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ECOLOGICAL RECONSTRUCTION MEASURES OF SOME LENDS
AFFECTED BY ROAD INFRASTRUCTURE

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Abstract:

Restoring degraded land following road construction is essential both for protecting the environment and for ensuring the sustainability of infrastructure projects. Road construction activities can significantly affect soil, vegetation, water resources and biodiversity, and the restoration of these lands is a crucial step in reducing the negative impact and reintegrating affected ecosystems.

The studied area includes a variety of natural habitats, which harbor a significant diversity of flora and fauna, some of which are sensitive to environmental changes caused by construction activities. In the framework of ecological restoration measures in the case of road construction, it involves the choice of ecological solutions depending on the terrain, biodiversity and estimated impact, and the development of ecological compensation plans and post-construction monitoring.

Following the mapping, the maps were prepared that provide the scientific basis for correct decisions regarding the route, technical solutions and ecological restoration measures.

The identification of ecological corridors guides the optimal route of the highway to avoid sensitive areas and informs decisions regarding the placement of ecological tunnels, ecoducts and wildlife crossings. The practical implementation of ecological recovery measures is materialized by introducing green works in technical plans and supervising the execution of protection and restoration measures.

Monitoring and maintenance includes monitoring biodiversity in the years following construction and adjusting measures based on the results

Keywords: , biodiversity, ecological reconstruction, degraded lands

• Introduction

The motorway section is located in the western part of the country, in the Banat region, belonging to the administrative territory of Timiș and Hunedoara counties.

The importance of restoring degraded lands following road construction is essential both for protecting the environment and for ensuring the sustainability of infrastructure projects.

Road construction activities can significantly affect soil, vegetation, water resources and biodiversity, and the restoration of these lands is a crucial step in reducing the negative impact and reintegration of affected ecosystems. Road construction works often involve excavations, cutting of slopes and material deposits that lead to the loss of fertile soil and land degradation.

Their restoration prevents erosion, landslides and desertification, protecting essential resources such as soil and water.

Land degradation affects the natural habitats of local species. Restoring vegetation and soil conditions allows for the restoration of biodiversity and supports the rebalancing of ecological processes.

Rapid restoration of affected lands minimizes adverse effects on neighboring areas and reduces the risks of water pollution, slope collapse, or watercourse blockage.

• Material and method

Within the framework of ecological restoration measures in this case, it involves the choice of ecological solutions depending on the terrain, biodiversity and estimated impact and the development of ecological compensation plans and post-construction monitoring. In the first phase, a mapping of habitats and species was carried out, which is a key tool for the ecological integration of motorway projects.

Following the mapping, maps were drawn up that provide the scientific basis for correct decisions regarding the route, technical solutions and ecological restoration measures. Without this stage, the risks of irreversible damage to biodiversity increase significantly. The practical implementation of ecological restoration measures is materialized by introducing green works in the technical plans and supervising the execution of protection and restoration measures.

Monitoring and maintenance include monitoring biodiversity in the years following construction and adjusting the measures according to the results. In cadrul măsurilor de refacere ecologică în cazul de față, implică alegerea soluțiilor ecologice în funcție de teren, biodiversitate și impact estimat și elaborarea planurilor de compensare ecologică și monitorizare post-construcție.

Results and discussions

Habitat fragmentation has a significant impact on biodiversity, especially when large infrastructure projects such as highways are built. In the case of the present study, this can affect both flora and fauna in the area, creating obstacles to species migration and interaction.

Habitat fragmentation can lead to the isolation of animal populations and the loss of biological diversity, and its effects can be observed in the long term on local ecosystems. In the first stage of reconstruction works, controlled embankment works are carried out, which are particularly important to maintain the long-term integrity of the infrastructure and to protect the environment.

Types of areas proposed for restoration/conservation in the study area

Tip zonă	Caracteristici	Măsuri recomandate
Longitudinal ecological corridors	Lanes parallel to the highway (on embankments, green ditches)	Replanting with native vegetation, anti-erosion barriers, maintaining vegetation continuity
Zone tampon între drum și păduri/pajiști	Transitional areas with mixed vegetation	Planting native shrubs, restoring soil structure
Buffer zones between road and forests/meadows	Land temporarily affected by the construction site	Reprofilare, reintroducerea humusului, plantări controlate
Degraded marginal lands	Strips stripped or compacted	Hydroseeding, phytoremediation, natural grassing

One of the most common and environmentally friendly methods of controlled slope development is the planting of area-specific vegetation with species of grasses, shrubs and trees that help to fix the soil.

In some cases, to prevent erosion and ensure long-term stability of slopes, geotextiles (resistant textile materials) and geogrids (rigid or semi-rigid structures made of plastic or other materials that allow drainage and protect the soil) can be used. These are placed on the slopes of the slope to support vegetation and prevent landslides

The benefits of replanting with native species.

Benefit	Explanation
Local adaptation	They are resistant to the climatic conditions and soils of the area
Ecological stabilization	They quickly restore the natural habitat, attract specific fauna (birds, insects)
Maintenance efficiency	Requires less irrigation and fertilizer after establishment
Soil protection	Strong roots reduce erosion and stabilize slopes
Preventing biological invasions	Reduce the risk of non-native species expanding aggressively



Grass species used for grass seeding are Festuca (Festuca spp.) and Poa pratensis, perennials that can easily stabilize slopes due to their ability to adapt to different soil types.

Secale cereale is also often used for hydroseeding, but also as a perennial plant for soil stabilization. Hydroseeding is a process that involves mixing plant seeds (usually species resistant to harsh conditions), water, and a binder (usually a mixture of organic or synthetic substances) in a specialized mixer.

This mixture is then applied to the surfaces affected by construction using specialized equipment, usually a hydraulic sprayer.

This method is particularly useful on slopes, hillsides or on land where the soil is not conducive to traditional planting.

Among the shrubs planted are the Bramble Tree (Rubus spp.), the Sea Buckthorn (Hippophae rhamnoides), a hardy evergreen shrub that can tolerate poorer soil conditions and helps stabilize the soil, and the Dogwood (Cornus spp.), an evergreen shrub that can be used on slopes to create a dense plant cover and prevent erosion.

Perennial plant species for biodiversity- Lavandula angustifolia (Lavender) In addition to its role as a soil stabilizer, lavender attracts pollinating insects and can contribute to habitat diversification.

- Corylus avellana (Hazelnut) Perennial shrub that can provide food and shelter for local fauna.

• Conclusions

In the process of ecological restoration of degraded lands following the construction of the highway, the first stage is the stabilization of the soil and slopes through controlled embankment with adapted inclination to prevent landslides, hydroseeding with mixtures of native grasses for rapid coverage, the installation of anti-erosion barriers (geotextiles, fascines, gabions) and the reprofiling of the land and the reintroduction of the humus layer, is essential. Replanting with native species is an essential measure for restoring local biodiversity, stabilizing the soil and preventing invasion by alien species.

To ensure the efficiency and sustainability of the ecological restoration measures of degraded lands, a systematic monitoring plan is essential in the medium (5 years) and long term (10 years).

This plan allows for the evaluation of the evolution of restored habitats, the detection of ecological deviations and the application of adaptive corrections.

The ultimate goal is to ensure sustainable ecological restoration, with the functional return of degraded lands and their integration into a stable, green and ecological landscape compatible with road infrastructure.

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