

MICRO-LANDSCAPE MODELS IN GEOMORPHIC INSTRUCTION

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The physical geographer has a traditional concern for field training. The majority of his research activities are conducted in the field. Instruction in a landform geography or geomorphology course commonly follows the strategy of lectures supplemented by indoor laboratory exercises in topographic map interpretation. Involving the student in field activities frequently is accomplished only during field trips which are usually highly structured and allow little time in the field for reflective thinking or student involvement.

The senior author formulated a field problem, for use in an advanced physical geography course, which took the student away from the classroom and the indoor laboratory. The junior author participated in the exercise as a student in the course and, therefore, is in a position to comment on the advantages and disadvantages of the activity. The nature and results of the exercise should have interest to others who offer such courses.

Field problem

The field problem is a logical extension of concepts and theories introduced in the lecture room. The exercise permits a high degree of student involvement and allows the participant to become an activist in contrast to the normal passive attitude which some instructors find discouraging. If the exercise is introduced to the student in broad terms, he is swiftly confronted with the consternation which frequently faces the researcher in formulating a problem and designing a plan of research to achieve his objectives. The instructor may provide guidance after the initiation of the project; however, the authors believe the student should take the initiative in formulating and conducting the investigation. It is just as important for the learner to discover inadequate means of investigation as it is for him to discover a workable plan.

There are some difficulties to consider in selecting a field study area. Field problems may be assigned within limited areas, say the county in which the campus is located, but the variety of landscape is often limited. If the study of a drainage basin is envisioned because of the advantages offered by its total unity, there may be attendant problems in travel, in the cost of obtaining map coverage, or in the consumption of an exorbitant amount of time in the actual construction of a map. Regardless of these difficulties, the value of the field problem far outweighs the arguments against its use. With some thought a workable solution can be gained. The basic requirement calls for an investigation area of limited size, while preserving a totality in its systems-character and a variety of components or variables which can be measured and contemplated. The choice calls for a small pack-

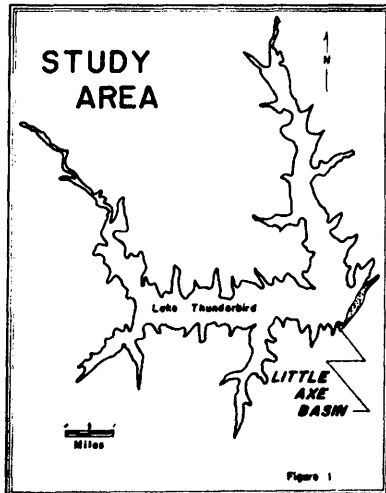


FIGURE 1. Location of borrow pit (Little Axe Basin).

age, area-wise, with miniature landscape components — a micro-landscape.

Such a micro-landscape was discovered in the form of a borrow pit on the south shores of Lake Thunderbird in eastern Cleveland County, Oklahoma (Figure 1). Material from this pit may have been used in construction of the earth-filled dam which impounds the reservoir. The pit is within 100 ft of a parking area and can be reached by car from the main campus of The University of Oklahoma in approximately 20 min. The area of the pit measures about 400 ft northwest-southeast and 300 ft northeast to southwest (Figure 2). It can be traversed in

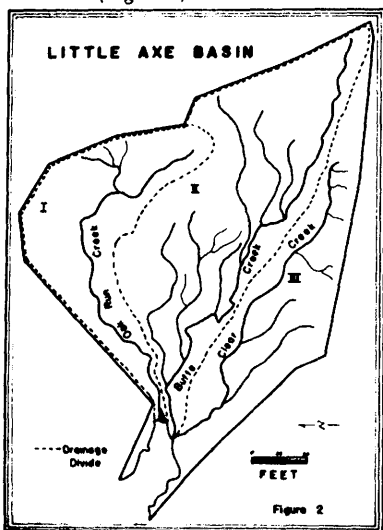


FIGURE 2. The borrow pit as a natural drainage basin.

a slow walk in no more than 3 to 5 min. A 100 ft steel tape and a Brunton transit with clinometer can easily be manipulated to obtain planimetric map data, slope gradients, valley widths and depths.

The borrow pit formed a conclave sloping, semi-circular basin, a natural drainage basin. During the time of the investigation (September, 1968 to January, 1969), it stood at the edge of the filling reservoir (Lake Thunderbird). The rise of water level was

not great during this time interval; the level fluctuated, creating several interesting features on the alternating emergence and submergence shoreline. Sediments removed from the higher portions of the basin were deposited in delta-form in the adjacent shallow waters of the lake. Today the basin in the pit has been altered, with the upstream drainage area being restricted due to construction of a diversion ditch during the building of a boat ramp, and by the slow but ever rising level of the lake as the reservoir fills. As Lake Thunderbird fills to low water capacity the remaining micro-drainage basin will be inundated.

The drainage basin formed in the borrow pit was superimposed upon nearly horizontal strata of the Garber formation of Permian age. The exposed portions of the formation are interbedded red sandstones and shales. The sandstone masses displayed crossbedding at several points of outcrop within the basin and on a microscale gave the appearance of steeply dipping strata. Minor amounts of siltstone were observed in some of the outcrops. Sediments were chiefly clays with sands of secondary importance.

The basin was relatively free of vegetative cover. The droughty, weathered residuum which cloaked the bedrock was an unfavorable medium for plant growth. The basin was characteristic of "bad lands" topography. Davisian adherents would class the basin as late youth or early maturity.

Fifteen students were assigned the problem of analyzing the basin in terms of its geomorphic character. The objective was to allow the student opportunity to utilize ideas obtained from assigned readings and classroom lectures in the analysis of an actual spacial entity. Introduction to the problem was made by taking the class to the field site, traversing the area on foot while generating comments from the students in regard to the recognition of the site as a unit drainage basin. Class instructions consisted of a brief commentary on the basin as a micro-landscape unit, followed by a statement that the problem was to be the "analysis" of the drainage basin or a portion of the basin. No specific methods were outlined; no length of paper requirement was

given; no requirements for photographs or maps were mentioned. The student was to design his research program, develop his methods, and create his format for reporting results of the investigation.

Study results

Although the emphasis of the approaches differed, the papers could be categorized into two groups. One group was of a highly descriptive nature; streams were located, cross-sectional and depositional features were noted, and the geologic structures were mentioned. The other group was a combination of description and analysis in which some quantitative techniques were applied. One student developed logical mathematical statements for his observations; another sought analogies to the field area and used these in his explanations. Among these papers evidence of unassigned outside reading was found. There was a similarity in regard to illustration, with considerable use of ground-level, color and black-and-white photography. One member of the class, a licensed

pilot, made low altitude, oblique, aerial photographs available to the group. Figures 1 and 2 are maps prepared by a student in the course. Students assigned names to the study area, hence the designation Little Axe Basin for the borrow pit.

A micro-landscape field problem offers numerous advantages over the library research paper, the stream table, and other types of laboratory exercises. The class believed that this was due to the greater realism and the necessity of using actual field techniques, such as mapping, photography, and calculations. Also the students experienced the frustration of an unstructured assignment approximating that common to persons engaged in field work, and overcoming this frustration was rewarding. Of value was framing the problem and constructing the research design by the participants. Several informal student-directed seminars and general conversations were held in an attempt to clarify what the instructor "wanted," and out of these sessions developed ideas and feelings of camaraderie.