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INVITED LECTURES AND ABSTRACTS

Fourth International Conference
on Land Degradation



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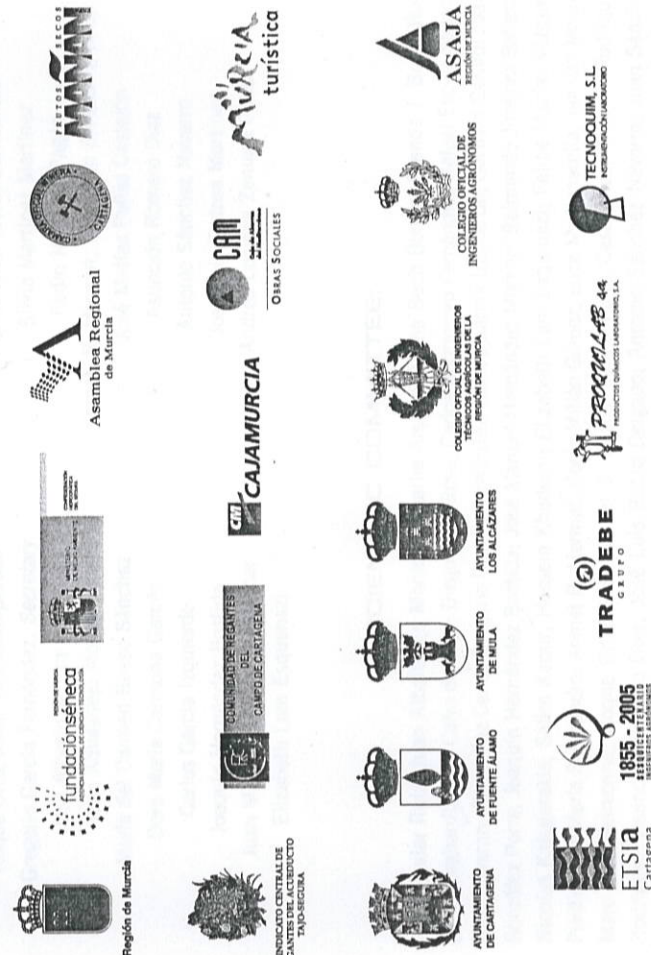
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BUILDING airports, as much as other great civil works, requires the execution of activities such as embankment and soil extraction compromising the soil, fauna, flora and local hidrcal resources. These procedures, besides their impact, may put both the access ways and the track of landing and take-off in risk. In order to minimize these negative impacts and improve the environmental and landscape aspects, Embrapa Solos has been developing, through an association with INFRAERO, a project of diagnosis and indication of technologies to recover these areas. A soil conservation diagnosis has been developed in 19 airports located in different kinds of Brazilian biomes. The diagnosis consists of physical characterization (climate, morphology, vegetation, soil and geology) of the degraded areas and descriptions of the erosive processes, drainage system and material available for reuse. Mostly, the degraded areas found in different airports presented the following main characteristics:

1. Mining areas - areas in which there had been soil removal for civil works and earthfills, exposing the subsoil to the erosive processes.
2. Natural drainage earthfills - natural drainage areas which have been filled with earth after soil systematization and posses groundwater line close to the surface.
3. Erosion in the surroundings of the drainage system works - erosive processes which compromise the durability and functionality of the superficial water drainage system.
4. Cut slopes - bent/inclined surfaces with poor undergrowth susceptible to different kinds of erosive processes.
5. Gullies - areas where the erosive processes took place for a long time and, therefore, caused serious injuries to the soil surface, specially when it comes to steep and instable areas.
6. Disposal areas - areas used as a deposit of waste, sewage residues etc.
7. Flat areas exposed to superficial erosive processes, specially the platform - the soil in the platform areas is compacted and disposes of a low rate of nutrients leading to a poor undergrowth.
8. Areas leased for agricultural use - areas destined to agriculture with no further concerns to soil conservation practices.
9. Permanent vegetation areas - areas that require recovery practices, either for their importance to the conservation of the natural resources, or for the high erodibility.

EVALUATION OF THE POTENTIAL OF SEWAGE SLUDGE UTILIZATION IN REVEGETATION PROCESSES OF DEGRADED AREAS

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THE sewage sludge application as an amendment for agricultural and forest lands has been presented as an adequate alternative for its final disposal, considering environmental point of view as well as the agronomic. Mainly in processes of recuperation of degraded areas, because it incorporates an economic value to a residue. The aim of the present work is to verify the viability of the application of the sewage sludge, produced by the Wastewater Treatment Plant of Rio de Janeiro's International Airport, in a mine spoil in order to stimulate revegetation process. Thus two vegetal species, *Mimosa caesalpinifolia* and *Mimosa bimucronata*, were introduced in the experimental area, and they were amended with increasing rates of sewage sludge equivalents to 0,00; 2,85; 5,70; 11,40 and 22,80 t ha⁻¹ (dry base). Changes in the soil fertility were evaluated through the following variables: pH, organic matter, cation exchange capacity (CEC) and the contents of macro and micronutrients. The potential risks of contamination of the groundwater were evaluated by means of soil-solution, obtained by centrifugation, analysis of pH, Ca, Mg, Na, K, Fe, Cu, Zn, Mn, Co, Cr, Ni, Al, Cd, Me, Pb, NO₃⁻¹, SO₄⁻² and F⁻¹. The growth behavior of the vegetal species were evaluated through measurements of the height and the diameter of the plants. The results obtained suggested that the revegetation process used for the reclamation of the degraded area is a viable alternative for the final disposal of the sewage sludge. Other behaviors were also observed. The sewage sludge addition to the soil increased the concentrations of organic matter, nitrogen, phosphorus and calcium, as well as CEC, and in lesser extension the concentrations of magnesium and potassium, in the order hand, soil pH showed little variation.

The new methodology used for the extraction of the soil-solution presented also satisfactory results, making it possible to consider its use as an important tool for the diagnosis and monitoring of the chemical processes of the soil amended with sewage sludge. As an example, the high levels of NO₃⁻¹ and SO₄⁻², associated to the highest application of sewage sludge, indicated that a possible risk for groundwater contamination could exist. It not observed any depressive effect caused by any rate of the sewage sludge, to the growing of *M. caesalpinifolia* and *M. bimucronata*.

**HYDROLOGICAL MONITORING IN A GULLY
SUBMITTED TO LAND RECOVERY PRACTICES:
INTERNATIONAL AIRPORT-RJ**

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EMBRAPA Solos has been developing, through an association with INFRAERO, since December of 2000, low cost mechanical and vegetative practices for recovery of degraded areas in 19 Airports around Brazil. The investigation of the gully stabilization process which took place in a cut slope since the 70's, due to mining activities during the construction of the Rio de Janeiro International Airport, is the aim of this paper.

The first step was the superficial water regularization and dissipation practices. Afterwards vegetative practices were implanted, through the use of vetiver grass (along the terraces) and a mix of legume trees inoculated with microorganisms (between the terraces and inside the gully). It was applied grass residues, a highly available reject in the airport, around the seedlings and in the gully cut slope. The gully's hydrological behavior was investigated in order to evaluate the efficiency of these practices, through a characterization of the soil physical properties, estimation of flow nets, and by measuring the influence of the litterfall and tree canopy. The paper's goal was to detect the local hydrological mechanisms being generated by the adopted practices, approaching relations between the soil physical properties, mechanical and vegetative practices.

The investigation methods includes the determination of the soil physical properties (grain size distribution, soil bulk density and soil particle density, hydraulic conductivity and water retention curves, for twelve different spots at depths of 20, 40, and 80cm). Then it was obtained, by tensiometric monitoring, the pore-pressures along the same points, being possible the estimation of the flow nets. It was also evaluated the water retention of the litterfall and the tree canopy interception, also at the same twelve spots.

The results of the grain size distribution analysis evidenced a loamy material. The results of soil bulk density showed some variability (results between 0,97mg/cm³ and 1,51mg/cm³), and the values of soil particle density were mostly high due to the nature of the parental material (between 2,5 and 2,67 mg/cm³).

The obtained values of hydraulic conductivity were highly heterogeneous (between 11,04cm/h and 0,017cm/h), the higher values were found at depth of 40cm, which induce the concentration of the subsuperficial fluxes. It was observed that the amount of litterfall has a great influence on the pluvial water interception. During the evaluation of the events, it was