Vetiver and Natural Disaster: Doi Tung Experience

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Introduction

In the Doi Tung Development Project, soil stabilization of the back and sideslopes of new road utilizing several engineering approaches including hydroseeding were conducted during 1989-1991 with extremely high cost. With the initiative of Her Royal Highness the Princess Mother following His Majesty the King's suggestion , in 1992 vetiver grass was introduced into the project. World Bank publication on vetiver was used as a guideline for soil erosion control and retention of soil moisture. Extensive propagation and establishment of vetiver hedgerows for soil conservation were implemented during 1992-1995. Cost efficiency of vetiver propagation and hedgerows establishment were carefully studied (Sayamanonta , 1996). Root characteristics and distribution studies utilizing P32 isotope Technique (Mahisarakul *et, al.* 1996), and vetiver hedges as barriers to prevent residues of harmful agricultural chemicals to enter watershed were conducted in the project area (Pinthong, *et, al.* 1996)

Landslides caused by road construction

In the rainy season of 1996 heavy rainfall caused landslides and collapse of road side and backslopes including those with cement-sprayed metal netting walls. Landslides causing damages on houses and public building. When the rainy season ended land levelling to create terraces vetiver hedgerows and hydroseeding were implemented to stabilize new gullies. Reinforcement of friable loose soil utilizing cement beams arrangement in squares to support the wet soil weights, and other engineering methods have been in practice whenever and wherever needed at critical sites. In all cases vetiver hedgerows have been fertilized selectively weeded and pruned for 1-2 years, and then the local plant species have been allowed to naturalize among vetiver grass, compete and finally dominate the site. By this time vetiver is no longer needed.

Vetiver for soil stabilization to save buildings and houses from landslide disaster

At Hauy Nam Kun village during 1989-1991 when new highway was built for the Doi Tung Development Project soil was excavated from the foothill for road construction. A large flat land area was left available after the construction was completed. A new temple, a nursery and daycare center , and houses were built next to the backslopes newly carved off the foothill. No precaution was taken on the soil erosion and landslide disaster. During 1994-1996 there were landslides of these bare backslopes at the foothills. Several houses were burried and a few people died in these incidents. To save all these remaining buildings the backslopes were leveled into terraces , vetiver hedgerows were planted , and bermuda grass was hydroseeded in the dry season. Vetiver grass and hydroseeds were regularly irrigated. By the time the rainy season started vetiver hedgerows were already well established , and bermuda grass provided cover to reduce the impacts of falling rain drops from making splash erosion. Due to poor soil fertility compost and chemical fertilizer were applied for the first 6 months. At the end of the rainy season natural local plant species were found among vetiver and burmuda grass. Selective weeding to get rid of vines were

done annually for the first two years. Within four years the natural vegetation was very dense and backslope has been stabilized.

Landslides caused by diversion of water ways.

From our experience on road building on the mountain during 1989-1991, an attempt to save the vegetation on the sideslopes by transporting the excessive cut soil from the construction sites and filling it into a valley to created flat land was carried out. When the filling work was completed vetiver hedgerows were planted as a living retention wall from the ridge of the newly formed plateau and along the sideslope of the landfill to serve as a living retention wall. The original creek was replaced by a manmade draining dish. The water from the dish was drained at the corner between the ridge of the landfill and the slope of the hillside down the steep slope. In the rainy season the impacts of strong water current on the friable soil of the hillside caused continuous landslides and slumps of the hillside for many consecutive years. A large deep gully was created at the draining point, upper and lower on the slope of the hillside.

Another landslides similar to previous one was at the foothill on the bank of irrigation canal caused by the impacts of water current on the foothill. The collapse of the foothill caused landslides and slumps of the lychee orchard above it.

In both cases vetiver hedgerows were planted on the gullies early in the rainy season because the places are not accessible for irrigation to be carried out. Replanting followed after heavy rain because vetiver plants were washed away. Three – four years after starting vetiver hedgerows, the gullies have almost been fully stabilized with the exception of the areas on the ridges. Natural vegetation of local species began coming back among vetiver hedgerows from lower part of the gullies upward.

Vetiver and prevention of landslides

In all the construction project on Doi Tung since 1992, right after the earth excavation cut and fill works has been completed vetiver contour hedgerows have been planted on the critical sites in the dry season and irrigated to ensure their survival. Their establishment during the dry season has always increased their soil stabilization ability in the following rainy season. The intensive care of vetiver hedgerows including fertilizer and compost application still costs less than engineering methods and even less than planting vetiver hedgerows in the rainy season and suffering from run-off-water washing away vetiver plant. After 1-2 years of selective weeding and pruning , naturalization of local plant species follows and the soil is stabilized. When vetiver are planted in places non-accessible for water transport planting vetiver hedgerows in the early part of rainy season is recommended.

References:

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