

Establishment of Ecosystem in Sai Tso Wan Landfill



Introduction

During 1978 to 1981, Sai Tso Wan was a landfill located in Lam Tin received approximately 1.6 million tonnes of domestic and commercial waste. The maximum thickness of waste was about 65 meters. After the closure of the site, it was recreated and become a Sai Tso Wan Recreation Ground nowadays. Outside the ground, there is a 2500m² shotcrete slope with gradient 60° sprayed with shotcrete for stabilization. To regreen this artificial slope, Eco-Green System was applied by Toyo Greenland Co. Ltd.

Eco-Green System

Eco-Green System is an improved greening technique, which focuses more on ecosystem establishment in the artificial environment.

In addition to the current techniques such as Hydromulching system and Toyo-Mulching System, Eco-Green System made use of extra Eco-bag filled with soil mix fixed on the slope before the installation of 3-dimensional wire mesh with fertilizer strips. On the



Hibiscus rosa-sinensis (大紅花)



Rhaphiolepis indica (車輪梅)

other hand, apart from grass and climbing ground cover, shrubs



Melastoma sanguineum (毛稔)



Fixing of Eco-bag on the shotcrete slope provide additional nutrients for shrubs planted

that bloom flowers with different colours were also planted in the Eco-bag on the slope.

It should be noticed that after the installation of 3-dimensional wire mesh, 50mm thickness of plant medium, called fiber soil, was sprayed on the top of the mesh.



Gordonia axillaries (大頭茶)



Rhodomyrtus tomentosa (桃金娘)

Such amount of nutrients was initially sufficient not only for grass seed to germinate but also for climbing ground cover to grow and develop; however, for shrubs, the amount was not adequate for their growth. Thus, the application of Eco-bag provides more nutrients and support for the shrubs planted to enlarge the greening effect on the closed landfill.

Most importantly, shrubs have flowering and fruiting periods once mature. There were different forms of flowers, e.g. they may cluster together and bloom or only just develop one single large flower at the top of the branches and various fruits would be developed afterwards. The native species would provide food and shelter for wildlife (e.g. insects and birds) and hence maintain the ecology of the area and conserve wildlife. The installation work was completed within three months from June to September 2003.

Plant species

In total, 10 plant species have been selected to green the captioned site. Standard grass seeds, Bermuda grass (百慕達草) and Bahia grass (百喜草), were added into the wet spraying machine with the fiber soil, spraying onto the slope, sticking in the fiber soil and waiting for

their suitable conditions for germination. With high germination rates, these grass species covered the slope thoroughly within 2 months.

After the fiber soil was sprayed, *Wedelia* (蜈蚣菊) was planted on the slope by sprigging, which quickly established and climbed all over the slope within 3 months. This climbing ground cover had a fast developing property because it produced daughter plants from its stolons. Each daughter plant would develop roots from its nodes and, if the roots touched the fiber soil, they could obtain more and more nutrients and further roots developed; cycles repeated and at the end, massive evergreen *Wedelia* with yellow small flowers have laid on the slope. High aesthetic value was achieved there.



Rhododendron simsii (紅杜鵑)



Mussaenda pubescens (玉葉金花)

After the sprigging of *Wedelia*, shrubs have been planted, they are : *Gordonia axillaris* (大頭茶), *Melastoma sanguineum* (毛稔), *Mussaenda pubescens* (玉葉金花), *Rhaphiolepis indica* (車輪梅), *Rhododendron simsii* (紅杜鵑), *Rhodomyrtus tomentosa* (桃金娘) and *Hibiscus rosa-sinensis* (大紅花). Throughout the year, it was really amazing to find most shrubs flowered on the slope in different periods of time. Moreover, although their growing rate varies, all the shrubs have adapted the new environment

and survived.

Plant Medium – Fiber Soil

Despite the original slope surface condition, vegetation planted showed their adaptation to the artificial environment. What is the key factor for this success? The answer is the fiber soil sprayed.

Fiber soil was made up of peatmoss, compost, soil factor, fast release fertilizer and base soiler (to bind the components together in the wet spraying machine) which was light, full of gas porosity and nutrients. It has prevented the surface runoff and erosion of the material and retained nutrients for the plant to grow. Also the high gas porosity let roots of vegetation penetrate into the soil as well as develop massively. Eventually, diverse vegetation could be cultivated in the fiber soil healthily.

Conclusion

The significant factor of this System is to establish an ecosystem on the slope. An ecosystem consists of a dynamic set of living organisms (plants, animals and microorganisms) all interacting among themselves and with the environment in which they live (soil, climate, water and light).

Under Eco-Green System, diverse vegetation species including grass, climbers and shrubs maintained self-sustained nutrients cycle after the establishment period. On the other hand, with the suitable planting fiber soil, new plant species such as *Duranta repens* (假連翹) and *Lantana camera* (馬纓丹) have invaded into the captioned slope showing other

flowers and providing additional living environment (habitat) for the inhabitant like insects, birds, or other animals.

By this, the living organisms interact with the environment and a microenvironment has been established. Consequently, the entire living environment within the system can be self-sustained.



A dragonfly staying on *Wedelia* (蜈蚣菊)



Invaded plant species –

Duranta repens (假連翹) with purple flowers



Invaded plant species –

Lantana camera (馬纓丹) with an insects

