Vidyodaya J. Arts, Sci., Lett., Vol. 6 *No.* 1, 1978 pp. 47 – 53

The Importance of Air Photographs to The Planner in Developing Countries

by

ABHAYA ATTANAYAKE

Department of Geography, Vidyodaya Campus

The incessant desire of man for a better life is clearly expressed by the continuous demand for adequate and better food, more housing, improved transportation and communication and the development of both natural and human resources. To insure social and economic progress man has always endeavoured to meet every challenge. Nevertheless, a significant proportion of the world's people live in a stage of chronic and paralysing shortages. This is particularly seen in the less developed countries.

Modern science and technology has eased this situation somewhat and has stimulated economic development. However, unless a sincere attempt is made to fructify the capacity for economic growth, the chances of freeing mankind from the bondage of extreme destitution seems very remote. It therefore becomes mandatory that all approaches perceptible should be explored to discern quicker and easier methods of meeting these challenges. The fact that developing countries, in recent years, have placed special emphasis on resource development shows the realisation of, not only the gravity of the situation, but also the need for constructive and urgent action to ameliorate the pitiful living conditions of the vast majority of the world's people.

Inspite of the conscientious and earnest attempts made to solve these basic problems in a number of less developed nations, many of the development plans, so far implemented, cannot be regarded as complete successes. The fact that planners have failed to produce effective schemes for economic development is partly a result of the need to have a detailed knowledge of a nation's natural resource potential. The absence of intelligent planning and effective implementation have, in many instances, retarded economic progress. In many of developing nations, no complete soil survey has been done, nor has there been any substantial evaluation of their mineral wealth; only about one quarter of the earth's surface has so far been mapped. Even where such surveys have been conducted, the maximum utilization of this knowledge has been rarely seen. This observation is relevant especially in regard to the less developed nations, where the effective utilization of the land and its natural resources, with a view toward developing their national economies, should be initially conditioned on accurate knowledge of the land. Untapped natural resources contribute nothing to a nation's progress.

The case in Sri Lanka clearly illustrates this rather distressing situation. The economic implications of such a lapse are revealed in a report submitted to the government of Sri Lanka, in 1970, by the Commissioners appointed to evaluate the working of the Galoya Development Project. The Commissioners comment:

THE IMPORTANCE OF AIR PHOTOGRAPHS TO THE PLANNER IN DEVELOPING COUNTRIES

"There must be a thorough assessment of the natural resources of the project area especially of topography, soil and hydrological conditions. It is clear that Galoya Scheme suffered from inadequate information in this respect, for only a necessarily very general soil survey had been done in advance.[1]"

It is evident from the above comment of the Commissioners that the ignorance of the true natural resource potential of the area had been a major drawback for the successful implementation of the Galoya Development Project.

This is only one instance of such haphazard planning. It is, therefore, not surprising that the success of most of Sri Lanka's development projects has been far below the expectations of the planners. This is especially so in the case of nearly all plans pertaining to land development and settlement. The situation is not very much different in other developing nations. Similar lapses in economic planning are not an uncommon feature in most of the less developed nations. Even where preliminary investigations had been conducted, the data have either proved to be factually sub-standard, incomplete or seriously considered.

One of the basic prerequisites of sound economic planning therefore, is a detailed survey and an assessment of a nation's natural resources. The traditional methods of data collection, vis-a-vis the field survey technique, could be utilized to obtain the necessary information. This, however, is a laborious task involving much expenditure, a large cadre of officers and a long period of time. The required information could, in the alternative, be obtained from air photographs, using modern techniques of photo interpretation.

Air photo interpretation, it must be emphasised, is a valuable method in acquiring information — particularly for land use studies and mineral exploitation. The techniques involved allow the work to be conducted with substantial savings in money and time and with little or no reduction in accuracy. In fact, the accuracy of the information derived through air photo interpretation and photogrammetry would be definitely greater. Since the collection of data from air photographs could be carried out away from the area of study work will not be delayed due to the vagaries of bad weather conditions.

Among the many advantages of the use of air photographs is the relative ease with which information could be obtained. Further, they form a permanent and a comprehensive record of every detail of the landscape they depict, and subsequent reference could be made whenever a need arises. Extremely large areas could be covered on a single day to give an almost instantaneous registry of conditions over a very large extent of land. This is an advantage that could never be experienced in a field survey. In most instances, no other method of obtaining information would be so economical, accurate and practical.

The first recorded air photograph was taken in 1858 by Aime Laussedat, a French Army Engineer, from a captive baloon. Air photographs have been used from very early times, for military purposes. The widest range of

objects comes under the survey of the military interpreter. During the American Civil War, for instance air photo maps of Confederate positions in Virginia were constructed. The development of air photo interpretation received impetus during the first world war also. The employment of airplanes for military use during the first world war brought into focus the significance of air photo interpretation. In the ensuing years, extensive use of stereoscopic coverage with vertical photography was emphasised. It was however, the advent of the second world war, that provided the greatest stimulus yet to the development of air photo interpretation. The British, who were pioneers in the development of a photo intelligence system, detected German V - 2 rocket launching sites along the coast of France.[2] More recently, the significance and the collection of photo intelligence data was demonstrated during the Korean conflict of 1950, the revelations of the U-2 flights over the U.S.S.R. in 1960 and during the Cuban missile crisis of 1962.

Prior to the second world war the use of air photographs for socio-economic studies was a little known skill. In the following years, civilian uses of air photographs increased at a phenomenal rate and air photo interpretation and photogrammetry became a valuable research tool. John Roscoe records the noteworthy role played by geographers in the development of this field.[3] The last quarter century shows the tremendous advancement in air photo study, especially among social scientists which today is accepted as an indispensable research tool. Its utility value is universally accepted, and the recent technical developments in the study of air photographs have greatly enhanced its value in socio-economic research.[4]

In recent times, a phenomenal rate of increase in the employment of air photographs for civilian purposes is noticed.[5] Air photographs are used for such diverse projects as automobile traffic control, highway location, urban land use, and housing type and density studies. The use of air photographs by social scientists such as geographers, planners and sociologists is very meagre compared to their use in the earth sciences. This is primarily due to the lack of opportunities available to the social scientist to study the methodology and techniques of air photo interpretation and photogrammetry. Consequently, the application of air photo interpretation in the social sciences, has been significantly limited. In a recent paper, G. Collins has analysed the potentials of aerial survey in urban planning.[6] Air photographs help the detail observation of patterns of arrangement spatial associations of phenomena not so readily noticeable on the ground. Consequently Clyde F. Kohn has made extensive use of air photo interpretation in his study of rural settlements in selected parts of the United States.[7] Branch[8], Pownall[9] and Stokes[10] have also effectively displayed the value of air photographs in the analysis of modern rural and urban settlements. Air photographs have been widely used in the development of natural resources in Mexico and Pakistan.[11] R.C. Wilson draws attention to different techniques of air photo analysis that may be used in forestry and timber surveys.[12] Air photographs have also been used in the study of geomorphology, soils and vegetation.[13] The dense cover of natural vegetation may hinder the image of the soil itself in air photographs. However, a high correlation between types of soil and types of vegetation is possible and, therefore air photographs are used with great advantage in soil surveys.[14]

THE IMPORTANCE OF AIR PHOTOGRAPHS TO THE PLANNER IN DEVELOPING COUNTRIES

The compiling of map detail and contours in topographic maps, particularly in the One Inch Ordinance Maps is now based on air photography. Additional control has been afforded by analytical aerial triangulation. Consequently, photogrammetric mapping has surpassed all other methods of compiling map detail needed for economic planning and development.

In Sri Lanka, the use of air photographs in planning is a comparatively recent development. Air photographs have been used in the planning of the Colombo - Kandy and Ella - Wellawaya highways. The Mahaweli and the Walawe development projects, among others, are two more instances where information gathered from air photographs have been used in development planning. A greater part of the mapping for the Walawe project, for instance, has been done by the stereoscopic study of air photographs.[15]

It is therefore, seen that air photographs are scientifically utilized as a source of information in a number of disciplines. The same air photograph would give different information to the geomorphologist, the geologist, the soil scientist, the engineer and the planner, according to their individual professional requirements. From this it follows that there cannot be one expert who would sort out all this information, but that various specialists will have to abstract required information according to their individual needs.

A noteworthy drawback is to find the perfect kind of air photograph for the study at hand. The ideal situation is to have air photographs taken specially for each particular investigation. There are instances where it is advantageous to fly at a certain time or season. For example, in geological studies in the mid latitudes where there is deciduous vegetation winter photography will show more ground than summer photography. For the delineation of timber types, infra red film is used. Broad leaf vegetation is highly reflective and therefore appears frequently in light tones in photographs. Needle leaf vegetation, on the other hand, absorbs infra-red radiation and is registered in darker tones. Infra-red film is also used in the determination of the drainage network, swamps, canals, and shorelines, because water bodies absorb more infra-red light, resulting in a darker registry on film. A further advantage of infra-red photography is its capacity to penetrate atmospheric haze. Usually these are exposed through red or dark red filters.[16]

The increasing frequency with which air photographs have been used by planners in recent years clearly displays their appreciation of the air photograph as a valuable source of information. However, as pointed out by Collins, the main problem which confronts the planner is to find avenues of obtaining the training necessary in the use of air photographs.[17]

The importance and the urgency of successful planning and plan implementation in less developed nations need no special emphasis. The formulation of such development programmes should be carried out by competent experts. It is imperative that sound development planning, and upto date record of a nation's natural resources potential should be available. A comprehensive knowledge of the location, the extent and the feasibility of exploitation of the available natural resources, therefore, becomes an absolute necessity.

The establishment of a comprehensive coverage by air photography is thus an essential prerequisite for efficient planning. It may be stated that because of the inherent value of the air photograph, not only as a cartographic document on which data is recorded, but also as a media from which information on natural resources are drawn or interpreted, all planners should be made familiar at least in the rudiments of air photo interpretation. It may be hopefully assumed that this would enable the planner to view resource development on a broader perspective than at present.

Footnotes

1. Report of the Gal Oya Project Evaluation Committee, Sessional Paper No. 1 - 1970. p. 136

2. Babington—Smith, Constance, *Air Spy: The Story of British Photo Intelligence in World War II* Ballentine Books, Inc. (Harper and Bro.), New York, (1957).

3. Roscoe, J. K. "*Photogeography*" Selected Paper on Photogeology and Photo Interpretation, Committee in Geophysics and Geography, Research and Development Board, Washington (1953), pp. 55 - 102

4. For further information the reader is referred to: Mac Fadden, C.K. "The Uses of Aerial Photography in geographic Research" *Photogrammetric Engineering* Vol. 18, (1952), pp. 732 - 737 and Kessel J. K. "The Use of Air Photography by Geographers". *Photogrammetric Engineering* 18, (1952) pp. 737 - 741

5. De Hass, W. G. L. "The Aerial Photography as a Sociological Tool" *I. T. C. Series* B. No. 6., I. T. C. Delft, Netherland, (1962), and Coleman, G. "Recent trends in Photographic Interpretation," '*Photogrammetric Engineering*' Vol. 26, (1960) pp. 755 - 763

6. Collins, W. G. "Aerial Surveying and its Potential in Urban Planning" Presented to the May Conference on Information and Urban Planning, Centre for Environmental Studies, London, May (1969).

7. Kohn, C. F. 'The Use of Aerial Photography in the Geographical Analysis of Rural Settlements,' *Photogrammetric Engineering* 17. (1951), pp. 759 - 751

8. Branch, M. C. Jr. "Aerial Photography in Urban Planning and Research," *Harvard City Planning Studies*, No 14, Cambridge Mass., (1948).

9. Pownall, L. L., "Air Photographic Interpretation of Urban Land Use in Madison, Wisconsin." *Photogrammetric Engineering* Vol. 16, (1950), pp 414 - 426

10. Stokes, G. A. "The Aerial Photograph, A Key to the Cultural Landscape." "*Journal of Geography*. 49, (1950), pp. 32 - 40

11. For example the reader is referred to : Larios J. P., et. al., "The Use of Air Photographs in the Development of the Natural Resources of Mexico," and Hemphill, W. R. and Kidwai, A. H., "The Application of Photogeology and Photogrammetry to Geological Surveys of Natural Resources in Pakistan." United States. Papers Prepared for the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas, Geneva, September, (1963).

12. Wilson, R. C. et al., 'Photo Interpretation in Forestry,' *Manual of Photo Interpretation*, American Soc. Photogram. Bauta Co., Menasha, Wisconsin, (1960), and, Wilson, R. C., "Photo Interpretation Aids for Timber Surveys," *Journal of Forestry,* Vol. 46 (1), (1948), pp. 41 - 48

13. Examples of such studies are, Frost, R. E. et. al, "Photo Interpretation of Soils," *Manual of Photo Interpretation*, American Soc. Photogram., Bauta Co., Menasha, Wisc. (1960), Colwell, R. N., "Aerial Photo Interpretation for the Evaluation of Vegetation and Soils Resources," United States. Paper Prepared for the United Nations Conference on the Application of Science and Technology for the benefit of the Less Developed Areas, Geneva, September, (1963) and Erb, D. K., "Landforms and Drainage of Ceylon." *The Ceylon Geographer* Vol. 20, (1966 - 70) pp. 1 - 38

14. U. S. Geological Survey, "Photo Interpretation of Vegetation in the Tropical Pacific Area and its use as an Indicator of Kind of Ground.,' Army Map Service, U. S. Army, Washington, D. C., No. 201550, (1944).

15. A Report on a Reconnaissance Survey of the Resources of Walawe Ganga Basin, Ceylon, July, (1960), p. 10.

16. Colwell, R. N., "Some Uses of Infra red Aerial Photography in the Management of Wild land Areas," *Photogrammetric Engineering*, Vol. 26, (1960.) pp. 774 - 785

17. Collins, W, G., op. cit.