

Ukrainian section II.

Date: September 23, 1996

Country: Ukraine

Name of wetland: Upper Tisa between Tyachiv and Vilok

Geographical coordinates: 22° 10' W - 23° 30' E, 47° 04' S - 48° 07' N

Altitude: 113-204 m above Baltic Sea level (a.s.l.)

Area: 36 000 ha

Overview: The floodplain territories of the upper basin part of River Tisa, the largest tributary of River Danube within the Transcarpathian Region of Ukraine, with their remains of unique primary ecosystems (meadow, forest and water-marsh complexes), uncommon flora and fauna, original history and culture of the local population, are of great value on the European scale and can be objects of international environmental concern within the framework of the operating Ramsar Convention.

Wetland type: M, T, U, X

Ramsar Criteria: 1.a, c; 2.b, c, d, 3 b

Map of site included? see Map

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General location: Ukraine, Transcarpathian Region, Uzhgorod district, Tyachiv district, Hust district, Vinogradiv district, Beregova district.

Physical features: In terms of tectonic zoning, this region is situated in several zones. From the village Dilove River Tisa begins to flow in the Central zone of Transcarpathian inter-mountain depression. The sediments of Neogene spread have a flat pitch there, with slightly expressed synclinal structure in the peripheral parts of the zone. A chain of salt domes and brachyanticlinal folds stretch in the middle belt of the zone. Then, in the area of the Hust Gate River Tisa flows along the territory of the Vyhorlat-Huta volcano massif, where bed deposits are basalts and andesites.

In the northwest the Central zone and Vyhorlat-Huta massif join the Pannonian fault zone. The zone is morphologically expressed by the Beregova hills, with

various effusive and intrusive Neogene volcano structures attached to it, part of which contains ores. This zone has a horst-like characteristic of the pre-Miocene basement, and the faults surrounding it are of long development and ancient origin.

From the geomorphological aspect, the River Tisa area is surrounded by low Holocene and medium level upper and medium Pleistocene terraces. From the Hust Gate River Tisa begins to flow along the territory of the Pannonian morphostructure which is a part of the large Pannonian middle massif situated principally further to the south (Hungary), and only its northwest districts are within the territory of the Transcarpathian Region. The massif emerged in the place of the upper Mesozoic fold zone. From the Transcarpathian intermountain depression the massif is separated by the zone of faults. Thus, the proposed object is situated in two geomorphological areas i.e. the Transcarpathian lowland and the Pannonian regions.

There are three principal soil features occurring in the territory of the region: meadow and bog soils on alluvium, sodic soils in high floodplain areas and sodic soils on the present-day alluvium (see Appendix). Meadow and bog soils on the alluvium occur in the floodplain areas of River Tisa and its tributaries. They have been formed on alluvial and alluvial-deluvial deposits. The meadow-bog soils on alluvium occur in lowlands where ground waters are at the depth of 40 to 50 cm. There is a bluish grey humus horizon from the surface down to 10-12 cm. The transitory horizon is about 25 cm thick, moderately humified, greyish-blue, with rusty stains, wet, swampy. The soils are highly acidic, pH is 4.0-4.5. The sodic soils on the high floodplain areas have been formed in the terrace of River Tisa and its tributaries, which is situated above the floodplain area within the Transcarpathian lowland and consists mainly of clay and loam alluvium. The humus horizon of brownish grey colour reaches 20 to 25 cm in depth. Its structure is granular and clotty. The eluvial horizon is not marked distinctly, it is of a dusty and clotty structure, its capacity is 10 to 12 cm. The illuvial horizon reaches 110 to 130 cm, has a tough prismatic nut-shaped structure, markedly gleyed. The pH of the soil varies within the range of 4.0-4.7. The sodic soils on the present-day alluvium have been formed in the floodplain area of River Tisa on sand and loamy sand, sometimes on slight loamy alluvial sediments. The humus horizon of 20 to 30 cm in depth has brownish grey colour, is markedly clotty-granular, mellow, porous, permeable to water. The transitory horizon is still humified enough, mainly stratified, it gradually comes into the parent rock of lighter mechanical composition, it is mostly sand which lays on shingle beds. Its actual acidity is not very high, sometimes it is close to neutral (pH is 4.7 to 6.3).

River Tisa is formed by the confluence of the rivers Chorna and Bila Tisa 4 km upstream from Rahiv. The river's general length is 966 km, its drainage area is 153,000 km² (within the boundaries of the Transcarpathian Region: 201 km and 11,300 km², respectively). In the section between the town Tyachiv and the village Badalovo, River Tisa flows along the valley which is 3 to 5 km wide within the area of Tyachiv and 8 to 9 km wide in the area down from Vinogradiv.

Down from the town of Hust River Tisa flows through the Hust Gate along a very narrow valley (1.5 km wide). Down from Vilok the river valley is not pronounced. The riverbed is winding, very branched, islands can be found there in high numbers (down to Vilok), while down below Vilok the riverbed is essentially not branched. Along the entire section between Tyachiv and Chop the river is in fact an alternation of deeps and shallows. The length of the shallows is essentially 50 to 200 m, some of them reach 2 km, the length of the deeps is 200-400 m to 1 km, down below Vilok it is up to some kilometres. The width of the river varies from 40-50 m to 80-140 m. The depth of the shallows in the upper part of the section is about 0.5-1 m (the shallowest ones are 0.2-0.3 m), that of the deeps is 1.5 to 4 m; in the lower part of the section the depth of the shallows varies from 0.5-1.2 m to 2.0-2.5 m, that of the deeps from 3 to 6 m, at some places up to 10 m (see Appendix). The velocity of the current at the deeps is 0.2 to 0.6 m/sec, while at the shallows it is 0.7 to 2.5 m/sec.

The hydrochemical regime of waters of River Tisa is formed under the influence of both natural (mountain relief with widely spread flysch rocks poor in salts, high humidity, etc.) and anthropogenic factors, and varies within a wide range along the river length, depending on seasonal factors. The river water has important hydrocarbonate-calcium composition and is characterized by low values of mineralization. During floods the degree of water mineralization and hardness vary within the range of 0.2 g/l and 0.8-1.5 mg-eq/l. During the intermediate periods these values rise to 0.4 g/l and 3.8 mg-eq/l. The average turbidity of the river water is 80-85 g/m³, with considerable annual variations, depending on the time and place of observations. The content of ammonium nitrogen in River Tisa water varies from 0.0 to 1.61 mg/l; that of nitrates: from 2.1 to 11.4 mg/l; sulphates: from 19.7 to 51.3 mg/l; chlorides: from 8.52 to 43.2 mg/l; phosphates: from 0.1 to 1.57 mg/l.

Hydrological values: The hydrological regime of River Tisa is formed amidst the complex conditions of the region and embraces piedmont, mountain and plain areas. The water capacity of the river varies essentially during the year and is characterized by a complex discharge hydrograph with many peaks. The spring high water is formed due to thawing snow with simultaneous raining, and consists mainly of several peaks in succession. The highest values are reached mostly in early March or in the middle of March, but may persist till the middle of April to early May. The height of the highest level varies along the river length and amounts 1-5.3 m in the case of an ordinary flood, while it can be 2.5-8.6 m in the case of a high flood. The warm period of the year is characterized by frequent and heavy precipitation which causes 6 to 12 rain floods each persisting 1 to 6 days and characterized by intensive water level raising and delayed abatement. In certain years the height of these floods exceeds the spring flood maximum. Autumn rains cause considerable rising of the level in October-November. The winter floods are caused by intensive snow melting at the times of persistent thaws, and are accompanied by pouring rains. Floods are often of extraordinary character in their amount and intensity and turn into overflows that cause considerable damage to the national economy and threaten human lives. During

the last 30 years seven catastrophic floods have been recorded in the region. The spring discharge makes up 40% of the annual value, the summer-autumn discharge amounts cca. 30%, while the winter discharge makes 30%. During the past years a trend has been noted as to the annual discharge redistribution, the floods making up about 70% of the total annual amount.

The processes taking place in the mountain sections of the riverbed concern mainly down-cutting, while in the piedmont and plain sections lateral erosion types predominate. Maximal solid sediment saturation of waters is observed in the piedmont sections. As a result of reduced velocity of the current when the river comes out of the mountains, a proportion of the sediments deposits, which causes the riverbeds to be unstable, often disfigured and branched. To protect the populated areas and fertile soils from floods, some dikes have been constructed along the river down from the village Velyka Kopanya. Besides, some ring-shaped and oval dikes have been built to shield certain populated areas (Tyachiv, Vyshkovo, down from the village of Kryva). The dikes are reinforced at some places with concrete slabs and stones. Work is carried on to fortify the coastline and to stabilize the riverbed.

Ecological features: Meadow and forest biotopes, wetland biotopes (stagnant basins, riverbanks, etc.) ecotones (shrubs, boundaries, gorges, etc.) and anthropogenic biotopes are mostly spread in this area. The zonality of vegetation is slightly marked, all communities are attached to two altitude belts: those of the Transcarpathian lowland, and of the piedmont.

The main vegetation types are represented by meadow (Molinio-Arrhenatheretea, Festuco-Brometea), forest (Salicetea purpureae, Alnetea glutinosae, Querco-Fagetea, etc.) as well as by water (Lemnetea, Potametea) and wetland (Isoto-Nanojuncetea, Phragmito-Magnocaricetea, Scheuchzeria-Caricetea fuscae) communities. Segetal communities (Bidentetea tripartitae, Galio-Urticetea, Plantaginetea majoris) are also spread to some extent (see Appendix).

Noteworthy flora: The Transcarpathian Lowland is the northeastern part of the Middle Danube Plain, their floras bearing similar features, and the same can be said about the region in question. At present natural vegetation cover has remained here in small patches and occupies only about 30% of the total area, while forest vegetation makes up only 10%. In the flora composition of this region about 1000 aboriginal vascular plant species can be differentiated. The most rich families are Asteraceae, Poaceae, Cyperaceae, Brassicaceae, Caryophyllaceae, Rosaceae, Fabaceae, Ranunculaceae, Apiaceae etc. (see Appendix). They are associated with meadows (flooded, meadow-steppe, boggy, peat), forests (fresh, humid, moist oak groves) and hydrophilic floristic complexes. In the flora of this region more than 50 taxa of endemic, endangered (rare, disappearing) and relic plants occur; 20 syntaxa requiring protection grow there (see Appendix). Most of these species are registered in the Red Data Book of Ukraine (1980), some of them appear on the International Red List (1976).

Noteworthy fauna: The section of River Tisa within the Transcarpathian Region of Ukraine, consisting of a flooded deep and plains with the dead lakes, flooded island forests and basins attached to them, (lakes, dead lakes, etc.) is a place for the concentration of many species of the fauna (see Appendix). The waters of River Tisa and its right-bank tributaries, their flooded parts are inhabited by species registered in the Ukrainian Red Data Book (1994), such as *Eudontomyzon danfordi*, *Leuciscus souffia agassizi*, *Acipenser ruthenus*, *Hucho hucho*, *Umbra krameri*, *Zingel zingel*, *Z. streber streber*, *Gymnocephalus schraester*. There are such birds as *Sterna hirundo*, *S. albifrons*, *Riparia riparia*, *Merops apiaster*, *Alcedo atthis*, *Ciconia nigra*, *Aythya nyroca*, *Hieraaetus pennatus*. Probably (further field observations are to be made) *Falco naumanni* and *Acrocephalus paludicola* also nest there. Besides the above mentioned bird species registered in the Red Data Book, such bird species rarely occurring in the region as *Podiceps cristatus*, *P. griseigena*, *P. nigricollis*, *Nycticorax nycticorax*, *Botaurus stellaris*, *Ixobrychus minutus*, *Aythya ferina*, *Chlidonias nigra*, *Ch. hybrida*, *Remiz pendulinus*, *Motacilla feldegg*, etc. nest only there. Before the Transcarpathian passage to the north, hundreds and thousands of geese, ducks, gulls (*Anser*, *Anas*, *Larus*), some species of *Charadriiformes*, etc. concentrate there. *Phalacrocorax carbo* also occurs there, as well as various species of herons (*Egretta alba*, *E. garzetta*). These places are interesting in the mammalogical aspect as well. Such species registered in the Red Data Book as *Myotis nattereri*, *Mustela erminea*, *Mustela (Putorius) eversmani*, *Felis silvestris* live there. Invertebrates are represented by the characteristic species *Hirundo medicinalis*, *Leucanus cervus*, *Papilio machaon*, *Cerambyx cerdo cerdo*, etc.

Social and cultural values: This region is of a great socio-economic importance as regards people having inhabited it for thousands of years. It belongs to the plain-piedmont zone of Transcarpathia, where about 70% of the total population of the region live. The natural resources of the region are used mainly in agriculture, forestry, for fishing and hunting sports, apiculture, recreation, etc. In the area there are the most ancient archaeological relics of Ukraine, e.g. a site of the earlier palaeolithic period near the village Korolevo, Vinogradiv district. On an ancient terrace of River Tisa the remains of a human settlement, aged more than one million years, were found. A number of sites revealing evidences of peoples belonging to the middle palaeolithic period (Mousterian period), mesolithic and neolithic periods have been found. As early as in the first stage of the neolithic period, objects of the Körös type, of painted and incised ware already existed. In the late neolithic period Polgár culture was formed there. In the aeneolithic epoch the culture of corded ware spread widely. In the early Bronze age in the Upper Tisa area Nyírség agriculture and Ottoman bronze culture existed. One of the principal cultures of the middle Bronze age, the Felseshévis culture followed. Then the culture of Thracian Hallstatt civilization started to predominate with the development of iron metallurgy. In the region some outstanding relics of the La Tène culture of the Celts have remained, as well as some of the Getae-Thracian culture. In the Late Roman period there existed an original culture of Carpathian burial mounds. The evidence of Slavic complexes

of the early Middle ages is the “Prague” culture of the 6th-7th centuries. The Slavic culture of “Luka Raikovetska” is richly represented in the region.

Land tenure/ownership of:

Authorities	Authorities
<u>Vinogradiv district administration</u>	<u>Beregova district administration</u>
Korolevo village council	Chetovo village council
Velyka Kopanya village council	Dobroselye village council
Rokosovo village council	Borzhava village council
Sasovo village council	Varievo village council
Fanchikovo village council	Badalovo village council
Petrovo village council	Halabor village council
Bobove village council	<u>Tyachiv district administration</u>
Nove Selo village council	Bushtyno village council
Vilok village council	<u>Uzhgorod district administration</u>
Shalanky village council	Solovka village council
<u>Hust district administration</u>	Esen village council
Steblivka village council	Tisaashvan village council
Sokymits village council	Chop city council
Vyshkovo village council	
Velyatyno village council	

Current land use: The main territory is the lands of the Transcarpathian lowland and the foothills, which are used for purposes of agriculture, animal breeding, forestry and recreation. Objects of nature protection are found in adjacent territories: there are “Chorna Hora” (747 ha), “Yulivska Hora” (176 ha), “Narcissus Valley” (256.5 ha), “Bihanska Hora” (5 ha), “Beregivske Horbohrya” (33 ha) can be found there, which are protected by the state.

Factors (past, present or potential) adversely affecting the site’s ecological character, including changes in land use and development projects:

In recent times a number of catastrophic floods were noted in Transcarpathia (in 1992, 1993, 1995). As a result of the flood during the period between 25-30 October 1992 the central water supply structures were put out of order in Hust, and some dikes were destroyed. In the Hust District 2.7 ha of arable soil were taken off. The next catastrophic flood in the River Tisa basin took place in between 21-24 December, 1993. As a result of the rising water of River Tisa (605 cm at the control range, Tyachiv), considerable damage was caused to the regional economy. In the Tyachiv District, for example, the sewage disposal structures of Bushtyno were flooded. In the Hust region dikes near the villages of Kryva and Vyshkovo were ruined by the water, a considerable part of Hust adjacent to River Tisa was flooded. The central water supply structures and the town sewage

disposal station were put out of order. Some sections of the highways between Rokosovo and Hust, Hust and Sokyrnitsa were ruined by the water. 1660 m of dikes, 26 bridges, 32.2 km of highways were ruined as a result of that flood. A furniture factory in the Vinogradiv District, the sewage disposal structures of the Vilok woodworking factory, and considerable areas of agricultural crops were flooded. In the Hust and Vinogradiv Districts only the damage was estimated at 42.4 billion karbovanets (in 1993 prices). The last flood was on 27-28 April, 1995. In the Hust District a newly built dike was ruined between the villages of Rokosovo and Kryva. Agricultural areas were flooded, a bridge near the village Dragovo was damaged. A "Complex Programme for taking flood-preventing measures in the Transcarpathian Region for 1994-2000" has been developed with the aim to take preventing measures against floods in the territory of the region, to reduce the enormous expenditures for covering the damage to economy, caused by the elements. The Programme includes primary (1994-1995) and long-term (until 2000) measures to save the territory of the region from floods. These measures encompass both administrative actions on district and interdistrict levels, and, specifically, professional work.

Conservation measures taken: There are 3 objects of natural reserve in the suggested territory, and 9 mineral water sources. They include (see Appendix):

"Atak" natural landmark, its area is 52 ha, it is a natural monument of state level; an object located in the territory of Beregova State Forestry; it was established to protect the places of highly productive oak and ash-tree stands in the River Borzhava floodplain area.

"Borzhava" protected natural landmark. Oak and ash-tree forests of artificial origin grow there. Its area is 205 ha. The main part of the territory is a floodplain area.

"Velyky Lis" (Big Forest) natural monument of local level, its area is 1.5 ha, located in the territory of Vinogradiv State Forestry. It was established to protect the sites of ivy occurrence in the oak stands. The territory is a floodplain area.

Conservation measures proposed but not yet implemented: In the suggested territory new objects of nature protection are planned to be established.

Those are:

Environs of the village Yablunivka, Tyachiv district. It is a group of isles along the channel line of River Tisa from where the state boundary with Romania stretches to the south of the river, to the place of the confluence with River Teresva. Colonies of the mallard are located there, nestings of the little ringed plover and Chorna stork occurrence were also noted there.

Environs of the villages of Sokyrnitsa and Steblivka. There are the Boronyava lakes belonging to the fish-breeding farm, and a boggy lake in the right side floodplain area of River Tisa. *Botarus stellaris*, *Podiceps cristatus*, *Aythya nyroca*, etc. occur there.

A section of River Tisa between Hust and the village of Kryva. Forests are located there, situated just at the left bank of River Tisa. Chorna stork and bank swallow occur there.

Environs of the villages of Drotyntsi and Hetynya. There are a group of isles along the channel line of River Tisa as well as a deep between the anti-flood dikes. A colony of the little ringed plover, bank swallows, gulls, great and little Bila herons are found here.

“Trosnyk” (100 ha). The area consists of flooded forests and lakes with rare flora and fauna.

“Variyivsky Lis” (Variyivo Forest) (800 ha). There are flooded oak and ash-tree forests there with rare flora and fauna.

Current scientific research and facilities: For the last five years the region has drawn special attention of naturalists. Among the most important research projects some principal ones can be noted:

1. Structure and functional characteristics of River Tisa water ecosystems (Transcarpathian Ecocentre of Transcarpathian Regional State Administration, 1992). Performers: Institute of Hydrobiology NAS of Ukraine, Uzhgorod State University).

2. Ecological optimization of natural ecosystems management in the plain part of Transcarpathia (Ministry of Higher Education of Ukraine, 1993-1994). Performer: Uzhgorod State University.

3. Inventory of endangered plant species and plant communities of River Tisa lowland (Ministry of Higher Education of Ukraine, 1995). Performer: Uzhgorod State University.

4. Combined studies of zoocenoses of typical natural ecosystems in the Transcarpathian Plain and development of their present-day ecomanagement and protection (Ukrainian State Committee on Science and Technology, 1994-1996). Performer: Uzhgorod State University.

5. NGO's proposals on establishing a Transboundary Nature Conservation Area in the Upper Tisa Region (Regional Environmental Centre, 1995-1996). Performer: Carpathian Ecological Club, Ruthenia.

Current conservation education: Within the framework of ecological education of the inhabitants of the region, staff of the Uzhgorod State University and the Carpathian Ecological Club carried out a campaign in 1995-1996, popularising of the ideas of biodiversity conservation, during which 5 articles were published in regional newspapers in Ukrainian, Hungarian and Russian, two radio programmes were made on these materials. An international-regional conference was held in which scientific, non-governmental, administrative organizations and institutions took part. The conference was devoted to the sustainable development of Transcarpathia and, in particular, the region where the bulk of the regional agricultural production is concentrated. The proceedings of the conference have been published (“Sustainable agricultural development and biodiversity conservation” edited by V. Kricsfalussy In: »Proceedings of international-regional conference«. - Uzhgorod, Patent, 1996.- 130 p.), and the regional press gave some publications about the conference.

Another aspect of ecological education is the activity practised by the Uzhgorod club of ornithologists who, for already 5 years now, have organized summer

ornithological camps for schoolchildren in June. The theme "Birds of flooded areas of the Transcarpathian Lowland" has been included in the camp work programme, in accordance with which camp members from the main centre located in the piedmont, visit the flooded area of River Latoritsa where they study the specific composition of waterfowl and waders. In the upper Tisa areas ecological camps are also organized annually (in August) by the Transcarpathian ecological naturalist centre for youth. Young people can, there, learn about the diversity of biocenoses in the areas surrounding River Tisa, the problems of their conservation and protection. This practice has been popularised by TV, in newspapers and magazines. A booklet has been published on the methods of the ornithological camp work: A. Lugovoy, A. Gerevich: "Organization and work of school ornithological camp in Transcarpathia" Uzhgorod, 1993, 13p.

Current recreation and tourism: The picturesque plain landscapes and surface waters of rivers, lakes, artificial basins are the basic recreational resources of this region. These waters are used for swimming, water tourism (rafting, catamarans, etc.), and other sports. The main recreation centres are the environs of Chop (River Tisa), Beregova (River Borzhava), Vinogradiv (River Tisa), Hust (River Tisa, River Rika) and Tyachiv (River Tisa). However, the level of organized tourism is rather low. Tourist centre is present only in Hust, called "Nartsis", which offers one-day floating tour on rafts down River Tisa, and a bus tour "Along River Tisa".

Jurisdiction: The protected natural objects of the Carpathian Biosphere Reserve are subordinated to the Ministry of Natural Environment Protection, other protected nature objects are subordinated to the administration of forestry and to local councils. There are private and collective agricultural farms subordinated to the Regional Department of Agriculture. The suggested objects located in River Tisa mouth will be subordinated to the "Zakarpattyameliovodhosp" production association and to the local Councils of People's Deputies.

Management authority: The main administrative structures of this area are the state bodies of power:

Tyachiv District state administration - 295710, Tyachiv, Lenin Str. 22;
 Hust District state administration - 295600, Hust, Pyatdesyatiricha Zhovtnya Str. 27;
 Vinogradiv District state administration - 295540, Vinogradiv, Lenin Sq. 5;
 Beregova District state administration - 295510, Beregova, Mukachivska Str. 3;
 Uzhgorod District state administration - 294000, Uzhgorod, Fizkulturna Str.;
 Regional administration for agriculture and food production - 294000, Uzhgorod, Kotsubinskoho Str. 2 "a";
 Regional administration of forestry - 294008, Uzhgorod, Narodna Sq. 4;
 State Department of Nature Protection in Transcarpathia - 294008, Uzhgorod, Narodna Sq. 4;
 Production association "Zakarpattyameliovodhosp" - 294017, Uzhgorod, Zahorska Str. 61 "a".

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Appendix

Physical features

Place of observation	Water levels		Water level fluctuation Amplitude
	lowest	highest	
1. Tyachiv	- 54 cm 12.12.1973	694 cm 30.12.1947	748 cm
2. Hust	- 25 cm 08.08.1995	426 cm 14.05.1970	451 cm
3. Vilok	- 242 cm 11.09.1984	696 cm 14.05.1970	938 cm

Table 2. Concentrations of polluting substances in River Tisa

№	Place of sample taking	Suspended substances mg/l	Chlorides mg/l	Sulphates mg/l	Biological requirement of oxygen mg/l	Synthetic superficially active substances mg/l	Ammonia nitrogen mg/l	Nitrate nitrogen mg/l	Nitrite nitrogen mg/l	Phosphates mg/l
1	Tyachiv	3.00	35.90	21.60	2.29	0.032	0.06	2.60	0.024	-
		35.75	26.40	21.10	3.80	0.025	0.35	5.20	0.053	0.50
		25.08	26.67	31.23	2.32	0.035	0.89	3.44	0.027	0.02
2	1 km downward from Hust	2.30	25.70	18.00	1.98	0.010	-	0.625	0.030	-
		103.00	10.25	19.45	3.71	0.020	0.50	5.55	0.020	0.40
		28.70	12.35	28.80	2.80	0.011	1.33	2.175	0.006	0.066
3	Vilok	26.25	38.15	21.44	2.93	0.024	0.19	5.46	0.070	0.32
		9.90	17.09	19.92	3.23	0.011	0.25	6.30	0.045	0.41
		29.19	25.97	30.79	2.41	0.026	1.55	6.21	0.006	0.096

Table 3. Physical and chemical characteristics of principal soil types

Soil type	Depth of horizon (cm)	Humus (%)	pH KCl	Absorbed cations (mg-equiv. per 100 g soil)		Exchange acidity (mg-equiv. per 100 g soil)	
				Ca ²⁺	Mg ²⁺	H ⁺	Al ³⁺
Meadow soddy-gley	0-3	5.8	3.7	7.3	5.2	5.51	31.50
	3-13	3.6	3.7	7.0	4.8	5.34	29.79
	13-33	2.3	3.8	6.4	3.8	4.73	27.36
	33-83	1.1	3.8	5.2	3.0	4.21	29.27
Meadow soddy	0-3	4.7	4.5	7.8	4.8	5.68	31.27
	3-18	2.4	4.6	8.6	5.6	5.14	30.18
	18-88	2.1	4.8	9.0	6.1	4.98	28.12
	88-106	1.4	4.1	9.3	6.5	4.90	20.16

Noteworthy fauna

Annotated list of vertebrate fauna

Pisces

Acipenseridae

Acipenser ruthenus L.

Salmonidae

Salmo trutta morpha fario L.

S. irideus G.

Hucho hucho L.

Thymallidae

Thymallus thymallus L.

Esocidae

Esox lucius L.

Umbridae

Umbra crameri L.

Cyprinidae

Carassius carassius L.

Cyprinus carpio L.

Barbus barbus L.

Alburnus alburnus L.

B. meridionalis petenyi H.

A. bipunctatus Bloch

Gobio gobio Flem.

Scardinius erythrophthalmus L.

G. frici Vlad.

Rutilus rutilus L.

G. uranoscopus Ag.

Vimba vimba L.

Leuciscus cephalus L.

Abramis brama L.

L. idus L.

A. sapa Pall.

L. leuciscus L.

Plecotus cultratus L.

L. agassizi Heck.

Chondrostoma nasus L.

Tinca tinca L.

Aspius aspius L.

Rhodeus sericeus Pall.

Blicca bjoerkna L.

Phoxinus phoxinus L.

Misgurnidae

Cobitis taenia L.

Nemachilus barbatulus L.

C. montana Vlad.

Misgurnus fossilis

Siluridae

Silurus glanis L.

Ictaluridae

Ictalurus nebulosus Le Sueur

Percidae

Perca fluviatilis L.

Lucioperca lucioperca L.

Zingel zingel L.

Acerina cernua L.

Z. streber St.

A. schraetser L.

Cobitidae

Cottus gobio L.

C. poecilopus Heck.

Gadidae

Lota lota L.

Anguillidae

Anguilla anguilla L.

Petromyzonidae

Lampetra danfordi R.

L. fluviatilis L.

Amphibia

Salamandridae

Triturus alpestris Laur.
T. montandoni Boul.
Salamandra salamandra L.

T. cristatus Laur.
T. vulgaris L.

Discoglossidae

Bombina variegata L.

B. bombina L.

Pelobatidae

Pelobatus fuscus Laur.

Bufonidae

Bufo viridis Laur.

B. bufo L.

Hylidae

Hyla arborea L.

Ranidae

Rana ridibunda Pall.
R. arvalis Nilss.
R. temporaria L.

R. lessonae Cam.
R. dalmatina Bonop.

Reptilia

Emydidae

Emys orbicularis L.

Anguidae

Anguis fragilis L.

Lacertidae

Lacerta agilis L.
L. vivipara Jack.

L. viridis Laur.

Colubridae

Natrix natrix L.
N. tessellata La.
Coronella austriaca Laur.

Vipera berus L.
Elaphe longissima Laur.

Aves

Podiceps griseigena Bodd.
P. cristatus L.
Ardea cinerea L.
Egretta alba L.
Nycticorax nycticorax L.
Ixobrychus minutus L.
Ciconia ciconia L.
C. nigra L.
Platalea leucorodia L.
Cygnus olor Gm.
Anser anser L.
A. albifrons Scop.
A. fabalis Lath.
Anas platyrhynchos L.
A. crecca L.
A. acuta L.

Athene noctua Scop.
Alcedo atthis L.
Upupa epops L.
Picus viridis L.
Dendrocopos major L.
D. minor L.
Riparia riparia L.
Hirundo rustica L.
Delichon urbica L.
Oriolus oriolus L.
Garrulus glandarius L.
Pica pica L.
Corvus corax L.
C. corone cornix L.
C. frugilegus L.
C. monedula L.

A. querquedula L.
Aythia ferina Pall.
A. nyroca Gould.
A. fuligula L.
Bucephala clangula L.
Mergus merganser L.
Aquila pomarina Brehm
Hieraeetus pennatus Gm.
Circus aeruginosus L.
Milvus migrans L.
Buteo buteo L.
B. lagopus Pontopp.
Accipiter gentilis L.
A. nisus L.
Falco tinnunculus L.
F. subbuteo L.
Perdix perdix L.
Coturnix coturnix L.
Phasianus colchicus L.
Grus grus L.
Crex crex L.
Fulica atra L.
Gallinula chloropus L.
Charadrius dubius Scop.
Vanellus vanellus L.
Tringa ochropus L.
T. glareola L.
T. nebularia Gunn.
T. erythropus Pall.
T. totanus L.
Calidris alpina L.
Scolopax rusticola L.
Larus canus L.
L. argentatus Pontopp.
L. ridibundus L.
Chlidonias nigra L.
Sterna hirundo L.
S. albifrons Pall.
Columba palumbus L.
Streptopelia turtur L.
S. decaocto Frivald.
Cuculus canorus L.
Asio otus L.
Remiz pendulinus L.
Parus major L.
P. coeruleus L.
P. atricapillus L.
Sitta europaea L.
Cinclus cinclus L.
Troglodytes troglodytes L.
Saxicola torquata L.
Phoenicurus ochruros Gm.
Luscinus luscinus L.
L. megarhynchos Brehm
Turdus iliacus L.
T. viscivorus L.
T. pilaris L.
T. merula L.
Phylloscopus collybita Vieill.
Ph. sibilatrix Bechst.
Acrocephalus scirpaceus Herm.
A. arundinaceus L.
A. palustris Bechst.
A. schoenobaenus L.
Locustella fluviatilis Wolf.
Sylvia borin Bodd.
S. atricapilla L.
S. communis Lath.
Regulus regulus L.
Prunella modularis L.
Motacilla cinerea Tunst.
M. flava L.
M. alba L.
Lanius collurio L.
L. excubitor L.
Sturnus vulgaris L.
Emberiza citrinella L.
E. schoenichus L.
Passer domesticus L.
P. montanus L.
Fringilla coelebs L.
F. montifringilla L.
Cannabina cannabina L.
Carduelis carduelis L.
Carduelis chloris L.
Pyrrhula pyrrhula L.

Mammalia
 Erinaceidae

Talpidae

Erinaceus europeus L.
Talpa europea L.

Soricidae	<i>Sorex araneus</i> L. <i>S. minutus</i> L. <i>S. alpinus</i> Schin.	<i>Neomys fodiens</i> Pena <i>N. anomalus</i> Cab. <i>Crocidura suaveolens</i> Pall. <i>C. leucodon</i> Herm.
Rhinolophidae	<i>Rhinolophus ferrumequinum</i> L.	<i>Rh. hipposideros</i> Bechs
Vespertilionidae	<i>Myotis blythi</i> L. <i>M. myotis</i> Borkh. <i>M. daubentoni</i> Kuhl <i>Pipistrellus pipistrellus</i> Schreb.	<i>Nyctalus noctula</i> Sh. <i>Vespertilio serotinus</i> Schreb. <i>Plecotus auritus</i> L. <i>P. austriacus</i> Fish
Lepidae	<i>Lepus europeus</i> Pall.	
Sciuridae	<i>Sciurus vulgaris</i> L.	
Gliridae	<i>Glis glis</i> L. <i>Pryomys nitedula</i> Pall.	<i>Muscardinus avellanarius</i> L.
Muridae	<i>Apodemus agrarius</i> Pall. <i>A. sylvaticus</i> L. <i>A. flavicollis</i> Melch.	<i>Mus musculus</i> L. <i>Micromys minutus</i> Pall. <i>Rattus norvegicus</i> Berk.
Cricetidae	<i>Cricetus cricetus</i> L. <i>Arvicola terrestris</i> L.	<i>Ondatra zibethica</i> L. <i>Microtus arvalis</i> Pall.
Canidae	<i>Canis lupus</i> L.	<i>Vulpes vulpes</i> L.
Mustelidae	<i>Mustela nivalis</i> L. <i>Martes martes</i> L. <i>Meles meles</i> L.	<i>Mustela lutreola</i> L. <i>Lutra lutra</i> L.
Felidae	<i>Felis sylvestris</i> L.	
Artiodactyla	<i>Sus scrofa</i> L. <i>Cervus elaphus</i> L.	<i>Capreolus capreolus</i> L.

Conservation measures

Characteristics of existing natural reserve objects

1) The "Atak" reserve is a botanical natural monument of state level. Its total area is 52 ha. It was established in accordance with the decision by the Executive Committee at the Regional Council of People's Deputies, on 16 November 1969. Situated on a conventional island between the rivers Velyka Borzhava and Mala Borzhava, it is virtually a remaining section of lowland oakeries. The yearly aggcounciltions with fertile brown soil contribute to the formation of productive mixed groves of the nitratophilous type. Fresh, moist hornbeam groves, moist and wet ash-tree groves and elm groves are common there. In the undergrowth there is hazel, European euonymus, water elder, Tatarian maple, English and single-seed hawthorn, alder buckthorn. Grass cover is represented mainly by the megatrophic and hydrophylous species. Ivy is common everywhere in this place, forming continuous thickets. The main value here is the natural occurrence of the narrow-leaved ash in the ash grove communities. This is a mediterranean species which rarely occurs in the plains of Transcarpathia.

2) The "Borzhava" reserve is of local importance. Its total area is 205 ha. It was established in accordance with the decision of the Executive Committee at the Regional Council of People's Deputies, reg. # 270, 18 October 1983. The reserve is situated along River Borzhava and consists of planted oak stands with admixtures of the narrow-leaved ash, aged 120-140 years. In the grass cover ramson and other rare plant species grow. The wide distribution of the ivy is characteristic of this place. The main value here are the planted stands which are equal to natural woods and are of great importance for seed selection.

Current scientific research and facilities

The Upper Tisa Project

1993

First draft

The goal is to ecologically optimise the natural ecosystem management in the lowlands of Transcarpathia, aiming at establishing the "Upper Tisa" International Park.

The project has been backed by the:

EEB - European Environmental Bureau of the European Community of Central and Eastern Europe

WWF - World Wild Fund for Nature

REC - Regional Environmental Centre for Central and Eastern Europe

CEE WEB - Working Group for Enhancement of Biodiversity for Central and Eastern Europe

EPCE - Environmental Partnership for Central Europe

ECOLOGICAL BRICKS - Initiative for Common House of Europe
FNNPE - Federation of Nature and National Parks of Europe
DNR - Deutscher Naturschutzring Bundesverband für Umweltschutz (Germany)
VERONICA - Ecological Centre SOP (Czech Republik)
IEC - Independent Ecological Centre (Hungary)
REFLEX - Environment Protection Society (Hungary)
SZOPK - Slovak Union of Nature and Landscape Protectors (Slovakia)
TISZA KLUB - for Environment and Netware (Hungary)

1993-1995

Fostering international co-operation, developing the joint Upper Tisa project with Hungarian, Slovak and Roumanian NGOs

The project becomes member of the International Carpathian Bridge (ICB), the association of NGOs of the Carpathian Euroregion

1995-1996

Second draft

NGOs proposals were released on establishing a Transboundary Nature Conservation Area in the Upper Tisa Region, in Hungarian-Romanian-Slovak-Ukrainian co-operation (Regional Environmental Center, Earmarked Grant Program).

Presentations of the Project

International conference: The East Carpathians' Fauna: its present state and prospects of preservation (Uzhgorod, Ukraine: September, 1993).

Deutscher Naturshutzring Seminar (Galati, Romania: October, 1993).

A Magyar Tudományos Akadémia Szabolcs-Szatmár-Bereg Megyei Tudományos Testületének ülése (Nyíregyháza, Hungary, November, 1994).

1st International-regional conference on environmental development (Nyíregyháza, Hungary, April, 1996).

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Kricsfalussy V. - Melika G.: About the necessity of establishing International Park "Upper Tisza" in the Central-East Europe- The 41th Working Session of the Special Committee of National Parks and Protected Areas of IUCN: Abstracts.- Beijing (China), 1993, p. 78. [In English].

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