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Specific File

**Construction of a Motorway in the Gorge of Kresna
- Corridor No. 4 of transport: EU PHARE Project –
Connection Bulgaria - Greece**
(Motorway E79 : Sofia-Kulata)

Report of the on-the-spot appraisal
(30 May – 1st June 2002)

by

Mr Guy Berthoud, ECONAT SA, Yverdon-Les-Bains, Sitzerland (e-mail : econat@bluewin.ch)

Secretariat Memorandum
Prepared by
The Directorate of Culture and Cultural and Natural Heritage

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Expertise concerning the Construction of a Motorway in the Gorge of Kresna Corridor No. 4 of transport: Connection Bulgaria - Greece –

1. Introduction

1.1 Justification of the expertise

In September 2001, the Standing Committee of the Convention of Bern was seized by a complaint deposited by a group of NGOs Bulgarian relating to the construction of a motorway through a site of the Network EMERALD, the Gorge of Kresna (Bulgaria), which is likely to be affected by the project in a prejudicial way. Rather than opening a file of procedure for complaint against the government, the committee considered it preferable to answer the proposal of the Bulgarian authorities to organize a visit on the spot and to try a conciliation between the parts. This expert report makes the synthesis of the information collected at the time of this visit and present of the solutions to try to solve the problem.

Summary of the situation

- In 1997 the investigations for the construction of a motorway in the south of Western Bulgaria begins. It is about the corridor n°4 of transport. The initial path entirely crosses the Gorge of Kresna - sector of exceptional natural value known as a future site selected by the " CORINE-BIOTOPE/NATURA 2000 " program.
- During the period 1998-1999, the General Administration of Roads (GRA) prepares several reports/ratios of environmental impact studies (EIA) for the project of motorway, which will be successively rejected by the Ministry of the Environment and Waters (MIAULER).
- Between 1999 and the 2001 the Ministry of Environment requests the Ministry for Regional Development and General Administration of Roads to provide several proposal for the realization of realistic alternative routes apart from the gorge.
- The conceptual study of the motorway is registered in the financial memoranda 98 and 99 of the program PHARE of the EU.
- In April a 2000 contract is signed with Italian company SPEA Ingenerie Europea to carry out the feasibility study of the project.
- The pilot project of application of the Network EMERALD in Bulgaria, proposes 7 priority sites of "CORINE-BIOTOPE" zones of special interest for conservation (ZISC) potential. The gorge of Kresna is not included in these seven sites but is registered as a potential "CORINE-BIOTOPE" site.
- In November the 2000 outline of EIA report prepared by SPEA is rejected by the Ministry of the Environment and Waters because of significant omissions.
- Until May 2001 the evaluation of alternative paths avoiding the gorge is not part of the mandate of the SPEA.
- In November 2001, the contractors devoted a few days to the study of solutions of replacement. A documentation of 3 maps and 4 pages of text is prepared by the SPEA.

- In October 2001 the ONGs¹ submit a proposal for the designation of the gorge of Kresna as a protected area in conformity with the concept of designation of a protected sector around the gorge, prepared by the Ministry of the Environment in spring 2001.
- In December 2001 an EIA report of the project is deposited with the MIAULER. The ministry immediately files proceedings also the procedure of classification of the protected site is not finished.
- The public consultation, included in the procedure of EIA, is carried out between March the 3 and 5 2002 with a preliminary distribution of documentation considered to be insufficient and with a weak participation of the local communities that did not allow any feedback about the project.
- The complaint of the ONGs in September 2001, arguing the non respect of the Convention of Bern, follows several requests of collaboration with the Ministry for transport. It asks for an expertise from the Standing Committee of the Commission of Bern in Strasbourg.
- A three day visit of the site is organized by the Bulgarian Ministry of Environment between May 30 and June 1 2002 to present the problems to the secretariat of the Commission and to his experts.

1.2 Course of the expertise

The expertise consisted of several stages.

- **Presentation of the technical project by the company SPEA Ingeneria Europea, including:**
 - The process of the study aiming from the beginning to an improvement of the existing road.
 - The search for alternatives allowing to better satisfy the requirements of a motorway and to avoid the probable impacts on the protected site (basic project + 4 alternatives).
 - Argumentation aiming at the selection of an acceptable alternative.
 - Stages of presentation of the project to the village authorities and the ONGs.

The SPEA placed at the disposal of the experts the following documents:

- Totalities of the technical plans (plan of general situation, plans of detail to the 1/10' 000 with the longitudinal profiles of the 4 alternatives analyzed).
- The file of the preliminary impact study with the complement on fauna and flora requested by the Department of Environment.

- **Presentation of the respective opinions of the ministries in charge of the file.**

The Ministry for the regional Development and public transport recalled:

- The context of the national development of road traffic and in particular of the carriage of goods by trucks through Europe.
- The stakes of the corridors n° 4 through Bulgaria which, in the event of non-realization, will be moved towards Macedonia.

The Ministry of the Environment and the Waters recalled:

- The need for indicating a sufficient number of protected surfaces to satisfy the request for protection of the habitats and species of European importance.
- The fact that Bulgaria is co-signatory of the Convention of Bern and the installation of the "EMERALD Network ", accepted by the whole of the European Ministers for the Environment.

¹ Grouping of associations following : Balkani Wildlife Society, Center for Environmental Information and Education, ECO-Club 2000 and Za Zemiata.

- The fact that the “CORINE-BIOTOPE” site of the gorge of Kresna constitutes a major element of the application of the EMERALD Network for Bulgaria

- **Visit of the site**

A visit on the field was done while following the bottom of the gorge by the existing road. On each significant locations, explanations were provided:

- By the representative of Company SPEA about the technical aspects of construction,
- By the person in charge of the environmental impact study,
- By the representatives of the Ministry of Environment and Waters,
- By the representatives of the Ministry for Transport,
- By the representatives of the ONGs about the historical and environmental heritage interests of the sites crossed.

- **Consultation of the inhabitants**

A meeting with the representatives of the communal authorities and inhabitants of the involved communities was organized in the administrative buildings of the town of Kresna.

After a short presentation of the interests involved in the realization of a new axis of transport in the area of the gorge of Kresna, the participants were able to present their expectations and concerns regarding the project and to ask questions to the participating delegation.

- **Collections of complementary information**

Additional data concerning the regional vegetation, the situation and the status of the existing protected sites were collected from the Ministry of Environment.

- **Analysis of the report of impact study preliminary**

Study of the file with drafting of remarks on the content to the attention of the Ministry of Environment.

- **Checking of the alternatives**

Rapid control of alternative paths analyzed with the support of the Laboratory of Transportation of the Federal Polytechnic School of Lausanne (LAVOC-EPFL).

- **Drafting of the expert report**

According to a calendar:

- Handing-over of the expert report, end of July 2002.
- Presentation of the report at the Commission of the Convention of Bern.

2. Analyze regional context

2.1 Geographical characteristics of the site

The motorway corridor n°4 connects Istanbul to Thessalonique while passing by Sofia. It crosses the chain of Rhodopes-Rila-Pirin that delimits the border between the south of Bulgaria and Greece, by borrowing the gorge of Kresna in which runs the Struma River (see chart 1). The gorge forms the only natural passage of low altitude to cross the mountainous chains of Rila-Pirin and Rhodopes in direction of the South.

This role of obliged passage has induced for several centuries the construction of tracks, a road, then of a railway in the content of the gorge.

From the point of view of the vegetation, the mountainous chain of Rila-Pirin and Rhodopes constitutes a phytogeographical limit between the sub Mediterranean vegetation present on the

southern slope and a thermomemoral vegetation of Balkan oak groves developed on the northern slope. They are separate in altitude by small alpine islands of ordinary mid-mountain beech forests.

The presence of an important river crossing the chain of mountains according in a North-South direction constitutes obligatorily an axis of natural exchanges for the animal populations as well as for the vegetation. Indeed, the ecological networks are organized there according to the distribution of precipitations, to altitude and to the presence of the natural corridors such as the mountains and the large rivers.

Thus on an international scale, the gorge of Kresna constitutes an axis of migration of first importance for the migratory birds and insects.

At a regional scale the gorge of Kresna also seems a major point of contact between the various types of vegetation and animal populations.

The archaeological inheritance, which testifies of an old and continuous frequentation of the gorge by men, seems particularly rich for the same reasons there.

From the geological point of view the gorge is located on an important tectonic fault system. The very active seismic activity of the area is one of strongest of the whole of Balkans.

Chart 1: General situation of the site of the gorge of Kresna

3. Knowledge of the existing situation

3.1 Zone concerned with the project

The zone of influence of a project usually analyzed in an impact study is defined starting from the various geomorphologic or phytosociological entities likely to be influenced significantly by the project. In a preliminary study aiming at the search for an acceptable alternative, it is necessary to consider information in a area sufficiently extended to satisfy the analysis of any alternative, even located at several kilometers from the primary axis. In this manner one avoids being in the situation of this particular project, where the alternatives suggested by the opponents are located far from the initial corridor of the primary path going through the gorge and cannot be quickly analyzed by default of collected data.

In the particular case, the zone of study should be extended to the two mountainous sides located at the east and in the west of the gorge, that is to say by a width of approximately 15 km. In the same way the access points to the gorge must be also taken into account (total length of approximately 30 km). This zone of reference is relatively easy to analyze, for general data are available and can be refined if necessary by the interpretation of satellite images or air photographs.

The charts presented in the following chapters are cartographic extracts of documents published in the national scale.

3.2 Geomorphologic situation.

The gorge was formed on a fault system crossed with tectonic collapses that created a complex of horsts and grabens.

The Struma River uses this fault system to run out through the mountainous chain, whereas the side valleys borrow faults perpendicular.

The transverse V profile that characterizes the gorge is created by side accumulations of materials of collapse and colluviums coming from the granitic edges of the faults. The slopes comprise some rock exposures, but are characterized especially by the presence of rocky outcrops that define the sides of the valley.

The bottom of the thalweg of the gorge, completely occupied by the river, barely allows the passage of the road and the railway on an embankment, located at the feet of the slope, partially respecting the general balance of the slopes.

The photographic documents opposite (Fig.1 and 2) provide an image characteristic of the crossed landscape and space available for the establishment of a motorway.

Figure 1: General sight of the gorge of Kresna

Figure 2: Establishment of the infrastructures of transport: The old road follows the right bank of the river and the railway, built on the hillside, cuts the important meanders by tunnels

3.3 Vegetation

The vegetation of the zone of reference can be known by the reading of the chart of the vegetation of Bulgaria established with the 1/600'000 (BONDEV, 1991²) and by the descriptions of the principal vegetation units published in the very complete work on the biodiversity of the gorge of Kresna (BERON, 2001³).

An extract of the chart of vegetation printed to the 1/50' 000 and accompanied by the legend of the units considered provides a coarse vision of the distribution of the phytocoenoses in the zone of study (chart 2)⁴.

The principal entities of vegetation present are primarily attached to sub Mediterranean xero-mesothermophilous oak groves including original associations from the Balkans.

The designation of a “CORINE-BIOTOPE” site in the gorge is based on the presence of 4 types of habitats included in appendix 1 of the Directives of the European Council 92/43/EEC on the conservation of the habitats and wild fauna:

- **Endemic Mediterranean juniper forests** (unit 42.A2 à 42.A5 ; subtype : Greek juniper forests 42.A43, Juniperetum excelsae), as priority habitat.
- **Mediterranean Forests of pine with the endemic Black Pine** (units 42.61 à 42.66 ; subtype : 42.66 Pines of Pallas Forest), as priority habitat.
- **Formation of Genevriers** (units 32.131 à 32.135 ; subtype Juniperetum and matorrals (arborescents) of Juniperetum foetissima), as habitat of Community-wide interest.
- **Forests of Eastern Plane trees** (unit 44.7, helleno-balkan riverine forests, subtype 44.711)

² **Référence :** BONDEV Yvan. 1991. The vegetation of Bulgaria. Map 1 :600'000 with explanatory text. (Bulg. : Abstract in English and Russian). St. Kliment Ohridski University Press, Sofia, 184 p.

³ **Référence :** BERON Petar. 2001. Biodiversity of Kresna Gorge (SW Bulgaria). Ed. National Museum of Natural History (Sofia), Institut of Zoology, Bulgarian Academy of Sciences, Sofia . 350 p.

⁴ **Notice on the extract of the chart of vegetation :** The techniques of cartography used to establish a national chart on the scale of the 1/600' 000 require a serious adaptation and checking of the limits of the entities of vegetation presented using air photographs, for example, before being used in the impact study. The extract of chart is presented as an indication to know the distribution of the interesting mediums.

The units present in the area of the gorge constitute the most important surfaces of Bulgaria. Moreover statements of vegetation appearing in the file of EIA indicate the presence of many endemic species⁵ and a remarkably high biodiversity.

Surfaces suitable to be classified as priority habitats, according to appendix 1, are displayed as an indication on the survey of the zone of study (chart 2). The data have been taken from the national chart of vegetation. These data still have to be supplemented by the identification of complementary original habitats, often secondary but that still may contain elements of the original vegetation likely to develop again.

Chart 2: Extract of the chart of vegetation of BONDEV, 1991

⁵ See chapter 3.8 of preliminary EIA report SPEA

3.4 Fauna

The regional fauna is known for its diversity and its originalities. Relatively exhaustive lists are provided by preliminary EIA report and the publication on the biodiversity of the gorge of Kresna (BERON, 2001).

Without entering in detail, the remarkable points of the various faunal groups are:

Five species of reptiles included in appendix 2 of the Directive " Habitats " of the Convention of Bern, reproduce in the sector : *Testudo Hermannii*, *Testudo graeca*, *Emys orbicularis*, *Elaphe quatuorlineata*, and *Elaphe situla*.

The surface of the " CORINE-BIOTOPE " site of the gorge of Kresna offers the following advantages:

- It is the most important area for the conservation of the two species of Testudo, with the density of the population and the habitats well preserved compared to other parts of the country.
- It is one of the 5 most important biotopes at the national level for the Leopard snake (*E. situla*) and for the Western four-lined snake (*E. quatuorlineata*).

A high reptiles diversity, with 21 species, and often-important populations (BERON, 2001).

Two species of Amphibians included in appendix 2 of the habitats are found here: *Triturus cristatus* and *Bombina variegata* among 10 species related generally to the alluvial zones of the river.

Among the 123 species of nesting bird in the gorge of Kresna, 23 are included in appendix I of the Directive of the Council 79/409/EEC on the conservation of wild birds, 86 appear in appendix 2 of the convention of Bern, and 106 are strictly protected by the Bulgarian legislation of nature conservancy. The gorge of Kresna is a particularly important area for the reproduction of the rupicolous species, but also for the wintering and the migration of these species.

Moreover the gorge forms part of a resting area of European importance for the migratory birds (Network VIA ARISTOTELIS), offering a very narrow corridor of migration to the birds migrating above the Balkan Peninsula between central and north Europe.

Among the mammals, the gorge provides habitats for 17 species of bats (more than half of all European population of bats. There is no other sector in Bulgaria, and even in the Balkans, where such a small sector offers such a high diversity of bats), of which 8 species appear in appendix 2 of the directive of habitats and the convention of Bern: *Rhinolophus Euryale*, *Rhinolophus ferrumequinum*, *Rhinolophus hipposideros*, *Barbastella barbastellus*, *Miniopterus schreibersi*, *Myotis bechsteinii*, *Myotis blythi*, and *Myotis emarginatus*. The particular importance of the conservation is based on the presence of several cavities that shelter large reproduction colonies of *Rhinolophus ferrumequinum*, *Myotis emarginatus*⁶ and of *Hypsugo savii*.

The gorge of Kresna constitutes a privileged site for the bats because of the existence of a singular microclimate, of a morphology very favorable for hunting, with the contiguous presence of forests and xeric meadows rich in insects, and with a river for the watering.

The other species of mammals protected in the sector include the brown bear (*Ursus arctos*) and the otter (*Lutra lutra*).

There is a need to point out, concerning the problems of space management and safety on a motorway, that the area is crossed by important populations of large mammals, notably with the ungulates: the wild boar, the red stag, the roe deer and the chamois, as well as the wolf, the lynx and the gilded jackal which usually cross the gorge during their displacements of dispersion.

⁶ For *Rhinolophus ferrumequinum* and *Myotis emarginatus*, it is the only sector known in the whole valley of the river of Struma where these bats reproduce.

The fish of the Struma river also are remarkable. According to STEFANOV (2001)⁷ 13 species belonging to 5 families are known in the gorge. Three species: *Vimba melanops* (Heckel 18379, *Chodrostama vardarensis* (Kraman 1828) and *Barbatula barreschi* (Drensky 1928), are endemic Balkan ones and 4 others: *Aspius aspius* L., *Alburnoides bipunctatus* (Bloch 1782), *Gobio gobio* L. et *Silurus glanis* L. are registered in the appendices of the Convention of Bern and in the Directive Habitats.

Among the invertebrates, the gorge of Kresna offers a remarkable original diversity, including 18 Balkan endemic species and one of Bulgarian importance. As a whole the site of the gorge arises with a diversity of threatened invertebrate species, protected and rare, among the highest of the country.

The presence of animal species of Community-wide interest was only partially taken into account in the EIA, because only the core area for these populations were studied. After discussion with the specialists met at the time of the visit of the site, a coarse delimitation of the known areas of frequentation has been possible.

These areas of partial extension of priority fauna are summarily delimited on the chart of situation of the sensitive habitats (chart 3). Priority areas for faunal diversity are primarily present within and on the sides of the gorge with important zones of extension in the alluvial plains located upstream and downstream from the gorge.

3.5 Infrastructures of transport

The existing road built at the bottom of the gorge constitutes the single North-South way connecting Sofia to Greece (Thessalonique). It is an old traditional road that has been gradually widened and equipped with structures during centuries.

The current road was recently upgraded⁸ with the gauge standard of 7,50 m and equipped with gutters and fences safety, thanks to the financings of the program PHARE of the European Community.

The traffic of vehicles remains mixed, including agricultural traffic (tanks with horses and cart with asses), two-wheeled vehicles (motorbikes and bicycles) as well as passenger vehicles and trucks. The traffic specifications are the following ones for year 2000:

Chart 3: Natural reserves and habitats protected

⁷ **Référence** : STAFANOV Tihomir. (In BERON 2001). Ichthyofauna of Struma River in the part between Kocherinovo railway station and the mouth of Strumeshnica River.

⁸ Pose safety fences in June 2002

| | | | |
|-------------------------------|-----------------------|------|--|
| Traffic daily: | 8'500 vehicles | | |
| Components of traffic: | vehicles light | 44 % | |
| | Heavy lorries | 36 % | |
| | Vehicles agricultural | 11 % | |
| | Vehicles 2 wheels | 9 % | |
| Average speed of circulation: | 67,5 km/h | | |

The railway built around 1950 is established primarily out of left bank, on the hillside. It includes a series of tunnels cutting the major meanders of the river. The frequency of the trains is of approximately 20 convoys per day.

Some minor roads go up the side valleys and give access to particular villages in which the practice of winter sports developed well lately.

3.6 Villages and isolated dwellings

The agglomerations are absent from the gorge itself. The towns of Krupnick and Kresna are located at the two ends of the gorge. Some isolated constructions exist near the exploitable agricultural areas.

A touristic restaurant including a rest area settled within semi-course of the gorge (inside a meander of the river. It is the mandatory starting point for all leisure activities (fishing, canoes, VTT, hikes).

The town of Kresna located at the southern outlet of the gorge, opens on a vast alluvial plain largely exploited by agriculture. It is dominated by a high, little-eroded, subvertical, cliff, made of fluvio-glacial deposits, which constitutes a remarkable geotope (protected site).

3.7 Transformation of the landscape

The construction of the road inside of the gorge certainly allowed a systematic exploitation of all accessible trees. However the strong slopes subjected to the constant crumbling of rocks preserved their well-adapted original vegetation. A secondary vegetation of bushes and xeric meadows locally occupies the steps or the weak slopes. They are old grazing grounds or meadows of mowing currently abandoned.

The important transformations are related to the construction of the road and the railway. On the Mountain side the two infrastructures required the construction of retaining walls with important stiffening of the slopes.

The construction of the railway required the correction the slopes on several tens of meters in height. This scar is still visible 50 years after, since the vegetation did not reinstall itself there.

The construction of the road also required to built walls on the bank of the river in many places.

3.8 Remarkable protected sites

The habitats priority for the natural inheritance are known by the existence of three protected sectors located on both sides of the gorge. It is about:

- 2 reserves of Tissata
- The reserve of Moravska

These three protected sectors are included in a larger surface proposed as "CORINE-BIOTOPE" site according to criteria's established to create the Network EMERALD on a European scale. This new protected area, centered on the gorge of Kresna was defined for the global protection of the

habitats and the species of fauna and flora selected as having a dominating Community-wide interest to preserve biological and landscape diversity in Europe.

The superposition of the units of vegetation, the perimeters of habitats of Community-wide interest and of the protected surfaces underlines well the logic of setting under protection the sites of the gorge of Kresna: From isolated surfaces identified for their original and rare vegetation, one sought to gather complementary and nearby areas, indicated as site of Community-wide interest, that could be used as buffer zones.

The presence of animal species appearing in the appendices of the Convention of Bern or in the Directive Habitats is more difficult to use as an argument. The lists of species established by various specialists and published in the work in synthesis on the biodiversity of the gorge (BERON, 2001) provide a very complete base of work to attest of an exceptional biodiversity on a European scale. Unfortunately they do not lead to a precise definition on a map of the localization of the habitats with high biodiversity or simply usable as zones of extension for the priority species. That would have been very useful within the framework of the motorway project. Nevertheless the visit on the site and the explanations provided by the specialists attest that the whole of the gorge as well as the exit and surrounding areas appear remarkable and worthy of protection.

A first approach makes it possible to explain this exceptional specific diversity, comprising many Mediterranean elements. Indeed the gorge crossing the mountains constitutes a zone of climatic transition between the northern slope and the southern slope of the chain from the Rhodopes with a possible penetration from Mediterranean elements by the bottom of the gorge whose totality of the 18 km is located below 400 m altitude (chart 5). This altitudinal limit, combined with a particularly favorable microclimate (the hottest zone of Bulgaria), explains the presence of the majority of the species and of important populations.

One can conclude from all this that the surface of the "CORINE-BIOTOPE" site of Kresna, as indicated on the charts of the project of motorway, covers in fact only one minimal surface compared to the really useful surface of a ZISC.

3.9 Ecological network in the landscape

A regional ecological network makes it possible to identify in the landscape sets of habitats favorable to the development of groups of specialized species by distinguishing in particular continuums of vital areas whose components are core areas, areas of development, complementary areas and corridors of connection. Synthetically one at least distinguishes 4 or 5 types of continua (for example: river, forest, meadow dry, rock, agricultural, continuum etc.) with possibilities of altitudinal cuttings or by climatic zones.

In the zone of study, a summary analysis makes it possible to highlight the following elements:

- At the supra-regional scale, the North-South axis of the gorge with the presence of the river constitutes a corridor of ideal natural displacement for the whole of the migrating fauna the moving by air, that is to say primarily the birds, the bats and the insects.
- A regional and local scale, the various elements of the ecological network consist of the following elements:
 - A river continuum (The Struma River and its affluents), practically intact (still little arranged and slightly polluted) developing important riparian forests and alluvial zones, even in the gorge.
 - A xero- and mesothermophilous forest continuum without interruption, located on the side of the gorge and being spread out largely over the southern side of the chain of Rhodopes.
 - An important rock continuum, morphologically very varied, also uninterrupted in the gorge.
 - A forest meso-hygrothermophilous continuum, largely opened by extensive pastures, strongly developed according to a East-West axis, and occupying major the part of the chains of Pirin and Maleshevska, whose gorge of Struma constitutes a zone of transition still passable.
 - A xero-thermophilous meadow continuum slightly discontinuous related on the rock exposures and the falls.

All these networks cross or are adjacent to each other in the gorge with their flows of specialized species (chart 4). Moreover the vicinity of complementary ecosystems is essential to the survival of many species. Thus the presence of the river and its affluents adjacent to the xeric biotopes conditions the survival of thermopiles species and creates daily movements between the water points and the hunting grounds (reptiles, batrachians, birds, bats and other mammals).

These simple facts largely explain the importance of the existing ecological challenge in the whole of the gorge, of which the protected zones constitute only core areas, included in a complex landscape system.

Chart 4: Elements of the regional ecological network

The concept of ecological network⁹ is still little known and by this fact was not taken into account neither in the designation of the ZISC, nor by the preliminary EIA of the motorway project. It would have made possible to better determine the patrimonial interests existing in the gorge of Kresna.

4. Problems of the development of a road with strong traffic in the Gorge

4.1 Influences

The current road (E79) has just been improved to allow a better safety and to increase the fluidity of the traffic. On the most important part of the gorge, the construction of the road requires, already in the current situation, adjustments for the stabilization of the accesses of the roadway, either by pavement of the riverbanks, or by walls of support for the unstable slopes of the gorge. A widening of the way by 10 or 20 m, conform to the assumption of a re-use of the current road or the construction of a new roadway system, according to the gauge adopted to construct a road with strong traffic, would increase considerably the impact on the site. Indeed, the construction of the motorway would require:

- important retaining walls or installation of new ripraps on the riverbanks,
- cutting with explosives of the rock exposures with the installation of protection nets, or,
- correction of the slopes of landslides stabilized on important heights, exceeding several tens of meters of height, according to the ground profile.

The final influence of the improved roadway system, including the adjustments of access and stabilization of the verges will increase at least by a factor two the influence of the traffic lane.

- Indeed the transformation of the existing road into an expressway with strong traffic will require the implementation of related installations such as : The creation of surface water collectors organized in technical basins for the storage of surface waters and the de-oilers allowing to retain hydrocarbons or accidental discharges of toxic products.
- The construction of separate ways of at least 6m (2 times 3 m) for local traffic (horses, carriages, tractors, bicycles, etc.)
- Connections or re-establishments of the transverse roadway system.
- Sufficient supply and lay bys for the heavy lorries and the tourist vehicles.

All these influences will be necessarily created to the cost of the significant and very limited biotopes which constitute the river banks and the wooded settlements of the strong slopes.

The construction of a motorway in an exclusive right of way, inside or outside the gorge, requires the construction of important works such as viaducts, bridges, tunnels and distinct glazes. These works, although of limited influence in the landscape, will have very important influences of building site higher than 2 or 3 times the influence of the finished work (tracks of access, plan of building site,

⁹ Among the principles applicable to the sites of nature conservation pursuant to the international instruments at the European level, one finds in particular the principles guiding of the " Pan European Ecological Network (NEP)" which rises from the initialization of the Pan European Strategy on biological and landscape Diversity. The NEP is based in particular on NATURA 2000, the national Network EMERALD and ecological networks (to be defined). The elements of these networks are made up of at least core areas, of areas of restoration, buffer zones and biological corridors. Many instruments of landscape analysis recognize the importance of the interconnection between the sites, but none has legal criteria defining specifically the international recognition of the passageways, the roads of migration and other connections that are vital for the species or the habitats.

However the practice of the environmental evaluation within the framework in particular of the EIA of motorway projects must imperatively be concerned with the biological operation of all the sensitive natural habitats to avoid creating new cuts and reinforcing the landscape bulk-heading at the international and even the regional levels. The goal of the EIA is to identify and evaluate all the possible environmental incidences of a project on the basis of current scientific knowledge and not only on the legal bases. These problems are particularly important to take into account in the case of "CORINE-BIOTOPE " sites or the future ZISC since the goal of the designation of these sites is to register them in the Pan European Ecological Network which is by definition an inter-connected system of priority habitats.

discharges and storage of materials of earthwork, that is to say an influence from 50 to 100 m for a new roadway system from 25 to 30 m).

The construction of tunnels also poses many problems for the environment:

- Volumes of excavated materials are important and involve the creation of consequent points of delivery.
- The galleries of the tunnels cause the appearance of drainage of considerable underground water often creating modifications of the surface vegetation.
- The evacuation of the stain air contained in the tunnels creates points of concentration of pollution at the exits of the tunnels or chimneys.
- The consumption of energy for lighting, ventilation and safety is enormous as soon as the lengths of the tubes exceed 100 m.
- The tunnels are regularly washed to remove dust that settles there, which requires the evacuation of large quantity of polluted water.

Under these conditions the impacts on the crossed habitats remain very important even if the natural environment is respected.

4.2 Disturbances

The harmful effects generated by the construction or the exploitation of the roadway system after realization are partially analyzed in the report of the preliminary EIA.

Two assumptions of traffic are proposed by comparison with the existing situation:

- Currently (year 2000) the traffic in the gorge is of 8342 vhc/jour whose 36 % of trucks and an average speed of 67,5 km/h.
- A low scenario for year 2020 envisages an affluence of 17' 200 vhc/jour whose 28 % of trucks and an average speed of 90 km/h.
- A scenario raised for year 2020 envisages an affluence of 24' 000 vhc/jour whose 26 % of trucks and an average speed of 90 km/h.

These assumptions are not clearly justified by a model of distribution of the traffic on a national scale. One can in this case consider very well that the heavy traffic of transit between Turkey and Greece will rely very largely on this new axis, convenient and short, thus involving a traffic definitely higher than that envisaged.

The models of dispersion of the noise and pollution by gases and dust were established starting from the current situation and were extrapolated according to two assumptions of traffic. It was deduced from it that the disturbed zones will be relatively modest and will make it possible to generally respect the medical standards in the inhabited zones.

These models of calculation were unfortunately not introduced into cartographic models making it possible to draw in 3D the iso-curves of noise or pollution, by taking into account the topography and the airstreams. These cartographic models usually used in the EIA would have drawn the attention to the extent of the surfaces really disturbed by the traffic. The following principles are particularly well known by the study of similar situation:

- A path in bottom of valley creates important phonic disturbances on the sides of the valley (the noise is propagated while going up).
- The polluted masses of air (gas and dust) accumulate by pockets of stagnation created by the meanders and the tormented morphology of the valley.
- A roadway system built on a fill or a viaduct creates considerable spreading of the deposits of dust while increasing by a factor 3 to 5 the width of the zone usually polluted.

Under these conditions, the construction of an expressway or a motorway in a gorge obligatorily creates a very unfavorable situation for the environment if the concerned habitats are sensitive, which is particularly the case in the gorge of Kresna for the biotopes and the concerned species.

Moreover, the construction of a motorway involves earthworks of great widths, with the creation of surfaces of slope requiring work of vegetalisation to stabilize the slopes and the carry out of a landscape treatment of the accesses of motorway.

This work, generally considered as mean of measurements of the integration of the work in the landscape, is certainly welcome in agricultural areas or built spaces. However they constitute in the natural areas a corridor of penetration for many exogenic ubiquitous species.

Indeed, even if maximum efforts of reconstitution of the habitats of origin is required, the techniques of ecological engineering for the sowing and the transplantation of local species, do not make it possible to avoid a contamination, even an invasion by pioneer species having a strong potential of adaptation. The landscape transformation is thus real and final for all the surfaces influenced by the building site.

4.3 Preliminary EIA report in the step of selection of the alternatives

The following remarks relate to the contents of the preliminary report, "Struma Motorway. Final report SPEA. September 2001", on the evaluation of the incidences of the project on the environment. They only aim at determining whether the incidences of the project are acceptable from the point of view of the Convention of Bern. They are however applicable to all the steps of environmental evaluation used within the framework of this study (section m2 in M5).

Notice 1: Description of the project.

The description of the project provided by the report is insufficient to know the general characteristics of the project for the major environmental aspects. A number of information is missing such as:

- Assumptions on the foreseen traffic in the medium and long term in the gorge, and, in particular, the model of distribution of the international traffic in the entire country in the event of non-construction of the motorway.
- Need for restoring or not the lanes for the local traffic (agricultural traffic and bicycle touring for example) simultaneously with the motorway.
- The standard influences of the building sites during construction, then during the exploitation of the motorway. Examples of establishment on the original ground, with construction of tunnels or viaducts.
- Probable and extended localization of the zones of loan and deposit of materials used.
- Characteristics of the structures built in seismic areas.
- Principles recommended for the drainage of surfaces of the roadway system in normal time and in the event of accident (basins of rolling, de-oilers, lagunage).
- Zones of development induced by the construction of the motorway (service station, restaurants, monitoring, cement factory, station of preparation of the concrete, industrial parks, etc).

In the absence of the data above, the decision maker will have trouble to imagine the real incidences of the analyzed paths apart from the influence strictly necessary to the lanes. At the stage of a preliminary study implying of the difficult choices of alternatives it would have been desirable to have more complete information not only on principles of current construction of the roadway systems and the structures, but also on all related installations, necessary or possible, permanent or provisional. It will be too late to discover them once the "ideal" path is definitively selected.

Notice 2: Justification of the project.

The technical file certainly provides useful basic information to understand the options of construction of the motorway, such as:

- Arguments for the definition of the corridor 4 Bulgaria - Greece.
- Economic stakes for the construction of the motorway.

These arguments should have been recalled in the EIA file.

Notice 3: Working methods.

The methods used are described only briefly at the beginning of the concerned chapters. The methods specific to the environmental evaluations neither are described nor used thereafter. Thus for each field the information is often insufficient, even non-existent. The following information would have been useful.

| | |
|-----------------|--|
| Meteorology: | Charts of the isohyets (summer/winter temperatures, distribution of the rain, the fog, etc.) |
| Air pollution: | Curves of the concentrations of the gases CO, NO ₂ , Nox, existing and future, in the situations of plain and gorges. |
| Soil pollution: | Theoretical curves of distribution of dust in situation of dams, cuts, of viaduct. |
| Noise: | Model of distribution of the isophonic curves existing and future. |
| Geology: | Charts of the outcrops and cuts representative of the situations. |
| Vegetation: | Chart of distribution of the principal types of vegetation described. |
| Fauna: | Charts of the principal habitats of the remarkable and characteristic species. |

This information would have been particularly useful as of the moment when the project was likely to affect protected sites, which is the case in the whole of the gorge.

Notice 4: Description of the existing state.

In all the fields of analysis, the provided data appear complete and relevant, which shows well that the data provided by the literature and the research centers are abundant. That also implies that some of the specialists who wrote these descriptions were certainly available to provide useful complementary data for the project. In the form of descriptive lists, these data are however useless if they are not located geographically. They should have systematically been the subject of a set of thematic maps, even simplified, so that the stakes are clearly defined.

The very detailed lists often provide only general qualitative data of the crossed sites. On the other hand they completely miss quantitative and functional information on the concerned populations and habitats. Thus a chart of the habitats announcing the cores of population with the complementary habitats necessary to the maintenance of the groups of species would have been useful to lead the evaluation of the incidences.

Notice 5: General analysis of the incidences.

This analysis is not possible in the absence of the models of influence of the various effects of the project, as well as in the absence of a map of the distribution of the types of receiving habitats. The confrontation of these two sources of information could have provided a quantitative indication (localization and surfaces of the touched zones) of the incidences of the project.

Notice 6: Comparison of the alternatives.

The comparison of the studied paths is based only on some non-exhaustive technical criteria such as the technical difficulties, the length of the works (tunnels and viaducts), the presence of protected sites, touched or avoided, and finally the total cost of construction completely conditions the choice of the alternative.

The true environmental incidences of the alternatives, except the fact of avoiding or not significant sites, are not evaluated at all.

Notice 7: Measures of the reduction of the impacts.

This type of measures must form part of the techniques of modern integration of a motorway path . They should have been described and located in the preliminary study even in the form of general principles so that one can judge their effectiveness and taken into account in the selection of the alternatives.

Notice 8: Compensatory measures.

This second type of measures must make real improvements to the environment by installations wit an ecological goal, rehabilitations of degraded sites or of the business applications favorable to the environment. An alternative a priori unfavorable by certain technical aspects can extremely well become interesting if sufficient compensatory measures are considered.

In conflict situations, an alternative of path is very often selected according to the possibilities of avoiding irreversible damage with the environment, but as for advisabilities of restoring a future natural state more favorable as in the state initial.

This aspect of the step is not taken into account within the framework of it project.

Notice 9: Selection of a preferential alternative.

The multicriterion analysis must include reliable indicators of technical, economic and sociological factors as well as ecological factors. In conclusion, concerning the choice of a preferential alternative (cf p.170-171 of the EIA), the assertions provided in the existing report are not sufficiently supported by data to be really useful in a decision-making process aiming at the integration of the project within its environment.

4.4 Search for alternatives paths

Three basic alternatives are proposed:

- The alternative "zero" which consists of a widening of the existing road.
- The "red" alternative that allows a clear improvement of the existing path by a serie of works (alternation of viaducts and tunnels) while using the current road.
- The "green" alternative that gives up the existing path while skirting the right bank gorge of the river with a series of tunnel.

The purpose of alternatives A and B, located at the East of the gorge, is to avoid the three protected zones. The alternative B circumvents completely the perimeter of the "CORINE-BIOTOPE" site.

These last two alternatives were the subject of a rapid technical study but were not analyzed from the point of view of the natural environment.

An alternative C, also located outside of the gorge, was added as an indication, following remarks provided by the ONGs at the time of the visit on the field. It only gives an account of the general features of the path .

These various alternatives are schematically represented on a chart of synthesis (chart 5) on which also appears the perimeters of the reserves and the "CORINE-BIOTOPE" site.

Characteristics of the alternatives ways

The project file drafted by the SPEA provides plans of situation and longitudinal profiles of the 4 alternatives " red ", " green ", A and B, but not of alternative "zero". Alternative C was outlined summarily to obtain the general characteristics as an indication.

The longitudinal profiles have been analysed and corrected summarily, starting from the project SPEA file, to allow a comparison between the extreme points of separation and convergence of the

various alternatives with the entry and the exit of the gorge, that is to say approximately 27 km of paths.

The general characteristics are recognizable starting from the simplified longitudinal profiles (fig. 3) and are summarized in the table below:

| General characteristics | Alternative zero | Alternative red | Alternative green | Alternative A | Alternative B | Alternative C |
|---------------------------------|------------------|-----------------|-------------------|---------------|---------------|---------------|
| Total horizontal length | 27'200m | 26'200 m | 27'200 m | 26'700 m | 31'100 m | 25'500 m |
| Length developed | 27'240 m | 26'240 m | 27'250 m | 30'200 m | 35'300 m | 27'000 m |
| Section on the ground | 27'080m | 17'940 m | 13'350 m | 12'100 m | 6'000 m | 8'000 m |
| Section in viaducts and bridges | 160 m | 7'240 m | 1'730 m | 7'230 m | 7'230 m | 3'000 m |
| Section in tunnel | 0m | 1'830 m | 10'340m | 112'865m | 18'245 m | 13'000 m |
| Maximum slope | 1% | 1,5% | 2,0% | 5,0% | 5,0% | 3,8% |
| Section in ZISC | 12'120 m | 11'520 m | 11'500 m | 7'500 m | 0 | 7,500 m |
| Section ZISC in tunnel | 0% | 8,7% | 62,0% | 82,7% | aucun | 82,7% |

Note: The figures above are only approximations obtained by drafts of alternatives drawn on the scale of the 1/50' 000. They ask to be checked.

4.5 Choice of a preferential path

According to the EIA report, the selection of the alternatives paths was carried out only on alternatives zero, red and green by using the following criteria:

- Research of the least risk in each field of study
- Research of the least impact on all sensitive areas, however by taking in account only the direct surfaces of roadway systems, not the "secondary" impacts at a larger scale.
- Calculation of lower cost.

According to this logic, the alternative "zero" joins together the best weightings¹⁰, followed by the "red" alternative which partially re-uses the existing road but which comprises tunnels and viaducts making it possible to improve the general performances of circulation. The latter is considered as being preferable.

A more complete analysis, considering in particular the extent of the disturbances on the significant sites and the fact that these disturbances are impossible to reduce, would obviously have counted the alternatives "outside the gorge" among the acceptable alternatives from the point of view of the environment.

The search for an alternative out side the gorge is also justified by the presence of a morphology in terraces revealing a level of favorable ground between 500 and 600 m of altitude (fig. 4).

The alternatives A and B, not analyzed, are identified as technically difficult to realize being given the presence of long tunnels with important slopes. Finally, they are definitely more expensive however making it possible to avoid the protected zones and site "CORINE-BIOTOPE".

An analysis of alternatives A, B and C, led in an identical way to the one done for the first three paths, would have made it possible to optimize each path, in particular by reducing the lengths of tunnels and the slopes, thus making these alternatives worthy of consideration.

¹⁰ The designation of the alternative "zero" as being the preferential layout, is valid only for the assessment of the influences of ground. This alternative only worsens the effect of cut in the landscape, the influences on the sensitive areas and the number of killed animals. Moreover the re-use of the existing voierey constitutes a bad technical solution for under-meanly roadway.

Chart 5: Situation of the alternative paths .

Figure 3. Diagrammatic presentation of the longitudinal profiles of the analyzed alternative paths

Figure 4.

Diagrammatic representations of a profile-type of the median part of the gorge:

A-B (H/L = 10/1) Profile indicating the possible spreading out of the alternatives paths.

A'-B' (H/L = 1/1) Profile showing in real proportion the V morphology characteristic of the gorge.

The alternative C, not under consideration in the preliminary study, appears relatively favorable in so far, as other constraints, in particular geological, do not seem to be definitive problems.

The fact of choosing a path partially touching a perimeter of protected zones should not constitute an eliminatory factor obligatorily. It could be acceptable for the environment if the following conditions are respected:

- The surfaces destroyed or disturbed by the project of the habitats do not put in danger the survival of the habitats and the biocenosis that are present in the protected site.
- The inevitable impacts on the sensitive habitats can be the subject of compensatory measures aiming at improving the quality or the functionality of other habitats similar but already degraded.

A total analysis of the protected site placed in its systemic regional context (the ecological network !) will underline the fact that the existing road currently creates a serious impact on the habitats and the species which one seeks to protect, by creating disturbances and, most particularly, insuperable cuts in the landscape. This is why the construction of a new motorway on the edge or near the significant sites must be the occasion to improve environmental integration of the current road by the following actions:

- To restore the road in its role of local connection for a traffic limited to the agricultural, commercial and tourist needs, completely excluding the transit by trucks, and by fixing a moderate speed limite that would require no correction of the path .
- To arrange the hydraulic works to facilitate the crossing of the roadway by small fauna and if necessary to build some specific works to improve the situation for all fauna ¹¹.

In all the cases the search for an alternative path outside the gorge must absolutely continue.

4.6 Claims of the ONG's

The arguments used by ONGs to obtain the study of alternative paths are relevant in so far as they bring solid knowledge on the localization of the habitats and the presence of the protected species.

The claims expressed since several years should have encouraged the group of studies of the project to create a partnership to lead to constructive measures for the integration of a future path and to a support for a concept of management of the natural and cultural heritage.

4.7 Step of consultation and participation

The creation of several advisory groups should quickly be considered so that the designers can clearly sort out the constraints having a real scientific basis from those purely political and control the degradation of a conflictual situation.

- A first "Natural habitat" group should define the extent of areas of biological interest and their operation in the landscape.
- A second "Agriculture" group should specify the mechanisms of the agro-pastorale exploitation which condition the evolution of the landscape.
- A third "Regional development" group should express the needs and concerns of the inhabitants vis-a-vis scenarios of development strongly conditioned by the construction of a motorway.

The creation of advisory groups woul enable to better answer the tendentious arguments of the opponents the project, such as:

- To the level of the gorge the motorway brings only harmful effects for the residents !
- The project of motorway caused the setting under protection of the gorge !

¹¹ To consult on this subject the synthesis of project COST 341 " Habitat Fragmentation due to Transportation Infrastructure " presented on the site " <http://www.cordis.lu/cost-transport/src/cost-341.htm> ", or: BERTHOUD & MÜLLER, 1994. Fauna / Traffic safety. Manual for Engineers. LAVOC-EPFL, 120 p.

- The protection of the gorge prevented the construction of the motorway !
- The European Union wants to control or restrict the possibilities of regional development!

In all the cases, without an active local participation, the development of the motorway project and the application of the Convention of Bern, will be perceived like a disaster by the local populations.

4.8 Assessment of the current situation

The absence of collaboration and consultation of the essential partners for the good development of the project led the project towards a dead end.

The passage in force of a motorway project on the single basis of technical criteria can lead to completely counter-productive confrontations, such as:

- Massive mobilization of the opponents of all sides.
- Recourse counters the project by the legal European authorities.
- Sabotages of building sites.
- Massive destruction of the habitats which one wishes to protect (for example: set fire to undergrowth).

5. Search for solutions

5.1 Integrating the natural constraints

In a landscape, the natural constraints are of geomorphological, pedological, climatic and biological origins. All the step of a preliminary EIA must try to describe as precisely as possible the elements characteristic of the landscape present in the zone of influence of the project. The useful elements are the following:

- Typology and cartography of the habitats by surveys of the whole zone of influence with the assistance of aerial photographs).
- List of the indicative species of fauna and the flora for each type of habitats (qualitative information of the habitats).
- Localization of the remarkable populations and of the diffuse presences of the indicative species (quantitative information of the habitats)
- Spatial behaviour: daily and seasonal movements and flows (functional information of the habitats).

The constraints are deduced from this description by selecting the natural or subnatural habitats offering:

- possibilities of optimal development for biocenosis remarkable by their biodiversity, the presence of rare or threatened species,
- a capacity to allow vital activities for particular species or biocenosis characteristic of a landscape.

In practice one will draw up not only lists of species or remarkable habitats but also especially a detailed cartography of the intact, degraded or transformed habitats among which one will precisely distinguish the priority sites and habitats to protect.

The degraded or transformed sites constitute the landscape matrix in which one will distinguish from the complementary habitats necessary to the maintenance or the extension of the priority habitats.

These interactions of habitats are to be highlighted by identifying the various ecological networks existing in the sector.

Thus defined the natural constraints can be easily integrated in a project such as a motorway:

- By selecting a path respecting as well as possible the said constraints.

- By envisaging measures of reduction of the impacts in the form of adjustments of integration of the accesses to the infrastructures in the landscape.
- By envisaging measures of compensation of the impacts in the form of revitalization of degraded habitats or reconstitution of habitats destroyed by the influences of building sites.

5.2 Measures of compensation

The importance of the measures of compensation is defined according to two axes of possible interventions:

- By the integral re-establishment of the destroyed habitats (case of the priority habitats).
- By a concept of total compensation aiming at improving the quality or the functionalities of the degraded habitats existing on the sector of influence of the project.

The plan of environmental measures proposes, locates and describes all the possible installations to realise in relation to the motorway project. The measures defined in their principles will be studied in detail in the phase of final draft and will form part of the conditions of realisation of the project.

5.3 Study of alternative paths

For the expressed reasons concerning the sensitivity of the habitats and the extent of the inevitable incidences of the project, the study of alternative paths located outside of the gorge is essential.

The presence of a "CORINE-BIOTOPE" site implies particular responsibilities on the conservation side for an heritage of European importance. That means that the project must respect the significant habitats as well as possible and systematically seek to reconstitute the quality and the functions of the destroyed or disturbed habitats.

If these constraints cannot be respected the path must be modified consequently. The passage of a road in the gorge (alternatives zero, red and green), obligatorily involving irreversible impacts of great influence in a single site of recognized importance and without possible measures of compensation, is thus unacceptable.

With my opinion, in spite of engineering constraints and higher costs, a path outside the gorge, close to alternatives A or C, is possible. The first drafts of path must be optimized as well in plan as in profile to release an acceptable project for a path.

5.4 The environmental assessment of the "CORINE-BIOTOPE" site

The environmental assessment of the site is necessary to establish for various reasons:

- It is essential to set up a system of control (monitoring) of the site, at least including the zone of influence of the project and if possible the totality of the site.
- It must make it possible to control its evolution after the establishment of the motorway in the vicinity.
- It must make it possible to judge the effectiveness of measures of installation, management and protection of the site.

This system of control must lead to a periodic environmental evaluation of the site whose first evaluation relates to the initial state at the time of the study of the path .

The phase of study of the final draft starts from the evaluation of the initial state to deduce from it the hypothetical incidences of the project and the extent of environmental measures to set up.

The first environmental assessment of the receiving site should be carried out in the year which follows the end of the building work of the motorway and the realisation of the compensatory measures.

At this stage of the evolution of the site, even if the assessment is probably unfavourable, for the compensatory measures are not yet completely operational, one will have at least all the necessary indications (influence of installations, new occupations of the ground, control program, evolutionary tendencies) to allow the follow-up on a long-term basis.

The periodic environmental assessments (annual report for the ZISC, but at least after 5 and 10 years for a motorway project) will have to check the evolution of the simple and precise indicators that are used as reference for the environmental evaluation.

All of the essential indicators for the environmental evaluation at least includes the following documents:

- A precise cartography of units of vegetation, digitized for a treatment on a geographical information system (GIS).
- A typology of the units of vegetation that distinguishes the intact, degraded and transformed facies.
- A chart of the ecological networks¹² defining the complementary sets of habitats and flows of exchanges existing inside as well as outside the zone of study.
- A grid of evaluation of the areas including of the qualitative, quantitative and functional indicators.

5.5 environmental Evaluation

The evaluation is carried out according to the method of the MPEM¹³ or an analogue method that distinguishes the evolution by habitat and ecological sector.

The data used to describe and evaluate the initial state, then the hypothetical final state of the zone of influence of the project must obligatorily be directly usable to set up the documents of definition of the objectives of management of the "CORINE-BIOTOPE/NATURA 2000" site and finally and relevant to the installation of the plan of management necessary to a ZISC.

5.6 The plan of environmental measures of the motorway project (PEM)

The PEM is the concrete result of all the measures taken to make possible the integration of the project in the site.

The PEM can be the subject of discussions or research of alternative solutions, to satisfy other objectives considered to be priority. It is not related to the only constraints rising from the presence of a protected site, but well from all the constraints of the projected path. It does not only aim to protect the habitats and the species of European interest, but also to respect or reorientate the human activities of exploitation of the natural resources.

The PEM should form part of a democratic process of participation in acceptance of the motorway project. The owners and the communes involved must consequently be informed and solicited to find solutions.

One outstanding measures of the project would be to envisage a re-calibrating of the existing road to give it back its initial statute of local road of agricultural and tourist vocation, while completely excluding the international transit of heavy lorries. The quality of life of the villagers as well as the biological quality of the site of the gorge would have much to gain.

The motorway project must be obligatorily related to the carrying out of the measures and the rehabilitation of the road in the gorge.

6. Conclusions

The summary analysis of the regional ecological context clearly underlines that the site of the gorge of Kresna must be regarded as being a natural sanctuary, already partially degraded, which will not bear the additional impacts of a motorway building site, for the habitats and the species registered in appendices 1 and 2 of the "Convention on the conservation of the wildlife and the natural

¹² The step is not described yet in an official publication but can be consulted in the following files: (1) ECONAT 2000. Project of national ecological network presentation of the charts provisoires. 30 p. (2) ECONAT 2001. Biological corridors in Isère (France). Ecological project of network department of Isère. The general Council of Isère. 71 p.

¹³ Berthoud et al., 1989, Method evaluation of the ecological potential of the habitats. Program national SOL Melts National of Scientific Research. Liebfefeld, 187 p.

environment of Europe " are localised only in the gorge and near the upstreams and downstreams outlets of the latter, this for geomorphological, climatic and orographical reasons. The gorge of Kresna precedes of this fact as a single station for the Balkan area for its high biodiversity and the presence of many rare and endemic species, as well as their habitats.

Within the framework of the procedure of approval of the motorway project, the preliminary EIA report does not bring decisive arguments to allow a choice of alternatives compatible with the environment.

The preliminary EIA was used inopportunistically only to document the paths suggested by the engineers, and only selected according to technical, financial and legal criterias. On the contrary, and before the initial selection of the paths, it should have helped to correctly define the patrimonial interests and the regional ecological constraints, in order to encourage the engineers to study upon the departure of the alternative paths located outside the gorge.

However, with my opinion of expert on studies of motorway projects and after discussion with the specialists in the Laboratory of the Lanes of the Polytechnic School of Lausanne (LAVOC- EPFL), such solutions appear credible and should allow to quickly find a acceptable solution by respecting the "CORINE-BIOTOPE" site in particular.

The basic documentation and good specialists and naturalists exist in Bulgaria who could allow the definition of an alternative path . The current problem is to accept an active participation, within the team of technical studies of the project, representatives of the scientific naturalists and local population. This representation can be carried out in the shape of commissions of consultation, working according to an iterative process of consultation, respecting of the very strict rules that could lead to the development of the project. This democratisation of the project by an open participation is essential, as well for the acceptance of the motorway project as for the installation of the protected surfaces within the framework of the project of EMERALD Network in Bulgaria.

The failure of one or another, even of the two projects, will probably have negative consequences in the long run on the development of the country. A participative step in the realisation of a project, whose stakes are of national importance, could be used as example for future projects of development.

In the case of the project of the Struma motorway crossing a "CORINE-BIOTOPE" site, it is a conflict of interests between a recognized site of European importance and and a motorway of supranational. The interests concerned are juridically receivable and equivalent. If a cohabitation is not acceptable, or even desirable, the question which arises then is of knowing which two objects is obligatorily related to the site of the gorge of Kresna. The answer is obvious : the establishment of a "CORINE-BIOTOPE" site is imperatively related to the presence of the gorge and its accesses, where as the project of motorway path is only for economic reasons. The motorway project must be modified consequently.

The motorway project must be necessarily related to the installation of a local concept of durable development including the installation of the "CORINE-BIOTOPE" site.

Thus led, the search for a motorway path compatible with the environment, today source of conflicts, should evolve quickly to an opportunity of harmonious development of the area.

Appendix



Convention on the Conservation of European Wildlife and Natural Habitats

Standing Committee

Draft Recommendation No. ... (2002) of the Standing Committee adopted on ... December 2002 on the project to build a motorway through the Kresna Gorge (Bulgaria)

The Standing Committee of the Convention on the Conservation of European Wildlife and Natural Habitats, acting under the terms of Article 14 of the Convention,

Having regard to the aims of the Convention to conserve wild flora and fauna and their natural habitats;

Recalling that under Article 4 of the Convention each Contracting Party shall take appropriate and necessary legislative and administrative measures to ensure the conservation of the habitats of the wild flora and fauna species, especially those specified in Appendices I and II, and the conservation of endangered natural habitats;

Recalling that Article 4 of the Convention stipulates that the Contracting Parties in their planning and development policies shall have regard to the conservation requirements of the areas protected under the preceding paragraph, so as to avoid or minimise as far as possible any deterioration of such areas;

Recalling that Article 4 further provides that the Contracting Parties undertake to give special attention to the protection of areas that are of importance for the migratory species specified in Appendices II and III and which are appropriately situated in relation to migration routes, as wintering, staging, feeding, breeding or moulting areas;

Referring to the report of Mr Guy Berthoud on the project to build a motorway through the Kresna Gorge, drawn up following his on-the-spot appraisal [document T-PVS/Files (2002) 7];

Bearing in mind the work carried out under the Pan-European Biological and Landscape Diversity Strategy, notably the code of practice for the introduction of biological and landscape diversity considerations into the transport sector;

Considering that the Kresna Gorge site and its surroundings contain rare and endemic species and habitats of European importance that are conservation priorities and which Bulgaria has undertaken to protect;

Recognising the role of the gorge on an international scale as a prime axis of migration for migratory birds and insects and also at regional level as a point of exchange for the different types of vegetation and animal populations;

Having regard to the diversity of the ecological networks existing in the sector and the value of the archaeological heritage;

Considering that the area concerned is a major component in the implementation of the Emerald Network;

Aware of the foreseeable ecological impact of the motorway project on this natural sanctuary unique in the Balkans region;

Mindful of the need to reconcile the economic and ecological issues raised by this project and convinced of the necessity of identifying a route compatible with the natural and human environment,

Recommends that the Bulgarian Government:

1. take account, in the development of this project, of the imperatives of conserving fauna, flora and habitats as well as the concerns of the local communities in the municipalities concerned;
2. ensure that the decision on the routing of the motorway is taken on the basis of an in-depth environmental impact assessment (EIA) supplemented by scientific and mapping data and any other useful source of knowledge on the area concerned by the project, to justify the choice of alternative as recommended in the expert's report;
3. consider the possibility of abandoning the option of enlarging the current road since this would substantially increase damage to a unique site, without possible measures of compensation, and continue studying alternative routes located outside the gorge that would respect the natural constraints as far as possible and provide for the integration of engineering works and compensate for environmental impact;
4. ensure that the choice of alternative is based not only on technical, legal and economic criteria but also on social and ecological criteria;
5. institutionalise dialogue and seek consensus solutions with the different partners concerned; active partnership could be forged with non-governmental organisations with sound knowledge of the location of habitats and the presence of protected species, and the setting up of advisory groups could be envisaged;
6. provide for the downscaling and rehabilitation of the existing road, restoring its initial status of a local road used by the farming community and tourists and thus ease current pressure on the site, with suitable planning to revitalise damaged areas and provide user information services;
7. establish periodic site assessments (Kresna Gorge and motorway route), providing, as soon as the EIA is produced, the mapping and biological inventories necessary for long-term bio-monitoring;
8. select the zone concerned for the Emerald Network, by extending the central site to cover the gorge entrance and exit areas, to take stronger account of the biological functioning of the natural habitats and the connecting areas between the sites (ecological network of core area plus complementary areas);
9. ensure that adequate legal protection is given to the whole of the gorge site and its development areas.