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Gabions and Phytogabions: Geotechnical and Environmental Design

In the wide range of diverse geo-environmental challenges, the issues associated with geological disasters like landslides, gain the high-priority importance due to difficult predictability and wide-scale devastating consequences.

Landslide challenges especially in urban areas remain largely unpredictable because of complex synergetic interference of geotechnical and climatic factors.

There are lots of engineering designs and techniques currently used for coping with landslide problems like retaining walls, gabions, geotextiles, controlled saturation wells, caged ripraps, phyto reclamation etc.

Conventional gabion is defined as some container, basket, cylinder or box filled with rock, concrete or other construction materials to be used in civil engineering, road building, urban landscaping, military applications etc. A gabion wall is a retaining construction arranged in stacks of stone-filled gabions wired together. Gabion walls are usually attached to the slope rather than arranged vertically. The use of gabion containers is more efficient technique than loose stone usage because they are modular and may be stacked in structures of various shapes; they are also resistant to washing out with water. Gabions also have advantages over more rigid structures, because they can withstand subsidence, distinguish energy of flowing water, and drain freely. In some cases their strength and effectiveness may increase with time, as silt and vegetation fill the voids and consolidate the structure. They are sometimes used to prevent falling stones endangering traffic on the road.

The life expectancy of gabions depends on the lifespan of the wire used to stack them, not on the filling materials of the basket.

Phytogabions are modified gabions with vegetation inside. They have several important features.

- Phytogabion should contain the gravels with smaller size in the midsection and bigger size outside to facilitate proliferation of roots and successful growth of plants.

- The seedlings or seeds of viable and highly resistant plant species are put together with the soil mix inside perforated geotextile bags. Further these bags are tightly placed in the midsection of the phytogabion.

Deep penetration of plant roots into the soil substrate creates a kind of monolith that effectively consolidate the slope with further aesthetic reclamation of the landscape via appropriate geo-environmental technology.

So, phytogabions as a combination of geotechnical structures with vegetation could be smart solution and innovative anti-landslide technique for slope stabilization and revitalization of urban landscapes.