II－50 An example of the application of Aerial Photographic Interpretation to Debris Control in the catchment area of an hydro-electric project.

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1. *Introduction.*

Aerial Photographic Interpretation involves viewing aerial photographs stereoscopically and studying and classifying the photographic characteristics and terrain features which may then be correlated with actual terrain conditions in the field. The amount and reliability of the information resulting from such a study varies widely with differing types of terrain under differing climatological conditions, and in practice also depends upon what the information is required for. Aerial Photographic Interpretation can often be of great assistance in engineering geological problems, particularly if used in the early stages. This paper covers the early stages of a study of the debris control problem on the upper Azusa River Basin in Nagano Prefecture, Japan.

Three dams are to be constructed on the Azusa River by Tokyo Electric Power Co. for hydro-electric power, and the life of the upper reservoir in particular may be adversely affected by the large volumes of debris transported by this river. Several debris control dams have been built in the catchment area over the years, mainly by the Forrestry Commission, and more are planned by the Power Authority. As a result of measurements made on the volume of debris collected behind these dams, some figures are available about the movement of debris along some parts of the drainage system, but this data has not yet been analysed by the author. The present study approaches the problem from an attempt to examine, map and classify the sources of debris rather than the movement of debris along the main streams of the drainage system.

2. Debris Sources.

2. 1. Modes of Debris Production. A study of the catchment area on aerial photographs shows that the debris results mainly from erosion scars on steep hillsides where the removal of material has been so rapid that there is a complete absence of vegetation. These erosion scars are easily recognisable on the aerial photographs, and the frequency with which they occur can be correlated with the geological conditions and the morphology to some extent. A second method of mass removal is found, but only along certain geological formations. This method is landslides which occur on a very large scale, probably very infrequently and with only a little movement at each time. This latter method is far less important than the former in connection with the production of debris.

2. 2. Method of Study. The erosion scars are being mapped over the whole area on a scale of 1:15,000, and may be classified to a certain extent. In order to arrive at an estimation of the volume produced per unit time, it is necessary to examine the manner in which the erosion scars form and the speed at which they develop. To do this, photographs taken in different years are being studied, and comparisons will be made. Unfortunately, only one set of photographs on a suitable scale exists for the whole area, and the comparisons

are restricted to the lower central region of the drainage system for which there is more than one set of photographs available, but this is not the region most suitable for such a comparison.

Results. It is too early to report on definate results as no field work, apart from two short reconnaissance visits, has been carried out to confirm the work done on the photographs. Nevertheless, it is hoped that it will be possible to estimate the volumes of debris that can be expected per unit time from the various parts of the catchment area, both from a study of the erosionsl and denudational processes at work, and also to arrive at an estimate of the volumes of debris carried by the main streams of the drainage system per unit time from the data connected with the debris control dams already constructed. It is hoped that these two estimates will be of the same order of magnitude, thus confirming the figures gained. Since it is impossible to measure the debris volume in practice, either where produced on the hill slopes, or as it is carried down the main streams of the drainage system, the only way to judge the accuracy of an estimate, which is by its nature very difficult to make, is to compare it with one or more other estimates derived independently. The results will be compared with other authors' work in this field in Japan.