Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)


HGM002-P01 Room:Convention Hall Time:May 24 16:15-18:45

# Landslide susceptibility mapping considering earthquake in west Nepal

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We used distribution data of 2005 north Pakistan (Kashmir) earthquake (M7.6)-induced landslides as the training data, and mapped earthquake-induced landslide susceptibility in study area of 27km by 27km in west Nepal using four causative factors: slope, convexity, pit-peak, and distance from active faults. For calculating the former three factors we used 30-m-resolution digital elevation model, and for calculating the distance, we dealt Main Boundary Fault as strike slip fault and Himalayan Frontal Fault as reverse fault in the study area. And for classifying the susceptibility we used the Information Value (InfoVal) method. As a result, four susceptibility classes, Very low (landslide area ratio, 0-1%, same as hereinafter), Low (1-3%), High (4-9%), and Very high (10-75%) are mapped; however, threshold decision according to the probability remains to be solved to keep objectivity.

Keywords: landslide, susceptibility, Nepal, earthquake, fault

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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

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# Knickpoints in Shihmen Reservoir Watershed

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The Shihmen reservoir watershed, northern Taiwan, has many knickpoints, which could be interpreted as a response of river incision against base-level lowering probably by uplift. The drainage network of Shihmen reservoir watershed is framed by trunk Dahan River, its three major tributaries and many minor tributaries. The knickpoints are identified from longitudinal profiles by using a 12-m DEM. A strong power-law relation is presented between drainage area above a knickpoint and distance from drainage divide to a knickpoint. There is a poor power-law relation between drainage area above a knickpoint and elevation of a knickpoint. Major tributaries have four or five major knickpoints each, and one knickpoint along one major tributary can be correlated to a knickpoint along another major tributary. This is indicative that landscapes respond to base level lowering via upstream propagation of knickpoints. Most selected third-to first-order minor tributaries display prominent steep reach at the confluences with trunk or major tributaries with relative height of several tens to a few hundred meters. The minor tributaries of the major tributaries also have knickpoints, which are frequent on higher-order streams and could be correlated to each other and to the knickpoints along the major tributaries. This does indicate that knickpoints in these tributary basins are the result of multiple episodes of base-level lowering on Dahan River.

Keywords: knickpoints, river incision

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# Transport processes of huge debris in Japanese mountain river basins

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Some of the Japanese mountain river basins have huge debris, sometimes larger than 10m, on their riverbeds. This study aims to discuss transport processes of huge debris. The investigated river basins are the Tedori River in central Japan and the rivers on the Yaku Island in southern Japan. The diameter of such huge debris was measured in the field and the channel slope was derived using 1:25,000 topographic maps. Further geomorphological investigations were performed in the field and using air photo interpretations.

The Tedori River is a 70km-long river that originates in the Hakusan volcano (2,702m a.s.l.). Its drainage basin was affected by heavy rainfall in July 1934. Snow-melt water and heavy rain caused severe flooding along the whole river course and many landslides in the headwater region. The valley of the upper reaches was buried about 20m deep. After the flood, much huge debris was seen on the riverbed. The largest one was 20m in diameter. It was named "Hyakumangan-iwa", which means a rock of about 4,000 tons in weight. The debris was carried from the upper tributary basin, because the geology of the basin is the same as that of the debris. A landslide with huge debris and small lacustrine-like deposits in the valley floor was found in this basin by field survey. This means that huge debris, including the Hyakumangan-iwa, was transported by the torrential flood as a small landslide dam gave way. During the event many landslide dams would form and break up, so that large amounts of debris ran down and buried the valley floor.

Many rivers on the Yaku Island, one of the UNESCO World Heritage Sites, also have huge debris on their riverbeds. Sometimes debris is as large as 10m in diameter. Detailed field survey carried out along the Miyanoura River has shown that the maximum diameter of the debris decrease downstream according to decrease in channel slope declivity. Huge debris as large as several meters in diameter, was also found on the riverbed with a 5% channel slope declivity. It means that the huge debris is transported downstream by the flood under a sorting process. Based on air photo interpretation, huge debris, found at the junction of the mainstream with its tributary, jams the valley floor of the main stream. This shows that huge debris produced in a tributary blocked up the valley floor of the mainstream forming a dam-lake. When the debris dam gave way, torrential flood occurred and huge debris was washed away. Because the debris underwent a sorting process, only smaller debris was transported to the lower reaches with gentler channel slope.

Formation and breakage of debris dams caused by landslides and/or debris supply from tributaries is very important for debris transport in the Japanese mountain river basins.

Keywords: debris transport process, torrential flood, mountain river, debris dam, Japan

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# Influence of rock properties on salt weathering of natural and reconstituted stones: An experimental approach

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To investigate the influence of properties of rocks used in buildings, salt weathering experiments were performed using five building stones used in Europe and Japan. They are; (1) the Bajocian limestone (BL) with abundant well-preserved calcite shells and (2) the Sinemurian limestone (SL), rich in quartz grains, (3) reconstituted stones (RS), agglutinated using cement with crushed above two types of limestones, (4) Savonniere limestone (SV), porous and biogenetic limestone widely used in north France, and (5) Oya tuff (OY), altered rhyolitic tuff and one of the most famous stone resources in Japan. The BL, SL and RS stones are used in the Orval Abbey in south Belgium, and SV is used as a restoration stone of the Reim Cathedral in France. Their rock properties as a starting material such as porosity, bulk density, pore size distribution and tensile strength are investigated. The porosity of these stones are; RS 29.0%, SL 12.9%, BL 34.8%, SV 40.0% and OY 38.9%. The tensile strength are; RS 3.05 MPa, SL 4.82 MPa, BL 1.38 MP, SV 1.41 MPa and OY 1.85 MPa. The specimens are cut into cylindrical with a size of 4.5 cm in diameter and 5 cm in height. A capillary rise experiment was performed under 20 degree C atmosphere using saturated Na2SO4 solution at 20 degree C (16%?Na2SO4 solution), half concentration of it (8%?Na2SO4 solution) and distilled water as a control.

The results showed that BL had the fastest rates of capillary rise under 16%?Na2SO4 solution and SL, RS, SV and OY follow in this order. Under 8%?Na2SO4 solution, the faster raters of capillary rates recorded BL, RS, SV, OR and SL in this order. After the capillary test, only RS was completely destroyed, although it has much higher tensile strength than BL and SV. Small amount of debris was produced from the top edge of OY specimen.

Keywords: Salt Wethering, Limestone, Oya Tuff, Rock Property