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review

INTERNATIONAL VIEWPOINT

Research Project: Sustainable Erosion Control Using Wood Wool - Part 1

By Thomas Wildberger

Mr. Wildberger, a long-time IECA member, is the owner of Lindner Suisse, the only creator and producer of specialized wood wool (excelsior) products, obtained from certified Swiss wood. Lindner Wood Wool, sold in 19 different countries, produces over 170 types and diameters of wood wool products from certified Swiss wood.

Vegetation is one of the main systems for natural protection against erosion by stabilizing the slopes and adjusting their water content. Once the roots of plants and grass are grown up, the soil erosion will be stopped. This natural process can be supported by the use of wood wool for the production of erosion control mats.

Wood Wool vs. Wood Mat

Protection against erosion with wood wool is a known and widely-used method in the United States. On the contrary and although once used, in Switzerland wood wool was replaced by synthetic materials and imported natural fibers (such as coconut and jute). Since the past couple decades, Switzerland uses wood mats-on which grass seeds are sown-for erosion control. The seeds on these mats come from local plants to guarantee good and ecological growth. The wood mat protects from physical agents, while it keeping the subsoil moist. Furthermore, its degradation provides fertile organic matter for the vegetation to grow. Wood wool is comprised of a natural and local material, therefore it is an ecological and 100% biodegradable product. The use of wood wool represents a close production cycle that helps local mountain ecologies.

The Research Project

The focus of this applied research, funded by the Swiss Commission for Technology and Innovation (KTI/CTI), is to evaluate the conditions to re-introduce the wood wool as slope stability controller for shallow landslides and natural or anthropogenic scarps. The efficiency of wood wool on erosion control was quantitatively evaluated by the use of a RIEGL VZ-4000 Terrestrial Laser Scanner (TSL), which is able to quantify both the development of the vegetative state and the ground surface for evaluating erosion control. This applied research, managed by HTW Chur (in which SUPSI is a research partner and Lindner Suisse and Ö+L GmbH are the implementation partners), tests wood wool in real situations to evaluate its efficiency over time. In addition, it determines which type of product is more appropriate for the different employment conditions.

Example of different kinds of wood wool application.

The 30 product test sites, located in Switzerland, covers a total area of 30,000 square meters. The various test sites were chosen according to different types of geological substratum and exposition slope. On each site, four types of wood wools are used that differ in wood basis weight and type of support (polypropylene or jute). To compare and quantify the effect of the wood wool, one section of each test site is left without erosion protection.

The sections with wood wool is coupled with sowing seeds. The use of seeds (HoloSem), taken from plants of surrounding areas, helps to recover the natural and original vegetation. The geological substratum and the type of soil is characterized by grain size analyses in a lab. The efficiency of the wood wool on the growth of the vegetation is controlled with direct observations, photogrammetry and terrestrial laser scanning.

The final goal of the study is to produce a practical manual to help erosion control professionals choose the appropriate type of wood wool, depending on the geographic and microclimatic conditions, exposition slope and type of substratum.

Terrestrial Laser Scanning

Long-range Terrestrial Laser Scanning (TLS) surveys were conducted at all test sites by means of long range TLS (Riegl VZ-4000). This gives the ability to register on a number of reflectors georeferenced with a free station method. The CH1903 coordinates of these tie points were measured using a Total Station and GNSS. The output of the laser scanning establishes a 3-D model of the test sites. It is possible to evaluate a spatial evolution of the erosion through geometrical factors, such as: volumes, surfaces, sections and contour lines. The instrument allows the identification of pulses reflected from the vegetation. This permits a quantitative analysis of the speed of vegetation growth with the different types of wood wool.

The project is ongoing and is expected to be complete by 2017.

Installation of wood wool at the Zurich airport.

References:

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