Special Problems Encountered in Tropical Land Use Mapping

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Since the days of T.V.A. in the United States, and much earlier in Great Britain, the value of land use and physical characteristics maps has been recognized. Varieties of land use-physical characteristics mapping techniques have been used in the past, and other are presently being employed. Until relatively recently, however, the majority of land use-physical characteristics surveys have been undertaken in mid-latitudes. Within the past few years extensions of such surveys have been projected into tropical areas.

Tropical surveys have produced many problems of a nature not encountered in similar surveys in temperate areas. The purpose of this paper

is to present, analyze, and offer solutions to problems peculiar to land use-physical characteristics mapping in tropical areas.

Nature of the Problems

The trained land use surveyor faces difficult problems of an academic, physical, and cultural nature when planning a mapping expedition into a tropical area. The first problems encountered are of an academic nature.

Academic problems attendant to the establishment of a mapping program are numerous. In the first place, one is faced with the question of what kind of mapping technique to employ. What shall be used as a base upon which to work? On what scale shall the mapping be done? How large an be utilized in the mapping procedure? These and many other enigmas are encountered from the very beginning.

Academic problems are by no means the only ones which must be faced, however. In addition, physical handicaps of many kinds and of varying degrees of severity must be met and overcome. One of the most obvious of the physical handicaps in a tropical area is the climate. High sensible temperatures attendant to the tropical environment tend to instill lethargy and make normally modest activities, such as walking, seem the hardest kind of physical labor. A more difficult aspect of the climate to overcome, however, is the rainfall. Field mapping is impossible in a tropical downpour, and the frequency of tropical showers results in loss of work time, and consequently, reduced efficiency. Tropical soils can be particularly tenacious when one attempts to move a wheeled vehicle after a heavy rain. The natural vegetation presents a formidable array of roots, limbs, and creepers to anyone attempting passage. Frequently insects and larger native animals plague the hapless surveyor. He is constantly threatened with tropical diseases of all kinds. The prevailing dampness attacks his personal and professional equipment. These physical factors and many more combine to increase the difficulties of the mapping task.

Many cultural conditions are detrimental to rapid mapping progress as well. Often transportation is difficult because of lack of, or inadequacy of, roads and trails. Native inhabitants are often suspicious of the foreigner, who tramps around and through his fields. The native is often unwilling to cooperate with a stranger in answering questions about his crops or agricultural practices. Dogs are encountered everywhere, and they are a definite psychological hazard. Lack of road signs and inaccurate maps result in mapping parties frequently losing their way. These and dozens of other cultural handicaps add to the difficulty of the surveying task.

Problem Analysis and Proffered Solutions

Tropical mapping is more difficult than its mid-latitude equivalent. Problems are numerous and varied in nature, but none of them is insurmountable. There are no "pat solutions" which can be applied to all problems in all areas, but successful application of certain techniques in one area is suggestive of possible success elsewhere. The forthcoming analyses and proposed solutions are based on the successful Rural Land Classification Program of Puerto Rico. The proposals are not panaceas, but guides for other proposed physical characteristics-land use programs in other tropical areas.

The first step, after necessary financial arrangements have been made, is to study all the available maps and literature on the area in question. After thorough analysis of this secondary material the area should be divided into mappable units. In areas of moderately rough terrain these units should be about 150 square miles in size if one man is to map the area in a six month period. The area to be mapped may be enlarged if the

terrain is flat and of easy access, or decreased if very rough and difficult of access. Only field mapping will determine whether a detailed survey of the entire area is necessary. Certain types of terrain and land use lend themselves to random sample mapping techniques. In such areas extrapolation of a 25 per cent or larger mapping sample to cover an entire area may result in a total error of less than 1 per cent. Where feasible it is obviously advantageous to use the sampling technique to save time and money.

To insure a high degree of accuracy in the survey aerial photographs of a scale not smaller than 1:10,000 should be used. Such photographs enable the mapper to include land use detail to about one acre. If greater detail is desired, obviously larger scale photographs are necessary.

The development of a key is intimately related to the kind of a detail desired in the finished map. On the scale mentioned above (1:10,000) the unit area method, utilizing a three digit numerator representing land use and a five digit denominator for physical characteristics, is quite satisfactory.

Mapping techniques and equipment to be used are, in the main, quite similar to those employed in the mid-latitudes. Minor modifications can be made, quite satisfactorily, in the field.

Physical handicaps to be overcome are not as great as they might at first appear. Planning will solve many of the problems before they are encountered. With proper physical conditioning the average healthy man can overcome all the deleterious effects of climate and acclimate himself quite well.

Tropical rains preclude mapping—all contentions to the contrary. Since they are usually short-lived, however, one can seek temporary shelter and resume mapping after the shower. The irrepressible Jeep will usually solve the problem of mud. If not, horses and the surveyor's own legs are available. Natural vegetation can be penetrated, although admittedly, frequently with some difficulty. Insect repellents will eliminate the insect nuisance, and reasonable care will reduce the danger of encountering large wild beasts. Diseases may be prevented by treating drinking water with halazone tablets, eating only cooked foods or those which have a thick peel, and taking available immunization shots and vaccinations before leaving the United States.

Of the cultural conditions encountered all may be successfully overcome. Lack of roads and trails does not eliminate mapping, it simply means that the surveyor must depend on his own legs for a greater share of his mobile power. Native suspicions may be overcome by employing a native as translator, even if the surveyor has complete command of the language. Dogs may be dissuaded by an attitude of contempt and a riding crop.

Conclusions

The problems mentioned in this paper are only a few of the myriad which are encountered in tropical mapping. The solutions which are offered are usually effective, but are not infallible. In the author's experience, however, it is believed that the problems listed are most frequently encountered, and the solutions offered are usually practical. Tropical land use-physical characteristics mapping is feasible, but more difficult than similar mapping in the mid-latitudes.