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THE TIME-LAPSE METHOD OF RECONNAISSANCE LAND-USE MAPPING

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Introduction

The measurement of distance is a major problem in mapping land use from a moving vehicle. The time-lapse method of reconnaissance mapping provides a solution to that problem when the nature of the conveyance or route do not lend themselves to more regular systems of distance measurement. This time-lapse method permits a single person to map land use from a moving vehicle, solely by locating the observations in units of time between points of known distance.

The measurement of distance is a particularly difficult problem for the person making a regional geographic survey in underdeveloped areas where few or no roads exist or when limited funds restrict one to a public conveyance. Automotive travel does not pose this problem because speedometer measurements can be made and, upon request, the vehicle may be slowed down or even stopped for detailed study. Rail and water transportation may be the only means of surveying underdeveloped areas, yet neither the railroad nor the riverboat have distance-measuring devices available to the passenger. Colby (1933) made a reconnaissance map along a railway traverse by counting the number of regularly spaced telegraph poles along the right-of-way. This quite useful method is limited to railroads that do have regularly spaced poles. Thus, it eliminates mapping from river-boat and from railroads that do not have communication poles paralleling their route. Even in those areas where Colby's method applies, counting the poles consumes the time of one individual, and another person is required to note land-use information. With the time-lapse method a *single* individual can make measurements of distance and note the items of the landscape as well.

The Time-Lapse Method

The time-lapse method requires the continuous notation of observations in units of time elapsed from known starting points. Single point features—houses, cross-roads, factories, etc.—are recorded in the notebook by the precise time of their appearance; areal phenomena—cropped fields, areas of natural vegetation, etc.—are recorded by noting the times of their first and final appearances. The mapper, therefore, correlates his information whenever possible with a scaled map of the

route followed and seeks to find "fixes"—that is, natural or cultural items found both in the landscape and on the map. Along a railroad the prominent landforms, stations, sidings, bridges, etc. serve as "fixes", and when the observer is certain a particular feature can be located on his route map, the time is checked and noted. The accuracy of all land-use information being mapped by this method depends upon the accuracy with which one can determine the average speed of the conveyance. Thus, when the distance traveled is broken into many short segments of "average speed", map accuracy increases. The mapper, therefore, must find as many "fixes" as possible.

The writer used the time-lapse method while riding as a rail passenger between Uberlândia, Minas Gerais, and Anápolis, Goiás—both in central Brazil. The 438 kilometers of rail distance between these cities required a day and a half of travel time. For route maps the more or less standardized *municipio* sheets, available through Brazil's Conselho Nacional de Geografia, were used. Observations were made of both sides of the right-of-way, and for speed and convenience notations were written in a ring binder notebook in the following order: (1) the time in hours and minutes (the hour in the first instance, then only the minutes until the next change of hour); (2) "R" or "L" for "right" or "left" to indicate on which side the observed feature was located; (3) a code symbol for the feature; and, (4) any explanation or elaboration needed to further describe the feature. In the last instance, estimates of crop acreage, of number of cattle grazing, of apparent quality of crop, and of evidence of erosion are examples of additional explanation found useful in providing information that supplemented the code symbol used.

With the notes and the route map, one can translate the observations into a finished traverse map in the laboratory. This process is relatively simple because one need not deal with miles or kilometers or with a route map of any particular scale, but with time translated into linear distance along a route. The notations made in the notebook tell the time that elapsed between prominent features, or "fixes", which were found both in the landscape and on the route map. Thus, the land-use information in the notebook is located on the map being drafted in the laboratory by first counting the number of minutes that elapsed between "fixes." Next, the linear map distance between the "fixes"—say a village and a bridge over a river—is measured in inches or centimeters. A wheel-type map measure is a valuable aid at this stage. The third step involves the division of the elapsed time, that is the number of minutes, into the number of inches or centimeters. The result is a distance equal to one minute of travel time. With this figure the draftsman locates each feature observed along the route according to the length of time that elapsed from the last observed feature. The use of dividers spaced the distance equal to one minute of travel time facilitates the location of features and eliminates the necessity of always measuring from the "fix." For example, one feature might extend two minutes from the first "fix", and

the second feature may be one-half minute farther along the route. The dividers are set the proper distance for one minute and they are "walked" two steps where the first feature is located on the map along the appropriate side of the rail route. The dividers are then walked another step, and one-half this distance is taken in locating the second feature. This process is continued until the next time check point, or "fix", is reached. If the draftsman makes an error such as the miscalculation of the linear distance between "fixes", a miscount of the number of time divisions between "fixes", or in the omission of one or more features along the route, the mistake will become apparent when he reaches the end of the notes because the dividers should then arrive at the second "fix." If the divider measurements fall short or go beyond the second "fix", obviously an error has occurred.

For each new pair of known points one must again measure the map distance between them and determine the map distance which equals one minute of time.

Summary

The time-lapse method is a means of measuring distance from a moving vehicle; it is only one of the problems involved in land-use mapping. Other considerations such as a thorough familiarity with the items one can expect to find in a given landscape (types of crops, native vegetation, soils, house types, a usable classification of these features, and a system of symbols that will permit a rapid notation of observations must be dealt with as well, but techniques dealing with these problems have been described by other writers.

Literature Cited

Colby, C. C. 1933. The railway traverse as an aid in reconnaissance. Ann. Assoc. Amer. Geog., 23: 157-164.