COMMENTS ON "PEMAIRAN DAN PEMETAAN TANAH SERTA PENGHARKATAN LAHAN DAERAH TRANSMIGRASI" BY TEJOYUWONO NOTOHADIPRAWIRO

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Tejoyuwono's short note in the October 1980 issue of Ilmu Pertanian (Tejoyuwono Notohadiprawiro, Ilmu Pertanian II (8), pp. 427 - 435, 1980. Yogyakarta) casts an encouraging note in the field of soil surveys. Indeed, a genuine recognition that soil studies should serve at the same time scientific and practical purposes can only enhance the effectiveness of the surveys and improve their usefulness in the overall context of agricultural planning. History shows that too much dogmatism in soil surveying approaches has frequently led to the isolation of pedologists outside the planning community and to the regrettable underutilization of the results of their investigations.

In addition to his usual contribution to the earth sciences vocabulary in Bahasa Indonesia (although we are not sure that all the proposed terms will be accepted by everyone), Tejoyuwono has clearly stated the dual function of soil surveys. He recognizes the reduced value of a soil map which cannot be translated in terms readily understandable by the land use planning community. He stresses in this respect that a soil potential map is a more appropriate document than a soil map relying on a sophisticated classification. The necessity of integrating soil investigations into a broader perspective on land resources management is also recognized in the article.

What does not clearly emerge, however, is the procedure whereby data on various dimensions of 'land', including soils, climate, landform, water regime, vegetation, present land use ... can be combined to enable the analyst to make a realistic assessment of the potential of an area to sustain agricultural production. Thus while we fully agree with Tejoyuwono's views, we would like to add the following comments dealing with procedures for a better integration of the soil surveys with other aspects of land development. The topic of integrated approach to resources inventory and management is very actual in Indonesia and points of methodology are important to consider because they often condition the success of the tentatives made in that direction.

It is useful in this respect to redefine the concepts of soil *(tanah)* and land *(lahan)*. Land is distict from and includes soil. Land encompasses the physical environment, including climate, landform, soils, hydrology, and vegetation to the extent that these influence the present or potential use of the land (after Brinkman and Smyth, 1973). The concept of land thus includes the past and present human activities on a given site. Because the practical suitability of a given soil for a given use cannot be assessed without taking into consideration all the other aspects of the environment, land rather than soil alone is to be characterized.

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How does one acquire, without too much difficulty, such a complete and, if possible, integrated view of an area ? The level of complexity of the adopted procedure will of course depends upon time, budget and expertise constraints. A Major problem usually arises at the beginning of the exercise; it is related to the identification of a spatial unit of land to be used as the base for the evaluation.

The objective is here to identify units of the landscape which for all practical purposes present some degree of homogeneity in their resource endowment. It is only once an agreement has been reached by all the concerned disciplines regarding the identification of such units that spatial planning can proceed in an integrated fashion. Two question immediately come to mind in this respect. At first, do such *"land units"* actually exist in nature and second, how does one go about identifying them ?

Any unit of any classification is a mental construct based on defined criteria. For example, physiognomic, floristic or functional criteria can be retained to classify vegetation. Accurate measurements of some soil characteristics are used to identify soil units while a visual assessment of landforms is adopted to identify broad physiographic units. There are therefore some systems of resource clasification which confine the surveyor within narrow guidelines while others give him/her the latitude to "shape" a unit of observation according to the objectives of the study.

The Foreword of the study carried out by the Soil Research Institute and the FAO in the Cimanuk River Basin (SRJ, 1976) provides an adequate description of the land unit approach :

> "The *Land Unit* is defined in terms of landforms, soils and present land cover/land use. The basic element is the landform and the nature/age of its formation. In some cases the landform is typified by a dominant physiographic feature or a combination of these; in other cases it is only characterized by a single feature which can often be of lower physiographic significance. This variability is inherent to the character of landform and also to the nature of the study : areas with greater development possibilities demand a higher intensity in investigation than areas of less importance for rural development".
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> "Additional features of the Land Units observed and recorded during more detailed field investigations are implied as follows :
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> 1. The soils data may indicate that a further subdivision of the units is necessary to render them homogeneous at the soil association level. Wherever possible the Detailed Reconnaissance Soil Map of the Cimanuk Watershed Area (Soil Research Institute, Bogor, 1976) has been used for a further delineation of the Land Units.
> 2. Data on other features of the Land Units, for example present land cover/land use, are considered as supplementary information to the already defined units."

These two quotations show that landforms are given a special attention in this approach. While one has to recognize that the landforms do not tell everything about an area, it is important to note the various advantages of a land form of physiographic approach to resource inventories. At first, landforms can easily be recognized on air-photographs and other remote sensing products. This can speed the surveys to an appreciable extent. Second, there is usually a high level of coincidence between the lanfdforms and the distributions of other resources such as soils, surface and underground water, drainage characteristics, macro and microclimate and, to some extent the land use. Last but not least, landform terms are easily understood by the non-specialists because

of their evocative nature. The importance of this last point was also recognized by Tejoyuwono (op.cit.) who insists on the readability *(keterbacaan)* of the soil maps.

Obviously, in areas of reduced topographical constrasts or in the case of high intensity surveys (such as the ones required in problem soils areas), those principles are not always applicable. Pragmatism then dictates the selection of an hierarchy of mapping criteria; the quality of the results will then depend upon the experience of the surveyor.

The result of a land resource survey carried out using the land unit approach is a map showing the spatial distribution of those units and a table describing each of them in terms of soils (often soil associations), water availability, vegetation, climate, present land use or any other pertinent characteristics. The subsequent evaluation of each unit is carried out in a systematic fashion with the assumption that each land unit presents a anique and uniform combination of resources.

Another approach which is also to be mentioned here is based on the execution of purely thematic surveys (soils, vegetation, hydrology ...) leading to the preparation of a series of maps which are then recombined using the *overlay technique.* Anyone who has attempted to recombine more than three or four thematic maps will testify that such a procedure can quickly become rather cumbersome. The utilization of digital techniques of spatial representation may alleviate some of those problems and allow some flexibility in the combination of selested parameters on a unique data base (some efforts are presently made in that direction by BAKOSURTANAL using the COMARC mapping system).

A last point which was not clearly expressed in Tejoyuwono's article is that resource evaluation in general should not be concerned with resources *per se* but with their use. Resources such as soils or water cannot be evaluated in absolute terms but must be considered in respect to specific uses. It is thus important to define such uses. While in some instances general classes of possible uses can be retained (such as, for example, subsistence agriculture, transmigration settlements, estate crops, forest etc ...), the optimization of resources management requires that the detailed definition of possible land utilization types be worked out (FAO, 1976). Indeed, the right choice and appropriate description of a range of possible alternative uses will condition the success of the evaluation. For example, an area can be found not suitable for a given type of land use and suitable for another. If, because of an oversight, this latter land use has not been considered, the evaluation will *per force* be incomplete.

The transmigration programme in Indonesia is case in point where the strict adherence to a unique land use model has for many years led to the rejection of areas which could otherwise be considered for other types of use compatible with general transmigration objectives. In the same line,cases have occured where the fixed land use type has been 'forced' into areas better suited for a modified version of that basic model.

In resources short situation, and this seems to be the case in many transmigration areas, the land use should be designed to fit the pattern of resources availability and distribution. Once again this requires some pragmatism in the approach. The definition of possible land utilization types for Indonesia has not yet received enough attention from agriculturists and socio-economists; it is a challenging task which calls for the application of imaginative approaches. One has to keep in mind that the diversity of environments is very large in the archipelago and that criteria of production have to be combined with appropriate environmental protection measures. Such requirements singularly complicate the task.

The preceding remarks have hopefully shown that while there is a general agreement on the need to adapt resources surveys to the realities of the planning processes,

much remains to be done to integrate existing approaches into a coherent and flexible framework. It is believed in this respect that questions of methodologies must be given special attention in any attempt to elaborate appropriate approaches to land resources management.

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