TO
AD ELEM
and
EBRD
copy to Ministry of Environment

Skopje, 04.11.2013

Subject: Comments on the final biodiversity monitoring report for the pre- construction phase of the project "Boskov Most"

Dear Sir/Madam,

We would like to thank you for sending the final biodiversity report to us, and for allowing time for us to comment; likewise we thank you for sending previously submitted seasonal reports. We would also like to thank you for inviting our representatives to the public hearing held on 25.10.2013; unfortunately we were not able to attend due to the short notice of the meeting. We would be grateful if you would consider our comments on this report below, they are related to the environmental issues and to some of the studied groups.

Before elaborating our comments in more detail, we would like to draw your attention again to the on-going process for the re-proclamation of Mavrovo as National Park and the preparation and adoption of the Management plan for Mavrovo National Park. This complex process should result in decision on the level of acceptable development and the level of protection of the environment within the National park (80% of the HPP Boskov Most project is located in the Park).

The preparation of an urban planning document for non-inhabited areas with the area assigned for the HPP Boskov Most project is also ongoing. This document is subject to a Strategic Environmental Assessment according article 3, point 15 of the Ordinance on strategies, plans and programmes; and changes are subject to environmental impact, human livelihood and health assessment (Official gazette of the Republic of Macedonia No. 153/07 from 20.12.2007).

The above mentioned documents and procedures are important for the overall assessment of the impacts of Boskov Most HPP project on the environment.

Summary
Our comments on the Biodiversity Monitoring Report refer to the species groups as well as to the absence of important technical data. In order to carefully analyze and judge this report, we have consulted several international renowned species experts.

Conclusions:

- This biological diversity survey is in large parts superficial, incomplete and misleading.
- It is not in line with international monitoring standards.

- In contrast to what the survey concludes, Boskov Most HPP would result in severe destruction of biodiversity and to population decline of endangered species.

We demand:

- Additional research: In order to fill the knowledge gaps and to present a scientifically accurate picture of the impacts of the HPP, we strongly demand the survey to be complemented. The monitoring procedure for species groups, such as for macrozoobenthos, mammals, and birds should be started next spring.
- Complete technical data: Add technical data about the operation of the project (e.g. outflow/discharge during different times of the year, km affected by drainage and flush, effects on water levels of Mala Reka and Radika during operation etc.)

General Comments on the Report:

The greatest concern of the national and international organisations represented here comes from the character of the proposed hydropower plant "Boskov Most". Boskov Most would drain large parts of the river network and would be flushing other parts of the river network. It would be operated as a peaking HPP; it will only operate in times of greatest energy demand, during which it will discharge large quantities of water up to the maximum capacity of the outflow pipes 22 m^3/sec.

The daily fluctuating water level downstream of the outflow is one of the most devastating effects of the HPP on the river ecosystem. In general, the practice of hydropeaking inevitably produces permanent negative ecological effects on the downstream systems for 10s of kilometres, even showing effects up to 100 kilometres away from the release point. There is normally a strong reduction in the primary food base (i.e. a decrease in macrozoobenthic productivity and biomass) and a disruption of spawning and rearing of young fishes. The effects of hydropeaking are often so pervasive that large reaches of river landscapes in Europe have been declared as "Heavily-modified" under the EU Water Framework Directive (WFD) for this impact alone, and thus are largely exempt from the overall goal of reaching good ecological status.

Thus, in contradiction to the statements presented in the Report, (and with reference to the Environmental Impact Survey), it is not possible for us to envisage an HPP at Boskov Most, without envisaging significant reductions in the ecological status of the affected water bodies, including river reaches downstream, which have not been considered in this monitoring study. Maintaining the combined catchments of all waters in the watershed of Mala Reka at a biological minimum (most of the water being forced into pipes), along with the modifications of the riverbed downstream of the HPP and the daily flushes, will lead to inevitable loss of the majority of the biodiversity in the river ecosystem. This will not only apply to the Mala Reka, but also downstream in the river Radika, and indirectly upstream of the point where the Mala Reka joins the Radika.

Overall, the Report appears to offer the view that although Boskov Most project undoubtedly affects ecological process and numerous plants and animals, the negative effects can be easily mitigated. This is not a view that we, as a professional scientists can share, especially as this project is largely to be carried out within an IUCN Category II National Park, whose primary goal is: "…protecting large scale ecological processes with characteristic species and ecosystems…" The management objective(s) should apply to at least three-quarters of the protected area – the 75 per cent rule. (Dudley, 2008 Guidelines for applying Protected Area Management categories).

These goals appear to be in stark contrast to those of the HPP Boskov Most.

Specific comments:

In order to analyze and to judge the report correctly, we sent the assessment to the following internationally renowned experts:

- Dragonflies and other macrozoobenthos: **Geert de Knijf** - Research Institute for Nature and Forest, Brussels. **Dr. Jürgen Ott** - Member of the IUCN Invertebrate Specialist Group and European Focal Point
- Fish: **Dr. Jörg Freyhof** – Leibniz-Institute of Freshwater Ecology and Inland Fisheries, Berlin and European Regional Chair of the IUCN_SSC/WI Freshwater Fish Special Group. **Dr. Steven Weiss** – Karl-Franzen-University Graz and chair of IUCN Salmonid Specialist Group & Red List Authority for Salmonid Fishes in Eurasia.
- Birds: MSC Willem Van den Bossche and **MSC Boris Barov** – Science department of BirdLife Europe
- Mammals:
Eurasian Otter: **Dr. Nicole Duplaix**, Chair of the IUCN-SSC Otter Special Group
Balkan Lynx: **Dr. Urs Breitenmoser** - Co-Chair, IUCN-SSC Cat Specialist Group
River ecosystem: **Ulrich Eichelmann** – CEO of Riverwatch, Society for the protection of Rivers.
Dr. Kai Frobel – Scientific advisor for Friends of the Earth Germany

Please find their individual statements attached.

1. Ambient noise and ambient air quality

The measurements of ambient noise in the final report have been completed during the summer of 2012 (August). At the last meeting held in ELEM (18.03.2013) it was agreed by all parties that an additional measurement should take place during the winter season. The final report needs to be updated with results from an additional measurement of the noise in a new season. The measurements of ambient air quality in the final report have been completed during the period August- September 2012. At the last meeting held in ELEM (18.03.2013) it was agreed by all parties that an additional measurement of ambient air should take place during the winter season. The final report should be updated with results from an additional measurement of ambient air quality in one new season.

2. Lack of detailed information on macro invertebrates

The biological survey report seems impressive in that many different groups of organisms have been surveyed, and as expected, a great deal of biodiversity is found in the Mavrovo National Park and surrounding areas. However, to underline the difficulty in gaining a rough estimate of the levels of biodiversity that will be affected by this project, we note that “no” species of the large order Trichoptera (caddis flies) are reported, rather only “empty houses”. Trichoptera (wrongly listed as “Trohoptera” in your Report) are one of the most diverse and functionally important groups of macroinvertebrates in these systems. Macroinvertebrates are highly sensitive to HPP development and there is no doubt that significant negative impacts in biodiversity, productivity and biomass of these creatures will occur, and these reductions can have ‘knock on’ effects for many aquatic, semi-aquatic and riparian species that depend on this fauna as a food base. Several species are not

determined exactly, but are named sp. (ie species name unknown) . This, combined with the very limited description of the macro invertebrate fauna descriptions indicates that a specialist was not involved in the study – contrary to what we would have expected.

3. Lack of data on Odonata (dragonflies) and other macro zoobenthos

Odonata (dragonflies) are characteristic, easily visible, and an important group for conservation, they are totally dependent aquatic ecosystems, including rivers and have not been well covered within the study. The report does not present the applied methodology for the surveys conducted on the macrozoobenthos; it does not give evidence of sampling intensity, state how many days observations were conducted or how much time was spent at each water body. Furthermore, the report does not specify how the species were identified. Most probably, only imagines/adults were detected. The larval stages were determined in the framework of the MZB-survey only (see below), however although adult dragonflies are seen flying in the air, their larval stages, which can take up to 5 years for Cordulegaster species, are dependent on water. Therefore these species are not terrestrial invertebrates – as listed in the Report - but freshwater insects. The survey itself did not focus on larval stages and exuviae were obviously not mapped – if they had been this would have proved the close affiliation (philopatry) of certain species to the study region.

Only eight dragonfly species were detected in the whole study area, that is far less than expected. For example we would have expected that *Cordulegaster heros* would have been present , is a species protected by the European Habitats Directive and has been found in the lower part of the river catchment of Mala Reka, records have been published for Debar region in the Crni Drim River. A survey would certainly yield many more localities in the area. Except *Cordulegaster bidentata (*classified as Near Threatened on the European Red List) all dragonflies recorded are more or less generalist (euryoecious) species. Another two species are mentioned in the context of the MZB-survey. The number of detected dragonfly species is surprisingly low, given the amount of aquatic habitats present in the study area. The dragonflies of Macedonia have not been studied intensively in the past, Boudot et al. (2009) but 59 species are known to occur in the country, with reference to Boudot's work, a comprehensive dragonfly survey for the project area would be expected to reveal higher dragonfly biodiversity. Some species which occur frequently along the Mediterranean basin and the Balkan Peninsula respectively are not represented in the report are *Calopteryx splendens, Coenagrion puella, Anax imperator* or *Anax parthenope, Crocothemis erythraea* among others). For some families no species have been detected at all (Lestidae, Gomphidae, Corduliidae among others).

We believe the surveys conducted were not comprehensive as other available studies have detected the species or families mentioned above (for example De Knijf et al. 2013). This lack of comprehensiveness is also evident in the low number of species detected in the framework of the MZB-survey. The presence of *Aeschna cyanea* is surprising, as the species is rather uncommon in the study region.

It is obvious that internationally respected dragonfly experts from Macedonia and the Balkan Peninsula in general have not been consulted.

We noticed that some species are listed in the Report as only being present for a short time of the year. This is true for the adults but not for the larvae that stay into the water for at least 1 year, but can be as long as 5 year, depending on the species. Therefore table 1-12 must be seen as an attempt to show the flight period of the adults. This table is not correct; *Calopteryx virgo* is included on the wing from May till late August, probably even till September, this is not the case it flies only in May.

Generally, hydro peaking significantly impacts the downstream dragonfly community. These impacts are frequently devastating for the species during the hatching period as all individuals are killed at the same time. In the aftermath of a hydro peaking event drought conditions prevail and important habitats for the larvae fall dry. This leads to even more fatal losses in the population through desiccation of sensitive larvae and elevated predation on larvae by birds. Even if hydro peaking does not occur during the hatching period, extreme discharges will lead to the dislodging of many individuals and ultimately elevated mortality rates. This is in direct contrast to the information given on page 54 of the report. The most likely outcome of hydro peaking is that nearly all dragonfly species, not only the *Cordulegaster* species, will be completely disseminated.

The construction of the HPP, the drainage of streams and the resulting flush waves will also severely damage the riparian vegetation (river edge plants). This will also have a negative impact on the emergences substrates used by dragonflies during the transition phase from larvae living in the water to flying adults. The Coleoptera species *Cerambyx cerdo* is threatened in Europe and listed on in the annexes of the EU Habitats Directive (in Annexes II and IV). However, the species is not identified as such in the list of the Report (See page 53).

4. Unique fish species affected

Two salmonid species have been reported as the only fish species in the affected river systems: *Salmo farioides* and *Salmo montenegrinnis.* Neither of these species has gone through any kind of IUCN threat assessment. This is typical for the genus in this region as there is considerable controversy about their taxonomy and little reliable data or research aimed at resolving the situation. To underscore the complexity, another species, *Salmo macedonicus* has been entered into the IUCN Global Red List as Data Deficient. Either way, there is little doubt that the region affected by this project contains unique populations/species of salmonid fishes, for which we lack sufficient data for proper taxonomic assignment, let alone an assessment of their threatened status. From section 1.2.3.3 (additional measures to mitigate impacts) it is assumed that barriers to migration will be the most important impact of the HPP. It should be emphasized that habitat degradation due to major hydrological impacts (water abstraction, flooding by the reservoir, and hydropeaking) will be the most direct and damaging impact to the aquatic systems. Stocking cannot compensate for habitat degradation and is seldom considered a viable measure or even compatible with the primary goals of Category II National Parks, which are primarily constructed to preserve biodiversity and ecosystem function. Stocking of salmonid fishes is notoriously ineffective and often results in a suite of additional problems for the native fauna.

The Report states that minimum flow requirements (MFR) will be applied and that this will result in no reduction in the ecological status of the affected water bodies. This statement is not compatible with facts or the existing EU legal framework. The affected rivers are in pristine or nearly pristine condition, and we know of no MFR legislation (e.g. in Europe), which would not lead to a significant ecological degradation as defined under the Water Framework Directive (WFD) of the European Union. MFR are compromises aimed at maintaining “some” functional or socio-economic components of a river within our cultural landscapes. They are not measures of conservation or nature protection that were designed or envisioned to be applied to nature reserves or National Parks where the maintenance of natural ecological processes and biodiversity are primary management goals. Even if State-of-the-art minimum flows associated with hydropower development in Europe are applied, they will severely impact ecological function, productivity and biomass of the fish and aquatic invertebrate populations of the affected rivers.

5. Poor section on birds

Regarding the section on birds, we note that the methods section lacks considerable detail. It is not clear how many visits were made to each site; there are no quantitative estimates of the present populations, and it is therefore not clear how the conclusions are drawn regarding the degree of impact. Threat categories are out of date, and some of the species names are incorrect all pointing to low quality research. Some species with potentially high conservation concern listed in the seasonal reports (e.g, *Ficedula semitorquata*, NT) are not listed in the final report. Most importantly, it is not obvious what the basis for the conclusion was. There is no information on the percentage of population affected, and no qualitative assessment of the potential impact. It would have been helpful to have at least a crude quantitative estimate e.g. a stratification of the area by habitat type and some sort of assessment which habitats will be most/least affected, their area of distribution in the National park and hence a proxy of the animal populations affected.

6. Mammals

a) Methodology

The methodology of mammal survey should have presented details on the locations of the camera-traps and lynxes prey, as this is what the conclusion that the lynx does not hunt in the region are based on (page 72). We feel more photographic evidence was needed.

b) Otters

More specifically, few pristine river ecosystems remain in south eastern Europe where otters can flourish, so each one is precious. Mala Reka and Radika are two such Rivers. The proposed drainage of the streams detailed in this report, will have an immediate negative impact on the fish habitats and fish populations in these watersheds, as well as the amphibian populations. Fish and amphibians are both favoured prey for otters and as a result, the otter's food supply will be affected year around. Although no details are provided concerning the effects of the proposed daily flushing regimen of the main rivers Mala Reka and Radika. Such repeated and drastic water level changes can only have a severe detrimental effect on both otters and their prey. The construction of the HPP will also severely damage the riparian vegetation along the river, cover which otters require for their dens and in particular, for raising their cubs. The otters will also abandon construction areas due to the human disturbance and noise levels. It is stated in the report that "*the reduction of the quantity of water in the affected watercourses, i.e. the reduced flow, will ease the access to food"* (page 73 of the report) which underlines the absence of the authors' basic understanding of otter ecology and behaviour as well as the how river ecosystems function. Boskov Most will have direct and severe impact on the resident otter population which is unlikely to survive. In our opinion this biological diversity survey remains superficial, incomplete and misleading with regards to the otter, clearly not taking the risks to this threatened species seriously.

c) Lynx

The risk of HPP Boskov Most to the Critically Endangered Balkan lynx *Lynx lynx balcanicus* (Kryštufek 2012) population remains one of the key controversial aspects, which the study has failed to answer. The Report argues that the HPP construction would not pose a big problem to the lynx. We think this is a wrong conclusion and that any additional loss of habitat or increased disturbance will negatively affect the lynx or its prey (see below). However, this is a matter of interpretation. We strongly argue, that, as long as the Balkan lynx is "Critically Endangered# (Melovski 2012), no further risk must be put on this species.

We believe that the construction will have a negative impact on the lynx, and a serious study on this important issue has not been made. To undertake construction without addressing this issue in a scientific manner is not acceptable. Comprehensive scientific ecological studies on lynx populations in Macedonia by KORA, the Macedonian Ecological Society and NP Mavrovo over the last seven

years (2006 – 2013) are not properly reflected in the report. Facts have been omitted, even though all the relevant documents were provided to the experts involved in the preparation of the study for the biodiversity monitoring, as agreed during earlier consultation meetings.
The recent population estimates (Melovski, 2012) yield an alarming 22 to 40 individuals in the potential distribution range of the Balkan lynx and not "around 100" as stated in the report. Furthermore, the comprehensive surveys in Macedonia and neighbouring countries have revealed that Mavrovo hosts the only remaining population nucleus of lynx, thus holds the last source population with reproduction of the Balkan lynx. We strongly caution against putting any additional stress on this source population as it may lead to the extinction of one of the most threatened mammal populations in Europe.
Recent camera-trapping study (Stojanov *et al*., 2013) conducted in within the boundary of NP Mavrovo showed that the resident female in the southern territory of the park had offspring last year (the female was photographed near the village of Gari in 2008, Mal Brzovec in 2012, 2013 and Jadovska Reka - near village Selce in 2010, 2013). A radio-telemetry study in 2010 and 2011 showed that, for most of the period he was followed, the territory of the resident male covered exactly the same area of the planned construction for Boskov Most.
It terms of the habitat preferences of the Balkan lynx, the facts in the report are misleading and imply that conflict between the lynx population and the construction site will be avoided. Eurasian lynx and thus the Balkan lynx much prefer forested habitats and transitional woodland-shrub (Avukatov in prep.; Ivanov in prep.); these are the habitats that will be destroyed by HPP Boskov Most construction. The Report states "…lynx move and feed mostly in the upper parts of Jadovska and Tresonechka river watersheds..." Our field research does not support such an assumption. Actually, the main prey item in the Balkan lynx' diet is the roe deer (57% of the radio-tagged lynx's prey in Mavrovo were roe deer and only 28% were chamois, Melovski et. al. 2010, 2011) and NOT the chamois as stated in the Report.
We concur that the main chamois habitat in the construction area won't be threatened. However, the roe deer habitat will be affected by the HPP construction. The short-term disturbance might lead to temporal dislocation of the populations of the chamois and the roe deer, but also of the lynx. The short-term disturbance, although temporary, may have a decisive negative impact on the lynx, which is at the brink of extinction. If both, prey and predator are temporarily depressed, prey might recover, but the predator may not because any additional stress to a critically endangered taxon could push it to extinction.

d) General comments on mammals with regard to infrastructure and water levels
We are of the opinion that the reservoir and the adjoining objects and infrastructure (especially pipelines and siphons) will pose barriers to unhampered movements of the mammals (which will mostly affect the wild boar, chamois, the brown bear, the grey wolf and the lynx), and the dam itself will present a barrier to the semi-aquatic species (the otter and the water vole). The change in the underground water-table (increased levels in the proximity of the dam) can negatively affect the populations of the Lesser Mole Rat *Spalax leucodon*, which are characterized with high caryotype diversity and represent potentially significant conservation units. In addition all populations of mobile species will be reduced by increased disturbance and noise levels. The infrastructure for the dam and the HPP (access roads, powerlines, water pipelines, water reservoirs, tyrolian catchments, material extraction sites, workers' camps, depots etc.) will take much more area than the reservoir itself, and will cause long-reaching consequences, habitat fragmentation, and cross-cutting of wildlife tracks and paths, especially in the canyon parts of Mala Reka catchment. The contamination with light during the construction and operational periods will also contribute to increased disturbance.

To conclude, although the conflicts stated here are characteristic for all HPP/dam constructions, we believe that because the majority of this project is situated in a National Park, the risks it poses to biodiversity are unacceptably high. We fear that if all planned infrastructure activities in Mavrovo NP continue, due to the cumulative impact, the Park will never meet the "75% rule" (the total coverage of the zone of strict protection and the zone of active management) for formal acceptance of the Park as Category II protected area under IUCN guidelines (Dudley, 2008). In view of the facts and professional opinions highlighted in these comments; IUCN's resolution for conservation of Mavrovo NP adopted at the last IUCN World Conservation Congress Jeju, Korea 2012; the attention of the international conservation community that this issue has raised; and the cumulative effect of the remaining energy-production projects planned for this National Park; we would expect that ELEM and EBRD will undertake a more detailed and objective assessment of the impact of HPP Boskov Most. Such a study should fill the gaps in the study highlighted and identify proper mitigation measures. Alternatively they could abandon the plans for the implementation of this project. In our opinion, the final biodiversity monitoring report remains incomplete, inaccurate, and at times deliberately misleading.

We remain open for future consultations,

Sincerely,

Ulrich Eichelmann	CEO, RiverWatch
Ana Colovic-Lesoska	Eco-Svest, Skopje
Dr. Jürgen Ott	Member of the IUCN Invertebrate Specialist Group and European Focal Point of the group
Dr. Kai Frobel	Scientific advisor for Friends of the Earth Germany
Dr. Geert De Knijf	Research Institute of Nature and Forest, Brussels
Dr. Steven Weiss	Karl-Franzens-Universität Graz and IUCN Salmonid Specialist Group (SSG) & Red List Authority (RLA) for Salmonid Fishes in Eurasia
Dr. Jörg Freyhof	Leibniz-Institute of Freshwater Ecology and Inland Fisheries, Berlin
MSc Boris Barov MSc Willem Van den Bossche	Conservation Action and Science Department of BirdLife Europe
Dr. Metodija Velevski	Macedonian Ecological Society
Dr.Nicole Duplaix	Chair, IUCN-SSC Otter Specialist Group
Dr.Urs Breitenmoser	Co-Chair, IUCN-SSC Cat Specialist Group
MSc Aleksandra Bujaroska	Front 21/42, Skopje
MSc. Elizabeth Radford	Plantlife International and IUCN SSC Plant Conservation Committee member

References:

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Boudot, J.P. et al. (2009): Atlas of the Odonata of the Mediterranean and North Africa. Libellula Supplement 9: 1- 256.

Breitenmoser, U., von Arx, M., Bego, F., Ivanov, Gj., Keçi, E., Melovski, D., Schwaderer, G., Stojanov, A., Spangenberg, A., Trajçe, A., Linnell, J. 2008: Strategic planning for the conservation of the Balkan lynx. Proceedings, III Congress of Ecologists of Macedonia with International Participation, Struga, 06-09.10.2007. Macedonian Ecological Society, Skopje, 2008. 242-248.

De Knijf et al. (2010): European Red List of Dragonflies, IUCN, European Union 2010: 1-40

Dudley, N. (Editor) (2008). Guidelines for Applying Protected Area Management Categories. Gland, Switzerland: IUCN. x + 86pp.

Freyhof, J. & Brooks, E. (2011). European Red List of Freshwater Fishes; IUCN and European Union: 1-72 pp.

Ivanov, Gj. (in prep.): A spatially explicit model for the recovery of the critically endangered Balkan lynx. Master thesis. Faculty of Natural Sciences and Mathematics, Skopje.

Jovic, M. & B. Mihajlova (2009): Catalogue of the Odonata collection in the Macedonian museum of natural history. Acta entomologica serbica 14 (2): 133-146

Jovic, M. (2009): Report on Macedonia 2008 project-Odonata. IDF-Report 21: 1-23.

Knijf, G. De, C. Vannappelghem, C. & H. Demolder (2013): Odonata from Montenegro, with notes on taxonomy, regional diversity and conservation. Odonatologica 41 (1): 1-29

Kottelat, M. & Freyhof, J. 2007. Handbook of European Freshwater Fishes. Kottelat, Cornol and Freyhof, Berlin, xiv + 646 pp.

Kryštufek, B. (2012): Valid name for the Balkan lynx: *Lynx lynx martinoi* Mirić, 1978, is a junior synonym of *Lyx lyx balcanicus* Bureš, 1941. Folia Zoologica. 12 pp.

Melovski, D. (2012): Status and the distribution of the Balkan lynx (*Lynx lynx martinoi* Mirić, 1978) and its prey. Master thesis, University of Montenegro, 85 pp.

Melovski, D., Stojanov, A., Ivanov, Gj. (2010): Status, ecology and land tenure system of the critically endangered Balkan lynx in Macedonia and Albania" Radio-telemetry annual report, MES, 17 pp.

Melovski, D., Stojanov, A., Ivanov, Gj. (2011): Status, ecology and land tenure system of the critically endangered Balkan lynx in Macedonia and Albania" Radio-telemetry annual report, MES, 17 pp.

Stojanov, A., Melovski, D., Sarov, A., Ivanov, Gj. And Zimmermann, F. (2013): Systematic camera-trapping survey in Mavrovo National Park, Macedonia in winter 2012/2013, MES, 16 pp.

Odontological comments on the annual report

„Survey in the Pre-Construction Phase (Pre-construction Survey) – Annual Report"

Authors: Dr. Jürgen Ott (www.lupogmbh.de)

- Former President of the German Society of Odonatologists (GdO e.V.)
- Coordinating Author of the latest and the previous German Red List of dragonfly species
- Co author of the European IUCN Red List of dragonfly species
- Member of the IUCN Invertebrate Specialist Group and European Focal Point of the group
- Head of the federal state association of nature conservation of Friends the Earth Germany e.V.
- Consultant in the fields of Zoology and Fauna for the Southern district government Germany

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- Biodiversity Consultant for
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- Biodiversity Consultant for Friends of the Earth Bavaria
- Bavarian representative at the German Society of Odonatologists (GdO)

General aspects:

Dragonflies only play a minor role in the project report. There is no specific chapter dealing with the occurrence of dragonfly species in the study area, which indicates that the order has not been investigated in particular.

Methodology:

The report does not present the applied methodology. It does not give evidence of the intensity of the conducted surveys (On how many days observations were conducted? How much time was spent on each water body?). Furthermore, the report does not specify how the species were indentified. Most probably, only imagines/adults were detected. Obviously, the larval stages were determined in the framework of the MZB-survey only (see below). The survey itself did not focus on larval stages and exuviae were obviously not mapped. However, these would have proved the philopatry of certain species.

A comprehensive description of the applied methodology is not provided in the report and the results presented are insufficiently reliable.

Results:

Merely 8 dragonfly species were detected in the whole study area. Except *Cordulegaster bidentata* all of these are more or less euryoecious species. Another two species are mentioned in the context of the MZB-survey.

The number of detected dragonfly species is surprisingly low. Regarding the aquatic habitats present in the study area, one would expect significantly higher dragonfly biodiversity. Even if the dragonflies of Macedonia have not been studied intensively in the past, according to Boudot et al. (2009) 59 species are known to occur in the country. With regards to this reference, a comprehensive dragonfly survey for the project area should generally reveal higher dragonfly biodiversity.

Many species which occur frequently along the Mediterranean basin and the Balkan Peninsula respectively are not represented in the report (*C. splendens, C. puella, A. imperator* or *A. parthenope, C. erythraea* among others). For some families no species have been detected at all (Lestidae, Gomphidae, Corduliidae among others). There is indication that the conducted surveys were little intense since other available studies have detected the species or families mentioned above (compare De Knijf et al. 2013).

Evidence of this lack of intensity is also given regarding the low number of species detected in the framework of the MZB-survey. However, the presence of *A. cyanea* is surprising, as the species is rather uncommon for the study region.

Obviously, internationally respected dragonfly experts from Macedonia and the Balkan Peninsula in general have not been consulted.

Potential impacts of hydro peaking:

Generally, hydro peaking significantly impacts the downstream dragonfly coenosis. These impacts are frequently devastating for the species.

Especially during the hatching period hydro peaking events have disastrous aftermaths as all individuals are killed at the same time. After the hydro peaking events drought conditions prevail and important habitats for the larvae fall dry. This leads to even more fatal losses in the population in many ways (e.g. desiccation of sensitive larvae, elevated predation on larvae by birds etc.)

Even if hydro peaking does not occur during the hatching period, extreme discharges will lead towards the dislocation of many individuals and towards elevated mortality rates in the end.

References:

The only reference listed in the dragonfly section was the book written by K.D. Dijkstra.

Not only sophisticated literature for the determination of dragonfly species is missing (exuviae, larvae), but also earlier published references from Macedonia and the Balkan Peninsula in general are not taken into account (e.g. by Adamovic, Karaman, Buchholz, Herbert).

Other important sources of information – which are also not cited – are:

Boudot, J.P. et al. (2009): Atlas of the Odonata of the Mediterranean and North Africa. Libellula Supplement 9: 1- 256.

Jovic, M. & B. Mihajlova (2009): Catalogue of the Odonata collection in the Macedonian museum of natural history. Acta entomologica serbica 14 (2): 133-146

Jovic, M. (2009): Report on Macedonia 2008 project-Odonata. IDF-Report 21: 1-23.

For a comparison of the possible dragonfly fauna see:

Knijf, G. De, C. Vannappelghem, C. & H. Demolder (2013): Odonata from Montenegro, with notes on taxonomy, regional diversity and conservation. Odonatologica 41 (1): 1-29

Comments on other sections:

Macrozoobenthos:

Several species are not exactly determined, but are named sp. This fact indicated that a real specialist was not involved regarding also the fact that the fauna in general is described only to a limited extend and intensity.

Cerambyx cerdo:

This Coleoptera species is subject to the EU Habitats Directive and listed in Annexes II and IV. However, the species is not identified as such in the list of the annual report.

Compare page 53

Muscardinus avellanarius:

The species is listed in Annex IV of the Habitats Directive as well, but not classified as such in report.

Compare page 569/70

RiverWatch
Society for the protection of Rivers

To
ELEM and the EBRD

Comments on surveys concerning HPP Boshkov Most/MK

Vienna, 22.10.2013

Dear Sir or Madam,

Riverwatch is an NGO advocating globally for the protection of rivers. Thankfully, we received the two studies "Biodiversity survey over the area of HPP Boshkov Most" and the “Environmental Monitoring over the Area of HPP Boshkov Most” for the purpose of scrutiny.

I would like to inform you that we view the assessment of the biodiversity as exceedingly inadequate and the conclusion for the respective species groups as utterly incomprehensible and simply incorrect.

It seems as if the authors have failed to comprehend the ecological repercussions that will follow from the construction of the power plant, or were not provided with adequate data. Thus, they not only arrive at a wrong conclusion in regards to species groups, but also at an inaccurate overall result.

While the impacts on species groups have been gravely understated, the consequences of the practice of hydro-peaking on the Mala Reka and downstream have been left out entirely from the study.

Furthermore, I would like to point out that the projected power plant is inconsistent with EU guidelines, as it contradicts the principle of non-deterioration of status in the Water Framework Directive. Moreover, it is inconsistent with Natura2000 guidelines, particularly the Habitat Directive (Council Directive 92/43/EEC of 21 May 1992). The construction of this power plant would not be possible within the EU. In the light of Macedonia’s accession aspirations, the government of Macedonia and involved companies are advised to closely adhere to European standards.

Finally, I would like to remark, that, on top of all, the project contradicts National Park Regulations, and thus construction at the proposed spot must be avoided at any cost.

Riverwatch will help to bring the case of Boshkov Most to the attention of the European Union and other international bodies.

I hope my comments were of help to you!

Sincerely,

Ulrich Eichelmann
CEO Riverwatch

IUCN SSC/WI Freshwater Fish Specialist Group
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Berlin, 23 October 2012

Statement Concerning the Establishment of the Hydro Power Plant Boshkov Most

The Biodiversity survey reports HPP Boshkov Most have been assessed by me as the European chair of the IUCN-SSC Freshwater Fish Specialist Group. The authors of the reports seem to be unfamiliar with habitat requirements of freshwater fishes especially the trout species (*Salmo* spp.) native to the National park. The proposed actions in the National Park will have strongly negative effects on the native trout populations which will largely vanish from the reservoir area as well as from the downstream section of the dams.

Especially the proposed daily flushing regimen of the rivers will have strong negative effects on freshwater fishes and all other freshwater and riparian biodiversity. Daily flushing is the end of all "normal" freshwater biodiversity downstream of the reservoir and this effect will continue to affect biodiversity for several km.

I as the European chair of the IUCN-SSC Freshwater Fish Specialist Group can hardly understand how such low quality assessments can be accepted and how such detrimental hydropower project can be taken into consideration within a National Park area.

Dr. Jörg Freyhof

IUCN SSC / WI Freshwater Fish Specialist Group
European Regional Chair

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IUCN Salmonid Specialist Group (SSG)
& Red List Authority (RLA) for
Salmonid Fishes in Eurasia

24.10.2013

Statement Concerning the Establishment of the Hydro Power Plant Boshkov Most

To whom it may concern,

I have briefly reviewed the biological survey for the HPP Boshkov Most project, and would like to make a few brief yet critical statements. Overall, there seems to be the view that although such a project undoubtedly affects ecological process and numerous plants and animals, the negative effects can be easily mitigated. This is not a view that I can, as a professional scientist share, and especially due to the fact that this project is largely to be carried out in a National Park, I strongly feel that it is in stark conflict with the primarly management goals of a IUCN Category II National Park.

Salmonid species

Two salmonid species have been reported as the only fish species in the affected river systems; ***Salmo faroides*** and ***Salmo montenegrinnis***. Neither of these species is officially recognized by the IUCN or has gone through any kind of assessment. This is typical for the genus in this region as there is much controversy on their taxonomy and little reliable data or research aimed at resolving the situation. To underscore the complexity, *Salmo macedonicus* has been entered into the IUCN data bank with no assessment due to deficient data. The species is reported to occur in the Mala Reka, yet the species has not been reported in the Boshkov Most biological survey? It is not clear whether ***S. macedonicus*** has been overlooked or misidentified. Either way, there is little doubt that the region affected by this project contains unique populations/species of salmonid fishes, for which we lack sufficient data for proper taxonomic assignment, let alone assessment of their vulnerability.

Reduced-flow effects, barrier effects, stocking, hydropeaking

From section 1.2.3.3 (additional measures to mitigate impacts) it is assumed that barriers to migration will be the most important impact of the HPP. It should be emphasized that habitat degradation due to major hydrological impacts (water abstraction, flooding by the reservoir, and hydropeaking) will be the most direct and damaging impact to the aquatic systems. **Stocking cannot compensate for habitat degradation** and is seldom considered a viable measure or even compatible with the primary goals of Category II National Parks, which are primarily constructed to preserve biodiversity and ecosystem function. Stocking of salmonid

fishes is notoriously ineffective and often results in a suite of additional problems for the native fauna.

The report states that **minimum flow requirements (MFR)** will be applied and that this will result in no reduction in the ecological status of the affected water bodies. This statement is not compatible with facts or the existing EU legal framework. The affected rivers are in pristine or nearly pristine condition, and I know of no MFR legislation (e.g. in Europe), which would not lead to a significant ecological degradation as defined under the Water Frame Directive (WFD) of the European Union. MFR are compromises aimed at maintaining "some" functional or socio-economic components of a river within our cultural landscapes. They are not measures of conservation or nature protection that were designed or envisioned to be applied to nature reserves or National Parks where the maintenance of natural ecological processes and biodiversity are primary management goals. Even if **State-of-the-art minimum flows associated with hydropower development in Europe are applied, they will severely impact ecological function, productivity and biomass of the fish and aquatic invertebrate populations of the affected rivers.**

Hydropeaking

The survey does not explicitly address the impacts of hydropeaking on the Mala Reka or downstream water bodies. Fluctuating water levels due to hydropeaking (the project is planning peak flows) are among the most large-scale and pernicious ecological impacts of particular HPP constructions. Hydropeaking can produce permanent ecological effects for 10s, or even up to 100 km or more on the downstream systems. Most often, there is a strong reduction in the primary food base (i.e. macrozoobenthic productivity and biomass) and disruption of spawning and rearing of young fishes. The effects of hydropeaking are often so pervasive that large reaches of river landscapes in Europe have been declared as "Heavily-modified" under the EU WFD for this impact alone, and thus largely exempt from the overall goal of reaching good ecological status. **Thus, in contrast to the statements in the biological survey (and reference to the EIS), it is not possible to envision such a project without significant reductions in the ecological status of the affected water bodies, including river reaches downstream, which have not even been considered.**

Aquatic invertebrates

The biological survey report is in part impressive in that many different organismal groups have been surveyed, and as expected, a great deal of biodiversity is found in the Mavrovo National Park and surrounding areas. However, to underscore the difficulty in gaining a rough estimate of the levels of biodiversity that will be affected by this project, I note that the large order Trichoptera (caddis flies), one of the most diverse and functionally important groups of macroinvertebrates in these systems is listed as "Trohoptera", and for this group "**NO" species are reported**, rather only "empty houses". **Macroinvertebrates are highly sensitive to HPP development and there is no doubt that significant negative impacts in biodiversity, productivity and biomass will occur, and these reductions can affect many aquatic, semi-aquatic and riparian species that depend on this fauna as a food base.**

Sincerely,

Steven Weiss, Assoc. Prof. Dr.

To :
ELEM (Elektrani na Makedonija)
European Bank for Reconstruction and Development (EBRD)

Brussels, 30th October 2013

Ref: WV 13/122

Subject: Comments on the final report for monitoring of the biodiversity in the phase before construction of the project "Boskov Most"

Dear Sir,

We would like to thank you for the opportunity to give some general comments on the final report of the project "Boskov Most" (AD Elektrani na Makedonija, 2013; Biodiversity Survey in the Pre-construction Phase over the area of HPP Boshkov Most – annual Report; Empiria EMS, Skopje; Tehnolab, Skopje; Society for Study and Protection of Birds of Macedonia, Skopje).

Overall, we are concerned about the impacts that this project, largely to be carried out in a National Park, undoubtedly will have on the ecological process and numerous plant and animal species. We are worried of the conflict of this project with the primary management goals of this IUCN Category II National Park.

The observations we want to share are:

- the section on methods used for the monitoring is not very detailed. It is for instance not clear how many visits were made.

- there are no quantitative estimates of the present bird populations in the report. Therefore it is not clear how the conclusions are drawn for the degree of impact to these species populations.

- the threat categories are out of date and some names are mistaken (this gives the impression of general low quality)

- and most importantly: what is the basis for the conclusion? As there is no information on the proportion of the population that will be affected, there is no qualitative assessment of the potential impact. It would have been helpful to have at least a crude quantitative estimate e.g. a stratification of

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the area by habitat type and some sort of assessment which habitats will be most/least affected, their area of distribution in the National Park and hence a proxy of the animal populations affected.

We remain open for future consultations and advices,

Yours sincerely,

MSc Boris Barov Conservation Action and Science Department of BirdLife Europe

MSc Willem Van den Bossche

Stichting Birdlife Europe

IUCN/SSC Otter Specialist Group

… leading global otter conservation

October 22, 2013

Statement Concerning the Establishment of the Hydro Power Plant Boshkov Most

Two reports, the "Biodiversity survey over the area of HPP Boshkov Most" and the "Environmental Monitoring over the Area of HPP Boshkov Most" have been brought to the attention of the IUCN-SSC Otter Specialist Group. As the chair of this group of international otter experts I would like to comment and express my concerns on the chapter concerning the threatened Eurasian otter (*Lutra lutra*). Few pristine river ecosystems remain in southeastern Europe, like the Mavrovo National park, where otters can flourish and so each one is precious.

The authors of the study appear to be unfamiliar with the habitat requirements and the ecology of the otters in this region and the effects that the HPP Boshkov Most may have on the resident otter population. The proposed drainage of the streams, detailed in this report, will have an immediate negative impact on the fish habitats and fish populations in these watersheds. The same will be true for the amphibian populations, both favored prey categories for otters. As a result, the otter's food supply will be affected year around.

Further, no details are provided concerning the effects of the proposed daily flushing regimen of the main rivers Mala Reka and Radika. Such repeated and drastic water level changes can only have a severe detrimental effect on both otters and their prey.

The construction of the HPP will also severely damage the riparian vegetation along the river. This will also have a negative impact on the otter that requires riparian cover for its dens and, in particular, for raising its cubs. The otters will also abandon these construction areas due to the human disturbance and noise levels.

You state in the report that *"the reduction of the quantity of water in the affected watercourses, i.e. the reduced flow, will ease the access to food"* (page 73 of the report) which underlines the absence of the authors' basic understanding of otter ecology and behavior as well as the functioning of river ecosystems.

In our opinion this biological diversity survey remains superficial, incomplete and misleading with regards to the otter, clearly not taking the risks to this threatened species seriously.

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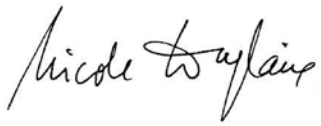
Boshkov Most will have direct and severe impact on the resident otter population which is unlikely to survive.

The IUCN-SSC Otter Specialist Group therefore requests that the EBRD conducts more detailed assessments to determine how the local otter populations will be impacted by the HPP Boshkov Most and what palliative measures need to be taken.

We remain at your disposal to further assist and advise you for this important project.

Sincerely



Dr Nicole Duplaix, Chair

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To
Elektrani na Makedonija (ELEM), and
European Bank for Reconstructiona and Development

Muri/Bern, Switzerland, 1 November 2013

Comments to the biomnitoring study for HPP Boskov Most, regarding the Balkan lynx *Lynx lynx balcanicus*

The risk of HPP Boshkov Most to the Critically Endangered Balkan lynx *Lynx lynx balcanicus* (Kryštufek 2012) population remains one of the key controversial aspects, which the study for biomonitoring of the biological diversity in the region of Boskov Most HPP failed to answer.

The Report argues that the HPP construction would not pose a big problem to the lynx. We think this is a wrong conclusion and that any additional loss of habitat or increased disturbance will negatively affect the lynx or its prey (see below). However, this is a matter of interpretation. We strongly argue that, as long as the Balkan lynx is "Critically Endangered" (Melovski 2012), no further risk must be put on this species.

We believe that the construction will have a negative impact on the lynx, and a serious study on this important issue has not been made. To undertake construction without addressing this issue in a scientific manner is not acceptable. Comprehensive scientific ecological studies on lynx populations in Macedonia by KORA, the Macedonian Ecological Society and NP Mavrovo over the last seven years (2006 – 2013) are not properly reflected in the report. Facts have been omitted, even though all the relevant documents were provided to the experts involved in the preparation of the study for the biodiversity monitoring, as agreed during earlier consultation meetings.

The recent population estimates (Melovski, 2012) yield an alarming 22 to 40 individuals in the potential distribution range of the Balkan lynx and not "around 100" as stated in the report. Furthermore, the comprehensive surveys in Macedonia and neighbouring countries have revealed that Mavrovo hosts the only remaining population nucleus of lynx, thus holds the last source population with reproduction of the Balkan lynx. We strongly caution against putting any additional stress on this source population as it may lead to the extinction of one of the most threatened mammal populations in Europe.

Recent camera-trapping study (Stojanov *et al*., 2013) conducted in within the boundary of NP Mavrovo showed that the resident female in the southern territory of the park had offspring last year (the female was photographed near the village of Gari in 2008, Mal Brzovec in 2012, 2013 and Jadovska Reka - near village Selce in 2010, 2013). A radio-telemetry study in 2010 and 2011 showed that, for most of the period he was followed, the territory of the resident male covered exactly the same area of the planned construction for Boskov Most.

It terms of the habitat preferences of the Balkan lynx, the facts in the report are misleading and imply that conflict between the lynx population and the construction site will be avoided. Eurasian lynx and thus the Balkan lynx much prefer forested habitats and transitional woodland-shrub (Avukatov in prep.; Ivanov in prep.), these the habitats that will be destroyed by HPP Boshkov Mostsconstruction. The Report states "…lynx move and feed mostly in the upper parts of Jadovska and Tresonechka river watersheds..." Our field research does not support such an assumption.

Actually, the main prey item in the Balkan lynx' diet is the roe deer (57% of the radio-tagged lynx's prey in Mavrovo were roe deer and only 28% were chamois, Melovski et. al. 2010, 2011) and NOT the chamois as stated in the Report.

We concur that the main chamois habitat in the construction area won't be threatened. However, the roe deer habitat will be affected by the HPP construction. The short-term disturbance might lead to temporal dislocation of the populations of the chamois and the roe deer, but also of the lynx. The short-term disturbance, although temporary, may have a decisive negative impact on the lynx, which is at the brink of extinction. If both, prey and predator are temporarily depressed, prey might recover, but the predator may not because any additional stress to a critically endangered taxon could push it to extinction.

Dr. Urs Breitenmoser
Co - chair,
IUCN/SSC Cat Specialist Group

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