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Geomorphic development in a basin fringe in West Java and its effect on agro-landscape differentiation

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A kind of elaborate traditional agricultural land-use, which is appreciated as sustainable resources management in humid-tropical environment, co-exists with some other types of land-use in a limited area of West Java. Although the land-use has been decided in compound socio-economic and/or cultural contexts, some physical environmental factors must be involved in. This report intends to clarify the spatial relation between geomorphic condition and present agricultural landscape.

The Bandung Basin situated in the western part of Java is a tectonic depression dammed-up repeatedly by volcanic products from the north. The south of the basin is fringed by low hills composed principally of Neogene volcanic and pyroclastic rocks and old Quaternary volcanic edifices behind. A south to north transection passing the southwestern margin of the basin is divided into the following three geomorphic zones which are further subdivided:

I Old volcano (Bubut Volcano): Ia Old volcano summit, Ib Old volcano flank
II Hills (Rampadan-Sadu Hills): IIa Higher hill zone, IIb Lower hill zone
III Alluvial fan (Karamatmulya Fan)

More precisely in topographic scale, the following geomorphic units are recognizable:

T (Hilltop gentle slope), A (Accordant ridge), M (Monoclinal ridge), I (Isolated hillock), C (Scarpland), S (Saucer-shaped trough), G (Gorge), B (arrow valley bottom), F (Small alluvial fan).

Any geomorphic zone or subzone is characterized by particular assemblage of topographic-scale geomorphic units. Morphometric characteristics of each geomorphic zone or subzone illustrate the contrast between coarse and fine topographic texture in the Old Volcano (Zone I) and the Hills (Zone II). Although the contrast does not simply correspond to geology, some locational differences in lithology control the occurrence of surface and subsurface water, and then they influenced the dissection pattern.

Erosional development of landforms in the Zone IIa was followed by the base-level lowering which resulted in the appearance of the Zone IIb. New accretion of volcano, the Zone I, probably in the Mid-Pleistocene, provided the rearrangement of drainage systems which connect the old system in the Zone II to the newly appeared one by which the volcano was dissected. Sincen the Latest Pleistocene or early Holocene, adaptation to the new base-level, i.e., that of the Zone III, has been on going.

The most impressive difference in agricultural landscape in the area is the concentration of mixed bamboo-tree gardens in Geomorphic Subzone IIb in contrast to the dominance of open upland fields in Subzones Ia and Ib. Subzone IIa shows an intermediate or transitional situation. The most apparent difference in geomorphic condition among the subzones is not relief energy but topographic texture. The difference in topographic texture among the subzones is the result of geomorphic history as summarized above. The difference, which is considered to provide the difference in arability, particularly the capacity of extensive forest clearance, and in accessibility to and applicability of water resources, is evaluated by local farmers in their decision of land-use. The result is the contrastive agricultural landscape.

Keywords: Tropics, Hills, Old volcano, Geomorphic development, Agricultural landscape, Java