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Large-areal land slide on Girová Mt., Jablunkovské mezihoří Intermountains (Czech Republic)

Velkoplošný sesuv zeminy na hoře Girová, Jablunkovské mezihoří (Česká republika)

Keywords: land slide, Planosols, Gleysols, Moravskoslezské Beskydy Mts., Czech Republic

In May 2010 extensive floods after several-days running rains afflicted Central Europe. The 20- and 50-years outflows of flood waters affected the major part of the Moravskoslezské Beskydy Mts. However, more than 100-years outflow afflicted for example the Olše (Olza) basin. During the floods more than 70 land slides occurred athwart the Moravian-Silesian District, another land slides occurred near Havířov, Skalice, Dolní Domaslavice, Fryčovice and Kunčice pod Ondřejníkem.

Evidently one from the largest land slide in the modern history of the Czech Republic arose on the 19.V.2010 during 5-6 a.m. on south slopes westward from the Girová Mt. top (840 m a.s.l.). We observed the stage of the land slide on the 25.V.2010. We explored the whole affected area and fixated as body of way points by GPS PDA. Vectorization of the generated point field was made in GIS TopoL 8.0. We obtained volumes and tree species compositions of affected woods by projection with graphical national database of the forest management plans/tissues using SQL Server 2000. During the field exploration we made reconnaissance of soil types. We created detail reconstruction of soil map of the afflicted area. Soil taxonomy was used according to the ISRIC-ISSS-FAO (DRIESSEN et al. 2001). According to the approach of ŽÁRNÍK (2008) based on the soil unit presence we executed review of forest site typological classification. The classification terminology was used according to VIEWEGH et al. (2003). Because definitions of some edaphic categories (EC) need informations about another macroscopical signs as well as the base saturation except basic knowledg on soil types (but chemical data are not disponsable), for identifications of the EC we had to respect known data about prevalent forest typological units from the whole Moravskoslezské Beskydy Mts. natural forest area (HOLUŠA et al. 2000). We pressume that whole area belongs to the fir-beech forest vegetation tier.

The destroyed area covered 20.92 ha (570-740 m a.s.l.). The land slide was not stable at the exploration time. Motions of the moulds connected on soft angle slopes of the ridge as well as on the face. The land slide was 1120 m long and 300 m wide (Fig. 3). The area of the afflicted forests made the content 18.82 ha. The land slide arose along ridge where the solid ground of Solanian (Paleocene) arkose sandstones and conglomerates were exposed (Fig. 1). There were destroyed spring areas of three small forest streams. The pit deep over 50 m was made at upper parts of the land slide. Mould was crush upto 3.8 m on the face. Some water reservoirs occurred at mushy soil matter in the central part (Fig. 2). The medium slope of the area was 11° before the slide event. Terrain slope after the event was about 7°. Spring areas and stream runoffs had situated in gill with Gleysols (16.09 %). Main Gleysol body was obtained in the constricted terrain depression. However, the most spread soil unit of the destroyed area was Haplic Planosol covering medium perimeter and whole south part (44.19 %) (Fig. 4). The Haplic Cambisol, Gleyic Cambisol, Skeletic Cambisol and Leptosols were obtained only in upper border parts (25.07 %).

From this view, the most significant forest type group (FTG) of the land slide could be represented by nutrient-medium (beech-) fir (Fig. 5) of the Gleyic series (5O) (60.71 %). Central parts of the land slide were probably represented by moist to wet fir-beech (5V) (15.35 %). The upper parts were covered by communities of the slope-stone fir-beech (5F) (9.16 %) and marginally by nutrient rich fir-beech (5B) (14.77 %) (Tab. 1).

Tab. 1. Ecosystem components destroyed by the land slide on the Girová Mt., Jablunkovské mezihoří Intermountains (source: Forest Management Institute Data Information Center)
Tab. 1. Složky lesních ekosystémů zničené při sesuvu na Girové, Jablunkovské mezihoří (zdroj: Informační a datove centrum ÚHÚL)

Biomass		**Geobiocoenological units**			
Tree species	**Volume (m^3)**	**Soil type**	**Area (m^2)**	**Forest type group**	**Area (m^2)**
Picea abies	3,371	Haplic Planosol	84,936.8	5O	122,348.8
Fagus sylvatica	2,080	Dystric Planosol	32,254.0	5V	30,935.5
Abies alba	871	Dystric Gleysol	30,935.5	5B	29,763.7
Alnus glutinosa	14	Gleyic Cambisol	20,464.2	5F	18,455.3
Fraxinus excelsior	6	Skeletic Cambisol	16,212.5		
		Haplic Cambisol	9,299.5		
		Gleyic Planosol	5,157.9		
		Haplic Leptosol	2,242.8		
Total	6,342		192,212.9		201,503.3

Total volume of affected wood reached to 6342 m^3. Majority of the affected forest stands was mature older than 110 years. Only upper parts of the observed area was partially covered by young cultures and small pole stands. Norway spruce (*Picea abies* (L.) Karst.) was the most abundant tree species (53.15 % from the total wood stock) concentrated mainly on the south, west and north-west. Common beech (*Fagus sylvatica* L.) (32.79 %) grew mainly on the east and central parts of the afflicted area. Silver fir (*Abies alba* Mill.) (13.73 %), black alder (*Alnus glutinosa* Gaertn.) (0.22 %) and common ash (*Fraxinus excelsior* L.) (0.09 %) grew mainly on the west border and in central depression.

The afflicted area is predominantly built by permanent wet soils. Their retention potential is naturally influenced by high ground water level. Soil water permanently reducted friction in the body. Some forest stands had man-made structure and composition there but the stands on the central gulch as well on the north-east had natural compositions. Their dominant age suggest that large land slide did not occur there until recently. However, close waterlight bedrock with dominant Planosols and Gleysols near spring areas

was main predisposition factor there. The fact that local forest stands grew to the mature stage on the permanently wet sites indicate unprecedent heavy rain event which was dominant desolation factor of the large-areal land slide.

Fig. 1. Upper parts of the land slide built very inaccessible terrain on exposed flysch bedrock
Obr. 1. Horní části sesuvného území byly tvořeny obtížně přístupnými terény na obnaženém flyšovém podloží

Fig. 2. Central parts of the land slide on Gleysols have been filling by water reservoires
Obr. 2. Centrální část sesuvu na glejích zaplnila stagnující voda

Fig. 3. Air view on the area affected by the land slide (570-740 m a.s.l.) near peak of the Girová Mt. (840 m a.s.l.)
Obr. 3. Letecký pohled na území postižené sesuvem (570-740 m n.m.) nedaleko vrcholu Girové (840 m n.m.)

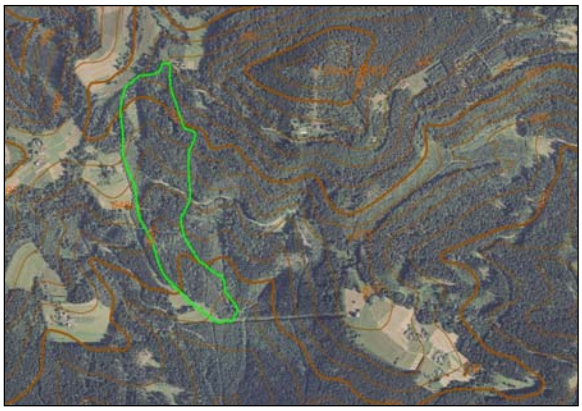


Fig. 4. Reconstruction soil map of the locality before the land slide event
Obr. 4. Rekonstrukce půdní mapy zájmové lokality před sesuvem

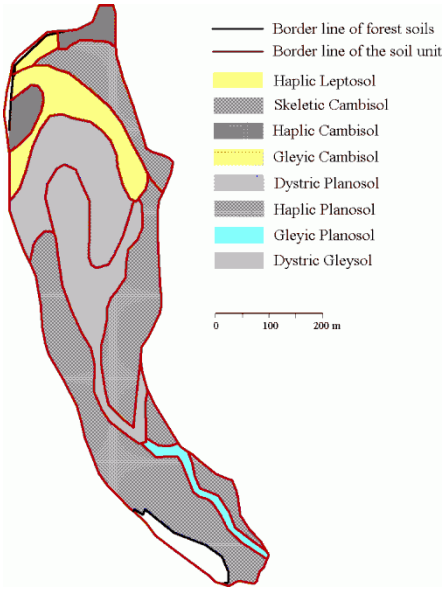
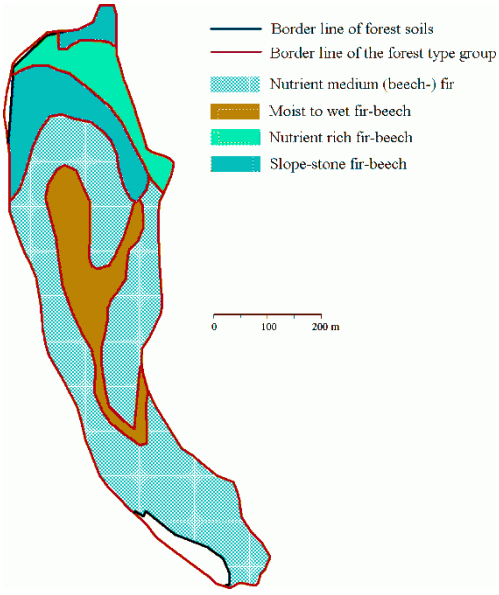


Fig. 5. Revised forest type group map of the locality before the land slide event
Obr. 5. Přehodnocená mapa souborů lesních typů na zájmové lokalitě před sesuvem



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