farms and Mill Locations: Reference USA Database for NAICS codes, accessed Nov. 2018
3) Roads: US Census TIGER Line Data, accessed Nov. 2018
4) Roads: National Transportation Research Centre (NTRC), CTA Railroad Network, accessed Nov. 2018
6) Shapefile: National Transportation Research Centre (NTRC), CTA Railroad Network, accessed Nov. 2018
8) Additional grain farms would be useful.

To deepen this analysis, a follow-up study identifying farms of varying scale that grow grain along with suitable locations for additional grain farms would be useful.

SOURCES

CHLOE LOUIS

FRIEDMAN SCHOOL OF NUTRITION SCIENCE AND POLICY, TUFTS UNIVERSITY; ADVANCED GIS, FALL 2018

1) Northeast Region, National Resources Conservation Service: regional boundaries, accessed Nov. 2018
2) Grain Farms and Mill Locations: Reference USA Database for NAICS codes, accessed Nov. 2018
3) Roads: US Census TIGER Line Data, accessed Nov. 2018
4) Roads: National Transportation Research Centre (NTRC), CTA Railroad Network, accessed Nov. 2018
6) Shapefile: National Transportation Research Centre (NTRC), CTA Railroad Network, accessed Nov. 2018
8) Additional grain farms would be useful.

To deepen this analysis, a follow-up study identifying farms of varying scale that grow grain along with suitable locations for additional grain farms would be useful.