



## Turning the tide on typhoon damage in the Philippines

*Road rehabilitation in a mountainous agriculturally rich area of Philippines tries to counteract effects of cyclones and man made slope degradation.*

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The Philippines Archipelago comprises more than 7,000 islands surrounded by the South China Sea, the Philippine Sea, the Sulu Sea and the Celebes Sea. During the typhoon season inter-island communications are especially hazardous, with all-too-frequent reports of ferries capsizing, resulting in tragic loss of life. But water is more than a two-dimensional issue in the Philippines. Typhoon rain forms a dangerous third dimension. The Philippines is perhaps second only to Taiwan, less than 500 km to the north, in typhoon severity. On average, 3.5 metres of rainfall per year descend onto the Central Cordillera mountain range on the island of Luzon. This rainfall usually occurs during discrete, high intensity storms between June and September. Steep topography, weak underlying rocks and the progressive deforestation over the decades, have combined to make the Central Cordillera highly susceptible to erosion and landslides during the typhoon season.




The ancient rice terraces of Banaue, located in the Central Cordillera

The economy of the Central Cordillera is based on agriculture. Some of the oldest rice terraces in the world have been sculpted from the slopes at Banaue, which now serve as a major tourist attraction. Today, large parts of the Central Cordillera have been given over to intensive agriculture and the region has become the vegetable garden of the Philippines, supplying produce for markets in the regional centre of Baguio and the capital Manila, 300 km to the south. Large portions of the rural community are reliant on substantial rainfall to grow crops, on the stability of the land for farming, and on the reliability of road transport to provide access to southern markets.

The region was extensively damaged by an earthquake in 1990, measuring 7.8 on the Richter Scale, followed the same year by a succession of typhoons and intense rainstorms. There was pervasive damage to the slopes and the Halsema Highway, which links Baguio with the agricultural hinterland to the north, was destroyed in several places. In 1997, the road was closed for 6 weeks while landslide damage caused by intense typhoon rain was repaired. The impact of these road closures on the local economy was highly significant. More recently, over 1 metre of rain was recorded in a single 24 hour period in Baguio during Typhoon Feria in 2001. Because of the steeply sloping ground, this rainfall inevitably runs off the hillsides causing erosion and damage to farmland and engineering structures.

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Since 1996 Scott Wilson, an international consultant in sustainable development, has been involved in the design and construction of road rehabilitation along the Halsema Highway. The highway is itself an economic corridor and consequently it is not unusual to find slopes immediately adjacent to the highway under cultivation, creating problems for water management and erosion. Finding sustainable ways in which water can be managed within the road corridor for the mutual benefit of the road and adjacent farmland is a difficult task. Emphasis is placed on harmonising the road drainage systems with those of the natural slope drainage pattern, and providing sufficient protection to prevent erosion from being initiated in vulnerable locations. Still, local farmers and developers need to be fully aware of the consequences of their actions with regard to the management of land in an area as dynamic as the Central Cordillera. Uncontrolled drainage and irrigation water can have devastating consequences on the sustainable use of the mountain region for agriculture. The conservationist practices pioneered by the farmers of past millennia must not be allowed to be forgotten in this age of increasingly intensive land utilisation and farming on the precipice.

*The design and reconstruction supervision of the Halsema Highway is being carried out by Le Bureau Central d'Etudes pour les Equipements d'Outre-Mer (BCEOM) and Scott Wilson under contract to the Department of Public Works and Highways, Republic of the Philippines.*



Erosion causes damage to buildings and agricultural land