Teacher Background Information on the Von Thunen Model

Geographers use models to help us understand how spatial process works. A model is a simplified version of reality that shows how things work under controlled conditions. They are used to make predictions. They include assumptions or IF statements and then make predictions or THEN statements. In this model, the IF statements are: 1) There is one market surrounded by one service area or hinterland. The market or city gets everything it needs from this hinterland and the hinterland gets everything it needs from the city/market. 2) The environment is the same throughout the hinterland. 3) The farmers in the hinterland are the same and they want to maximize the profits from their production. 4) There is only one form of transportation and farmers bear the costs. 5) Transportation costs are directly related to distance traveled. That is costs increase with distance traveled.

Because the environment is uniform, the cost of producing an acre of any crop is the same throughout the hinterland. Because the farmers are all the same, they have no ability to differentiate the crops so the market price for an acre of crop is the same no matter where in the hinterland it is grown. Therefore, the profit for an acre of crop is equal to the market price per acre less the combination of the production costs and travel costs.

Because the production costs are the same everywhere and because each crop has a different transportation cost, transportation costs determine the pattern of crop production. Profit per acre decreases with distance from the market. Every crop will yield a profit close to the market and therefore, farmers close to the market will grow crops that yield the highest profit per acre. High profit crops with high transportation costs are grown closest to the market. At some distance from the market, crops with high transportation costs cease to be profitable and are replaced with crops that have lower profit and transportation costs (see Von Thunen Diagrams) Under the conditions of the model, rings of land use emerge.

Because of the influence of distance on travel costs and profits, land closest to the city is most valuable so it is used to grow crops that yield high profits. To produce the profits the land is used intensively; that is farmers invest in ways to increase the yield of the land and expend more labor. Dairying and growing vegetables are types of agriculture that produce high profits per acre that need high inputs of capital and labor. The intensity of agriculture decreases with distance from the market and becomes more extensive. Extensive agriculture has low inputs of capital and labor but uses large amounts of land. Small fields of vegetables give way to large fields of grain and ranching replaces dairying. By altering the assumptions, we can alter the patterns of land use. For example, if we assume two forms of transportation, we will see the rings bend to reflect new patterns of transportation costs.

The utility of the model lies in the way it structures our thinking about the role of accessibility in determining land use. Although many changes in agriculture and transportation technology have occurred since the model was first developed, we still see that accessible places are worth more than places that are more remote. We also see that land use or enterprises compete for locational advantages within a region and inside cities.