

# Biological Assessment

## Yusufeli Dam & Hydro-Electricity Power Project's Environmental Impact Assessment

*Prepared for the Berne Declaration and Friends of the Earth France*

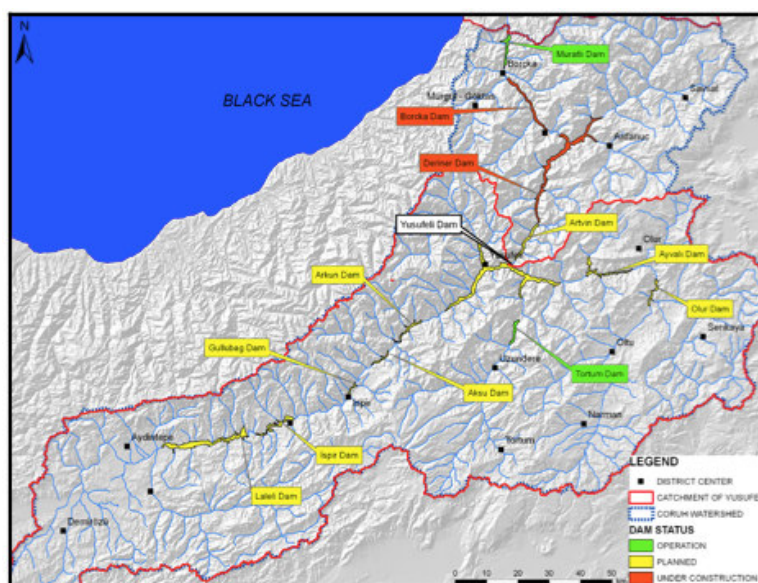
*By Appropriate Pty Ltd – Melinda Lambourne*

*Date: 9/10/06*

### Brief summary

---

The proposed Yusufeli Dam and Hydro-Electric Power Project (HEPP) is to be located on the Coruh River in the eastern Black Sea region of Turkey (ENCON 2006, p. IV 1). The Yusufeli Dam is the second largest dam within the larger Coruh River Development Plan which plans to build 13 dams, of which 2 are operational and another 2 are under construction (ENCON 2006, pp. executive summary (ES) 31 & IV 3)(See map 1). 8,320 GWh/year will be produced by 10 dams built on the Coruh River (ENCON 2006, p. ES 5).



Map 1: The location of the Coruh River Development Plan dams in eastern Turkey (Source: ENCON 2006, p. IV 3).

This project aims to increase Turkey's hydro-electricity capacity for social, economic and industrial development (ENCON 2006, p. III 1). The Yusufeli Dam will have 33 km<sup>2</sup> surface area, 60 km total length (including tributaries), and an average width of 550 m (ENCON 2006, p. ES 5)(See map 2). Operating 8 hours per day over peak period it will produce 315-540 MW and will cost 855 million USD (ENCON 2006, p. ES 6). The proponents of this project are the Turkish government and a consortium consisting of: Dogus Insaat ve Ticaret AS (Turkey) as leader; Alstom (Switzerland, France and Brazil); Coyne and Bellier (France); and Dolsar muhendislik (Turkey) (ENCON 2006, p. ES 2).



## Guidelines and compliance

---

The Yusufeli Dam and HEPP needs to comply with Turkish law and the Organisation for Economic Cooperation and Development recommendations proposed for Export Credit Agencies (ECAs). Turkish laws are not considered in this report.

This EIA is ‘guided’ by the following World Bank policies: Environmental Assessment (OP 4.01); Natural Habitats (OP 4.04); Involuntary Resettlement (OP 4.12); and Cultural Property (OP 4.11) (ENCON 2006, pp. ES 4 & I 6). This report only considers compliance with OP 4.01 and OP 4.04. The proponents did not attempt to comply with the policy on Projects on International Waterways (OP 7.5).

This project does not fully comply with Environmental Assessment (OP 4.01) as this EIA does not include:

- sectoral or regional environmental assessments even though these are required where projects have sectoral and regional impacts (paragraph 7).
- take into account ‘trans-boundary and global environment aspects’ (paragraph 3);
- ‘eliminate or offset adverse environmental impacts, or to reduce them to acceptable levels’ (Annex A paragraph 3).

### *Environmental Assessment (OP 4.01)*

OP 4.01 requires Regional Environmental Assessment (EA) for regional projects and the Yusufeli dam and HEPP is part of the Coruh River Development Plan which proposes 13 dams in the Coruh Catchment, and a total of 27 dams are planned for the Coruh Catchment (WWF 2005, p. 131). Individual EIAs can and do mask serious cumulative impacts. Raff (1997) noted that one of the 10 principals for assessing the quality of EIAs is that an EIA need not be restricted to site specific environmental effects. In 2003, when consulted by the proponents the Turkish Society for the Conservation of Nature and WWF stated that a comprehensive regional assessment is required for the Yusufeli Dam and HEPP (ENCON 2006, p. AK 10). Three years later there is still no Regional EA. **A Regional EA is essential and not optional for the Yusufeli Dam and HEPP.**

In addition, a Sectional EA is needed for the hydroelectric and irrigation sectors in Turkey focusing on instream dams including strategies, policies and plans. In 2004, 37% of Turkey’s hydro-electricity potential was operational, 8% was under construction, and the remaining 55% were in planning (ENCON 2006, p. I 6). It is unclear how many more dams are planned for Turkey, their location, and how many more streams and the extent to which these streams will be affected. **A Sectoral EA is essential for a full understanding of the cumulated affects of current and future dams on Turkish streams.**

Proponents have not attempted to comply to ‘trans-boundary and global aspects’ (OP 4.01 paragraph 3). Also, the proponents have not complied with the World Bank policy on Projects on International Waterways (OP 7.5) which applies to ‘any river, canal, lake, or similar body of water that forms a boundary between, or any river or body of surface water that flows through, two or more states’ (paragraph 1a). This policy also applies to ‘hydroelectric, irrigation, flood control, navigation, drainage, water and sewerage, industrial, and similar projects that involve the use or potential pollution of international waterways’ (paragraph 2). These guidelines note it is of great importance for countries ‘making appropriate agreements or arrangements for these purposes for the entire waterway or any part thereof’ (paragraph 3). At present, there are

no agreements between Georgia and Turkey on water access rights. ‘A regional power that holds an upstream position is in a better situation to implement projects without consultation, and this has been the case in Turkey, India and China’ (World Commission for Dams (WCD) 2000, p. 174). WCD (2000, p. ii) notes ‘when rivers cross borders within or between nations, water scarcity leads to water stress which leads to water wars’. This is an unstable region and it cannot afford more reasons for conflict but this further project adds to regional tensions. **A water access rights agreement between Georgia and Turkey is essential.**

The environmental management plan does not ‘eliminate or offset adverse key environmental impacts, or to reduce them to acceptable levels’ (OP 4.01 Annex A paragraph 3). Appropriate baseline data is required to be able to affectively design appropriate mitigating measures for the 35 threatened species (see Baseline Data section). There are no specific mitigation measures for the 21 threatened plants. There are some mitigation measures for the Wild Goat including the increase in size of the existing wildlife protection area but it is unclear whether the other mitigating measures are the most appropriate. There are no specific mitigation measures for the other 11 threatened mammals. There are no mitigation measures for the 2 threatened fish species or the other 6 fish species that require river or creek habitat. **The mitigation measure for this project do not ‘eliminate or offset adverse environmental impacts, or to reduce them to acceptable levels’** (Annex A paragraph 3).

#### *Natural Habitat (OP 4.04)*

This EIA does not comply with the Natural Habitat (OP 4.04) in the following areas:

- ‘does not support projects that, in the Bank's opinion, involve the significant conversion or degradation of critical natural habitats’ (paragraph 4);
- ‘Wherever feasible, Bank-financed projects are sited on lands already converted (excluding any lands that in the Bank's opinion were converted in anticipation of the project). The Bank does not support projects involving the significant conversion of natural habitats unless there are no feasible alternatives for the project and its siting, and comprehensive analysis demonstrates that overall benefits from the project’ (paragraph 5);
- appropriate environmental expertise is used ‘to ensure adequate design and implementation of mitigation measures’ (paragraph 7); and
- proponents to ‘incorporate into their development and environmental strategies analysis of any major natural habitat issues, including identification of important natural habitat sites, the ecological functions they perform, the degree of threat to the sites, priorities for conservation, and associated recurrent-funding and capacity-building needs’ (paragraph 9).

#### *Export Credit Agencies and lack of compliance*

‘Unlike the major development financing agencies, ECAs generally lack policies on environmental and social issues and do not necessarily adhere to internationally accepted standards and guidelines. Experiences from the Three Gorges dam in China, Ilisu dam in Turkey, Maheshwar dam in India and San Roque dam in the Philippines underline the need for ECAs to examine closely the social and environmental impacts of project they support. This absence of common standards among ECAs leads to ad hoc competitive decision-making’ (WCD 2000, p. 189).

It is unclear the reasons for the proponents not fully complying with the World Bank policies.

However, in WCD report (2000, p. 189) eight in-depth case studies (including one from Turkey) found three basic reasons for lack of compliance to World Bank guidelines:

- ‘The tendency for large projects to proceed under a restricted decision-making process negotiated between governments, lenders and contractors with little public oversight, little participation by affected parties and limited disclosure and public access to information. In many cases lack of clear monitoring procedures also limited public scrutiny.’
- ‘The lack of sanctions for non-compliance, either at national or international level. In many cases local affected communities were unable to defend their interests when faced with a strong centralized government especially in countries with weak legal safeguards and recourse mechanisms.’
- ‘The dependence, in many cases, on the good faith of sovereign States and public pressure to resolve disputes, adjudicate claims and ensure compensation for those who have suffered wrongs. The absence of legal sanction or, where this exists, difficulty in accessing it made it easier for developers (especially governments) to escape the consequences of non-compliance. The costs involved in seeking legal remedies were often prohibitive for those who may have been negatively affected.’

## **Project description**

---

The proposed dam wall will be: 270 m high; have the surface area of 33 km<sup>2</sup> at high water level; 60 km long (including tributaries Barhal, Oltu and Tortum); average width of 550 m; maximum depth of 215 m; and be the second largest of 13 planned dams in Coruh River Development Project (ENCON 2006, p. ES 5). WWF (2005, p. 131) states that a total of 27 dams are planned for this catchment – Coruh River Development Project dams and other dams. The 540 MW power station will include; 3 turbines, a 63 m wide spillway, 2 diversion tunnels, cable head yard and a switchyard (about 8 km upstream) (ENCON 2006, p. ES 5). Quarries and borrow areas will be upstream of the dam site and excess material will be stored at a disposal site (ENCON 2006, p. ES 5). Permanent service roads, right and left bypass roads, temporary main service roads, secondary main service roads and two relocation roads (Artvin-Bayburt and Artvin-Erzurum) will be built (ENCON 2006, p. ES 6). Camp facilities both permanent and temporary will be built to house 1,800 workers and 100 people during its operation (ENCON 2006, p. ES 6). A number of new power lines (380 kV and 154 kV) have been built for the lower and middle Coruh River Development Plan (ENCON 2006, p. ES 6). The dam will take appropriately 7.5 years to build and cost 855 million USD (ENCON 2006, p. ES 6). The EIA has provided maps showing the location of project elements as well as technical drawings (ENCON 2006, Chapter 4).

## **Site description**

---

Vegetation maps have been produced to help visualise the affected area (ENCON 2006, AE Annex E1 & E2). Also, there are tables showing agriculture, settlements and vegetation type affected by the dam and its surroundings. There is no land-zoning map which is needed to know the legal status of the affected land.

## Baseline data

---

Biological data was collected by: review of pertinent literature; field studies carried out in the project area; high resolution Satellite image interpretation; communication with the inhabitants in the study area during the field studies; and consultation with nature conservation administration and related agencies and institutions concerned (see ENCON 2006, pp. V 59-60). Previously, biological field studies were carried out in 1998 and 2002 (ENCON 2006, p. AE 9) but it is unclear of the methods and results of these surveys. The methods used for listing the species at the study site, although it is unclear how the bat data was collected (ENCON 2006, Appendix E). Generally, these methods could not be exactly repeated because of the lack of precise detail. General distribution data is presented in this EIA (eg occurs in Coruh Valley) but it is unclear the source of this data.

The sampling methods for amphibians, reptiles and insects were probably insufficient. In the methods it only mentions collecting water reptiles and amphibians by scoops and land reptiles and amphibians searching under rocks and logs (ENCON 2006, p. AE 33). For frogs a combination of listening for frog calls, spotlighting, searching within habitat and call recording should be used (New South Wales Department of Environment and Conservation (DEC) 2004, p. 78). For reptiles a range of sampling techniques are necessary including pitfall trapping, active searching and spotlighting on foot (DEC 2004, p. 79). Insects were only sampled using nets or collection by hand (ENCON 2006, p. AE 34). General surveys often involve the use of several techniques that target different groups of insects but the use of a range of techniques will give an estimate of the species diversity. However is unlikely to provide an exhaustive inventory (DEC 2004, p. 98).

Seasonal surveys maybe needed to ensure that range of species that occur in this area are identified. However, in 2004, flora and fish surveys only occurred in May, June, July and August and mammals, reptile, amphibian and invertebrate surveys in May, June and July (ENCON 2006, p. AE 22). However, it is unclear when the 1998 and 2002 occurred.

**The biggest problem with the baseline data is that it only identifies the species present. The baseline studies do not enable the prediction of impacts of Yusufeli Dam and HEPP on the identified threatened species.** Therefore effective mitigation measures cannot be designed. To predict the impact on threatened plant species the following information is required for each species: species and population location; population area and size (or extent); reproductive state; age structure; land conservation status; threats (DEC 2004, p. 74); proportion of species within a protected area and the status of protection; habitat needs of each species and existing habit quality; fragmentation of populations; and proportion of species adversely affected. To effectively identify the impact of the Yusufeli Dam and HEPP on the fauna species the following information is required for each species: where each threatened species exactly occurs in the study area; where exactly each threatened species occurs in Turkey; how each threatened species use the study area; threats to each species in this area and nationally, and internationally and the significance of each threat; habitat needs of each species and existing habit quality; species abundance; fragmentation of populations; and proportion of species with a protected area and their protection status; and proportion of species adversely affected.

## Impacts

---

The authors of Yusufeli Dam and HEPP have not referred to other dam studies literature when predicting the impacts of this proposal.

*Wildlife protected area:* 1,460 ha (or 6%) of 23,200 ha Coruh Valley Wildlife Protection Area will be lost (ENCON 2006, p. ES 23). The dam will be in the centre of the Coruh Valley Wildlife Protection Area and further divide this area into 4 parts (ENCON 2006, p. V 104)(see map 2). It is unclear of the exact **amount** of protected land lost from the: Artvin dam, roads, switch yard, power station, power lines, quarries, borrow areas, camp and construction facilities, storage and disposal sites and any other relevant direct or indirect project components. Also, it is unclear if other protected areas in the Coruh Catchment will be affected by the 27 proposed dams in the Coruh Catchment.

*Plants:* A total of 509 plant taxa were identified in the study area and of these 21 taxa are listed as either critically endangered, endangered or rare in the Turkish Red Book for Plants (ENCON 2006 AE Annex B Table B1 pp. 1-36 & Table B2 pp. 1-3, Ekim et al 2000). Seven taxa are critically endangered, 5 taxa are endangered, and 9 taxa are vulnerable (ENCON 2006, AE Annex B Table B2 pp. 1-3). Of these taxa all but one are endemic to Turkey and of these 2 (or 10%) are only located **only** in the Yusufeli and its surroundings, 8 (or 38%) **only** in Coruh Valley, and 6 (or 29%) **only** in Artvin-Erzurum region (ENCON 2006, AE Annex B Table B2 pp. 1-3). See Appendix A for summary of threatened plant information.

The impacts on the threatened plants of the Yusufeli Dam and HEPP **cannot be predicted because of the lack of baseline data on each of these threatened species**. However, it can be stated that the **Yusufeli Dam and HEPP will adversely affect potentially 21 threatened plant taxa** especially 10 threatened plants that only occur in the Coruh Valley or Yusufeli and the surrounding area. Furthermore, the cumulative impact of the 27 planned dams in the Coruh Valley is unknown. In 2003, WWF noted that ‘Coruh River Basin is located in an area that is among 200 globally important ecological regions determined by WWF’ (ENCON 2006, p. AK 10). The Coruh Valley is listed as one of the 122 identified important plant areas of Turkey (WWF 2005, pp. 129-131) and the Yusufeli Dam is located in the middle of this identified important plant area. WWF (2005, pp. 129) notes that this valley is one of the most endemic rich areas of Turkey with 104 threatened taxa of which 67 are endemics. In the Coruh Valley there are 6 globally threatened taxa (2 found in the Yusufeli study area), 61 European threatened taxa (20 found in Yusufeli study area) and 37 Turkish threatened taxa (WWF 2005, p. 131). Furthermore, WWF (2005, p. 131) identifies the greatest threat to these plant taxa are the 27 dams planned for the Coruh River and its tributaries. Therefore, **potentially these 27 dams will adversely affect 104 threatened plant taxa**. However, to predict the actual impact of these 27 dams a cumulative impact assessment is urgently needed.

Thirteen vegetation communities are identified in the Yusufeli Dam and HEPP study area and it is **unknown if any of the identified communities are threatened as there is no conservation status for certain habitat types in Turkey** (ENCON 2006, p. V 65).

This EIA concluded that the overall impact on the identified threatened plants was not significant (ENCON 2006, p. VI 95).

*Mammals:* 24 mammals are recorded in the Yusufeli dam and HEPP study site of which 12 are threatened – either endangered, rare or vulnerable in Turkey (Demirsoy 2002, ENCON 2006, pp. V 73-75). Two of these threatened species are also listed on the IUCN Red Data Book as vulnerable - the Wild Goat and the Mediterranean Horseshoe Bat (ENCON 2006, pp. V 73-75, IUCN 2006). There is an error in table V.22 as the Lesser Horseshoe Bat is listed as vulnerable instead of least concern on the IUCN red list (IUCN 2006, ENCON 2006, p. V 73). The threatened mammals are: the endangered Wild Goat and Alpine Chamois; the rare Persian Squirrel, Forest Dormouse, Eurasian Badger and Wolf; and the vulnerable Lesser Horseshoe Bat, Mediterranean Horseshoe Bat, Greater Mouse-eared Bat, Schreiber's Bat, Pipistrelle Bat, and Grizzly Bear (Demirsoy 2002, ENCON 2006, pp. V 73-75). Also see Appendix B.

The impacts on the threatened mammals of the Yusufeli Dam and HEPP **cannot be predicted because of the lack of baseline data on each of these threatened species**. However, it can be stated that the **Yusufeli Dam and HEPP may adversely affect potentially 12 mammals**. Furthermore, the cumulative impact of the 27 planned dams on these and other threatened mammals in the Coruh Valley is unknown.

The major impacts identified by this EIA to the Wild Goats are: disturbance of drinking areas and collision by vehicles travelling on the roads near the dam (ENCON 2006, pp. VI 98-99). The Yusufeli and Artvin Dams and HEPPs will further fragment the Coruh Valley Wildlife Protection Area into four although this EIA states that the Yusufeli Reservoir would not lead to effects such as isolated of Wild Goat populations as they are already isolated by the rivers (ENCON 2006, p.VI 97). However, there is no evidence presented to support this claim. IUCN identifies the major threats to Wild Goats as: habitat loss and degradation by livestock and wood extraction; hunting; change in native dynamics through competitors and hybridization; and human disturbance through recreation and tourism (IUCN 2006). It is unclear how the new roads and dams will further threatened the Wild Goat populations by increased access. For example, increased access would probably lead to an increase in hunting that has been identified as the greatest threat to the Wild Goats in this area (ENCON 2006, p. VI 99). Increased access may lead to an increase of domestic goats in the Coruh Valley Wildlife Protection Area leading to competition for food (ENCON 2006, p. 15) and the risk of hybridization. Also, local ecotourism is being considered for the Coruh Valley Wildlife Protection Area and this may further disturb the Wild Goats (ENCON 2006, p. VIII 15).

The Forest Dormouse is the only other threatened mammal mentioned in the impact section of this EIA (ENCON 2006, pp. VI 99-100). The Forest Dormouse will lose almost all of its habitat in this study area, however, this EIA concluded the impacts on the Forest Dormouse of this project is insignificant (ENCON 2006, pp. VI 99-100). No other impacts were identified to the remaining 10 threatened species in this study area (ENCON 2006, p. VI 100).

*Fish:* 12 species were identified at the study site and it is unclear of the threatened fishes as there is no Turkish threatened fish species list. However, from government fishing restrictions potentially 2 species could be threatened - the Black Sea Salmon (*Salmo trutta labrax*) and Brown Trout (*Salmo trutta macrostigma*) (ENCON 2006, p. V 90). The Black Sea Salmon migrates up the Coruh River for spawning and this will be interrupted by this dam and other dams (ENCON 2006, p. V 89). The Black Sea Salmon only occurs in the eastern Black Sea area and populations are being destroyed by pollution, illegal fishing and deforming river beds (Aydin & Yandi 2002). The Brown Trout migrates further up the Barhal River for spawning (ENCON 2006, pp. V 88-89). The Brown Trout occurs in the

Barhal River which will be partially inundated by the proposed dam. It is unclear what impact this will have on the Brown Trout. Populations of Brown Trout are already declining because of the introduction of the Rainbow Trout (ENCON 2006, pp. V 88-89).

Populations of fish species present will be adversely affected by the construction of the dam and some species are likely not to recover because of the new water conditions created. Eight out of the 12 species rely solely on creeks and rivers for breeding and with a total of 27 dams planned for this catchment this habitat will be drastically reduced (ENCON 2006, p. VI 108). Furthermore, 55% of Turkey's hydro-electric potential is yet to be developed (ENCON 2006, p. I 6) which will further reduce river habitat for riverine dependent fish species.

*Reptiles, amphibians & invertebrates:* Of the 8 reptiles and 2 amphibians recorded in this study area none are listed on IUCN red list or have important conservation status in Turkey according to Ali Demirsoy (2002) (ENCON 2006, pp. VI 85 & 87, AE Annex C Table C3 p. 1 & Table C4 p. 1). There is no IUCN list of threatened invertebrates and the threatened status in Turkey is unknown (ENCON 2006, pp. VI 105 & AE Annex C Table C5 pp. 1-8). No significant impacts are expected for the identified reptiles, amphibians and invertebrates (ENCON 2006, pp. VI 104-105).

## Mitigation and enhancement

---

To design appropriate mitigation measures appropriated baseline data is required. However, this EIA does not have sufficient data, including a cumulative impact assessment, to predict impacts and thus design appropriate mitigation measures. When designing these mitigation measures no best practice guidelines or literature was referred to.

*Wildlife Protected Area:* The Coruh Valley Wildlife Protection Area was increased from 8,177 ha to 23,222 ha in 2002 partly because of mitigation measures for the impacts of both the Yusufeli and the Artvin dams (ENCON 2006, p. V 101). However, it is unclear how much land will be protected after the completion of both the Yusufeli and Artvin Dams and associated direct and indirect projects. Also, it is unclear of the legal protection status of the species, particularly threatened species, within this reserve and the further fragmentation effects of the dams. However, increasing the protected area is an appropriate mitigation measure.

*Plants:* There are no stated mitigation measures for the 21 plant taxa threatened which is unreasonable (ENCON 2006, Chapter 8). Erosion control measures for reforestation will **not** be a mitigating measure for the threatened plants, in fact, reforestation could further threaten these identified threatened species (ENCON 2006, p. VIII 23). Mitigation measures are required for these 21 threatened plant taxa especially the 10 species that are limited to the Coruh Valley or around Yusufeli and its surroundings, otherwise these species may be threatened with extinction. It is unclear if threatened plant taxa have legal protection status in the Coruh Wildlife Protection Area or occur in this protected area. Detailed threatened species studies are needed to design appropriate mitigation measures (see Baseline Data section).

*Mammals:* Only Wild Goat mitigation measures are designed which are: extension of the Coruh Valley Wildlife Protection Area; deer warning signs on the road; around 5 under-road culverts so goats can assess the dam for drinking; and completing a Wild Goat Management Plan (ENCON 2006, pp. VIII 22-23). However, it is unclear whether access for drinking is the greatest impact of the project on Wild Goats. If access to water is the greatest impact then deer

warning signs are appropriate but it is unclear how successful road underpasses will be. There are no specific mitigation measures for the other 11 threatened mammals. Detailed threatened species studies are needed to design appropriate mitigation measures (see Baseline Data section).

*Fish:* There are no mitigation measures for 2 threatened fish. Appropriate mitigation measures for the Black Sea Salmon would be to build fish ramps for this dam and the other dams affecting its migration. However, with 27 dams to be built it is unclear of the amount of suitable spawning habitat remaining and the effort required to reach these. Sufficient flow will be maintained to support aquatic life downstream of the construction site and when in operation there will be a minimum downstream discharge (ENCON 2006, pp. VIII 23-24). However, the habitat of the river will drastically change favouring lake dependent fish species. An appropriate mitigation measure would be the protection of streams in good condition from development and fishing where these threatened species exist.

## Alternatives

---

This EIA considered the following alternatives: project type, location, dam wall size and operation mode (ENCON 2006, p. VII 1). These alternatives were analysed from an economic and technical perspective (ENCON 2006, p. VII 1). Social, environmental and archaeological criteria were not considered. The hydro-electric option was compared directly with a coal powered plant and the hydro-electric option was considered better because of its economic life and cost (ENCON 2006, p. VII 2). There was no serious analysis of alternative energy options such as wind, solar, biomass, gas fired thermal, nuclear, or geothermal (ENCON 2006, pp. VII 2-3). The location of the dam was considered by comparing either a two or three dam option for the middle Coruh Development Plan using the following criteria: energy produced; project costs; area to be inundated; and cost of land acquisition and resettlement (ENCON 2006, pp. ES 31-33). The two large dam options were chosen because of the energy produced and associated costs (ENCON 2006, pp. VII 33-36). Four different types of dam walls, height of the dam, and operation modes were considered by comparing options using cost benefit analyses. A 'no action alternative' noted that without this project there would be: an effect on Turkey's energy needs; adversely affect other dams in the Coruh River Development Plan; limit social and economic development; and avoid adversely affecting towns and villages, ecosystems and river hydrology (ENCON 2006, pp. ES 34-35).

## Overall impression

---

After reviewing this EIA, we can conclude that the Yusufeli Dam and HEPP have the following major concerns remaining:

- a) 35 threatened species have been identified but only one of these, the Wild Goat, has received any mitigation measures. This is grossly inadequate and does not comply with Environment Assessment (OP 4.01) 'eliminate or offset adverse environmental impacts, or to reduce them to acceptable levels' (Annex A paragraph 3). The baseline data only identified the threatened species present. Further specific information (see Baseline Data section) is essential for each threatened species to be able to predict the impacts of this project and therefore design appropriate mitigation measures.

- b) There has been no consideration of cumulative impacts on the Coruh Catchment which is remarkable considering that 27 dams are going to be built in this catchment - 13 from the Coruh River Development Project (WWF 2005, ENCON 2006, p. IV 3). A cumulative impact assessment is urgently required.
- c) A sectoral EA for hydro-electric and irrigation dams is needed to put the Yusufeli Dam and HEPP into national context. Fifty five percent of the hydro-electricity dams in Turkey are at various planning stages (ENCON 2006, p. I 6).
- d) Given the major international concerns about water resource use, an international water rights agreement is essential between Turkey and Georgia, otherwise, this will add further tension to an already unstable region.

## **Issues to clarify**

---

Below are questions that need clarification.

### *Policy compliance*

1. What reasons do the proponents have for not fully complying to the relevant World Bank guidelines?
2. Why is there no Regional EA even though 27 dams will be built in the Coruh Catchment (WWF 2005)?
3. When will a Regional EA be produced?
4. Has a Sectoral EA been produced, if not when will one be produced?
5. When will a water access agreement between Turkey and Georgia regarding the Coruh River be developed and signed? Why wasn't water access considered in the initial phases of the Coruh River Development Plan?

### *Project and site description*

6. What is the legal status of the land and surrounding land affected by this project? Is there a land zoning map available for this area?
7. How many irrigation and hydro-electric dams have been built or are planned in the Coruh River Catchment (including tributaries) both in Turkey and Georgia?
8. What is the economic life of the Yusufeli dam?
9. What will happen to the Yusufeli dam after its economic life has been completed?
10. What is the total number of hydro-electric, irrigation and other dams already built on streams in Turkey?
11. What percentage of streams and catchments are currently affected by hydro-electric and irrigation dams?
12. What is the total number of hydro-electric, irrigation and other dams planned to be built on streams in Turkey in the future?
13. What percentage of catchments in Turkey will be affected by dams when all the planned dams have been built?
14. How many relatively intact wild rivers are left in Turkey?
15. How many relatively intact wild rivers will be left in Turkey after all the planned dams have been built?
16. Is there an English version of the Turkish Government's strategies, policies, and plans in regards to hydro-electric and irrigation dams? Where can this be found?

17. Has this EIA report been translated into Turkish so affected locals can make comments?

*Baseline*

18. What was the aim, methods and results of the field surveys in 1998 and 2000? What was the timing of these surveys?
19. What is the source of the plant distribution data come from in Appendix E Annex B Table B2 pp. 1-3?
20. What is the source of the mammal distribution data in Chapter V Table V.22 pp. 73-75?
21. What is the source of the reptile and amphibian distribution data in Chapter V Table V.25 p. 87?
22. What were the precise methods used to collect flora and fauna data in 2004?
23. What methods were used to survey bats?
24. Have seasonal fauna and flora surveys been done?
25. Are individual threatened species surveys going to be completed so impacts can be more accurately predicted?
26. Of the reptile, amphibian and insect species identified are any of these endemic to Turkey?
27. Why in ENCON 2006, pp. V 73-75 has some of the mammal data got more than one conservation status listed by Demirsoy 2002?

*Impacts – Protected Area*

28. What is the **total** amount of the Coruh Valley Wildlife Protection Area that will be lost (including other dams, roads, quarries, power lines, camp facilities, disposal and storage sites and developments directly or indirectly associated with the Coruh Dam and HEPP)?
29. Clearly state the legal protection for animals and plants, including threatened species, in the Coruh Valley Wildlife Protection Area.
30. Are there any other protected areas in the Coruh Catchment or nearby? If so, how large are these protected areas, what is their location, and level of protection? Will any of these identified protected areas be affected by any proposed development in the Coruh Valley including the building of dams?
31. What is the percentage of land protected in Turkey and what is the level of this protection?
32. What problems face this wildlife protected area?
33. Can this wildlife protected area adequately protect threatened species?

*Impacts – Threatened Species*

34. What is the exact distribution, using maps, of each threatened plant and animal species identified by this EIA in Turkey?
35. What is the exact location, using maps, of each threatened species identified in this EIA in the project area and in this catchment?
36. List the threats to each of the 35 identified threatened species in this area?
37. What is the population size of each threatened species that will be affected by the dam? What is the population size of each threatened species that occur in this area? What proportion of the whole population will be threatened?
38. Do any of the identified threatened species occur in the Coruh Valley Wildlife Protected Area besides the Wild Goats and Alpine Chamois? What proportion of each threatened species occur in this area?
39. What proportion of each threatened species are in a protected area and what is the level of protection?

40. What is the reproductive state, age structure and abundance of each threatened species identified?
41. What are the habitat needs for each threatened species?
42. What is the quality of the habitat present for each threatened species?
43. How will fragmentation caused by the dams affect each of the threatened species? Will this lead to genetic decline for any of the identified threatened species?
44. How does each threatened fauna species use the proposed dam site (some data has been present in ENCON 2006, pp. V 73-75)?
45. What are the cumulative affects of this dam and other dams in this catchment on these and other threatened species in Turkey?
46. What is the definition of a 'significant impact' and an 'insignificant impact' used for this EIA?
47. Are there any endemic reptiles, amphibian or insect species found at the Yusufeli dam and HEPP site?
48. Which subspecies of Alpine Chamois (*Rupicapra rupicapra*) occur in this region? *Rupicapra rupicapra ssp. asiatica* is endemic to Turkey.
49. From dam development in Turkey, which fish species have been greatly impacted on?
50. From the dams built what percentage have introduced mitigating measures for migrating fish?
51. From future dam building in Turkey what fish species are likely to become extinct, endangered, vulnerable or rare.
52. Have the impacts of past dams built in Turkey being studied? If so, what were the findings?
53. Is there any legal hunting or gathering of the identified threatened species that occurs in this area?

#### *Mitigation measures*

54. Why were there no specific mitigation measures for the 21 identified threatened plant taxa, 10 mammal species and 2 fish species?
55. How was access to water for drinking identified as the greatest impact from this project on Wild Goats?
56. Are there any relevant threatened species management plans or recovery plans? If so, what were the findings and recommendations?
57. What is the Turkish Government's commitment to implementing the recommendations from the Wild Goat Management Plan?
58. Is enforcement of anti-hunting effective in the Coruh Valley Wildlife Protection Area?
59. Are domestic animals, such a goats, a problem in the Coruh Valley Wildlife Protected Area?

## References

---

- Aydin H & Yandi I, 2002, 'The general status of spawning areas of Blacksea trout in the East Blacksea regions (*Salmo trutta labrax* Pallas, 1811)', *E.U. Journal of Fisheries & Aquatic Sciences*, vol. 19, iss. 3-4, pp. 501-506.
- Demirsoy, A 2002, *Genel ve Turkiye Zoocografyasi – General Zoogeography and the Zoogeography of Turkey*, Meteksan, Ankara.
- Ekim, T, Koyuncu, M, Vural, M, Duman, H, Aytac, Z & Adiguzel, N 2000, *Turkiye Bitkileri Kirmizi Kitabı – Red Data Book of Turkish Plants*, Turkiye Tabiatini Koruma Dermegi – Turkish Association for the Conservation of Nature, Ankara, Turkey.
- ENCON 2006, 'Yusufeli Dam and Hydroelectric Power Project Environmental Impact Assessment', Ankara, Turkey.
- IUCN 2006, *IUCN Red List of Threatened Species*, database searches, viewed 12 September 2006, <<http://www.iucnredlist.org/search/search-basic>>.
- New South Wales Department of Environment and Conservation 2004, 'Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities Working Draft', New South Wales Department of Environment and Conservation, Hurstville, NSW, Australia, viewed 7 October 2006, <[http://www.nationalparks.nsw.gov.au/pdfs/tbsa\\_guidelines\\_draft.pdf](http://www.nationalparks.nsw.gov.au/pdfs/tbsa_guidelines_draft.pdf)>.
- Raff, M 1997, 'Ten principles of quality in environmental impact assessment', *Environmental and Planning Law Journal*, vol. 14, no. 3, pp. 201-221.
- World Bank 1999, *The World Bank Operational Manual, Operational Policies for Environmental Assessment OP 4.01*, viewed 12 September 2006, <<http://wbIn0018.worldbank.org/Institutional/Manuals/OpManual.nsf/944eea1d5fb31d95852564a30060b223/9367a2a9d9daeed38525672c007d0972?OpenDocument#“Bank”%20includes%20IDA%3B%20“EA”%20ref>>.
- World Bank 2001, *The World Bank Operational Manual, Operational Policies for Natural Habitat OP 4.12*, viewed 12 August 2006, <<http://wbIn0018.worldbank.org/institutional/manuals/opmanual.nsf/tocall/71432937FA0B753F8525672C007D07AA?OpenDocument>>.
- World Bank 2001, *The World Bank Operational Manual, Operational Policies for Projects on International Waterways OP 7.5*, viewed 12 September 2006, <<http://wbIn0018.worldbank.org/institutional/manuals/opmanual.nsf/tocall/5F511C57E7F3A3DD8525672C007D07A2?OpenDocument>>.
- World Commission on Dams 2000, *Dams and development – a new framework for decision making*, Earthscan, London, UK.
- WWF 2005, *122 Important Plant Areas of Turkey*, WWF Turkey, Istanbul, Turkey.

## Appendix A: Threatened plant from Yusufeli Dam & HEPP

Source: ENCON 2006, Appendix E Annex B Table B2 pp. 1-3 & V 67-69, WWF 2005

	Species	End <sup>1</sup>	TRDB <sup>2</sup>	Distribution in Turkey	Flora book of Turkey	WWF important plants of Turkey <sup>3</sup>
1	<i>Reseda globosa</i>	No	CR	Coruh Valley		
2	<i>Lathyrus woronowii</i>	End	CR	Coruh Valley	Limited to study area & surroundings	Europe-K
3	<i>Ferula mervinii</i>	End	CR	Yusufeli & its vicinity		
4	<i>Anthemis calcarea</i> var <i>calcarea</i>	End	CR	Artvin-Erzurum	1-2 locations	Europe-R
5	<i>Anthemis calcarea</i> var <i>discoidea</i>	End	CR	Artvin-Erzurum	1-2 locations	Europe-R
6	<i>Centaurea straminicephala</i>	End	CR	Coruh Valley	1-2 locations*	Europe-R
7	<i>Centaurea leptophylla</i>	End	CR	Yusufeli & its vicinity	Limited to study area & surroundings	Europe-K*
8	<i>Clypeola raddeana</i>	End	EN	Coruh Valley	1-2 locations*	Global-I
9	<i>Morina persica</i> var <i>decussatifolia</i>	End	EN	Artvin-Erzurum	1-2 locations*	
10	<i>Campanula troegerae</i> f	End	EN	Artvin-Erzurum	Limited to study area & surroundings	Europe-R
11	<i>Verbascum gracilescens</i>	End	EN	Coruh Valley	1-2 locations*	
12	<i>Asperula virgata</i>	End	EN	Coruh Valley		Europe-R
13	<i>Acer divergens</i> var <i>divergens</i>	End	VU	Coruh Valley	1-2 locations*	Global-V
14	<i>Sempervivum staintonii</i>	End	VU	Coruh Valley	Limited to study area & surroundings	
15	<i>Seseli andronakii</i>	End	VU	Artvin-Erzurum	1-2 locations*	Europe-K
16	<i>Bupleurum brachiatum</i>	End	VU	Middle & East Blacksea		Europe-R
17	<i>Bupleurum schistosum</i>	End	VU	Coruh Valley		
18	<i>Centaurea pecho</i>	End	VU	East Blacksea	1-2 locations*	Europe-R
19	<i>Centaurea hedgei</i>	End	VU	Artvin-Erzurum	1-2 locations*	
20	<i>Linaria genistifolia</i> subsp <i>artvinensis</i>	End	VU	Coruh Valley		Europe-R
21	<i>Iris taochia</i>	End	VU	East Blacksea		Europe-R
22	<i>Paracaryum montbretii</i>	End	DD	Artvin-Erzurum	1-2 locations*	
23	<i>Stachys sosnowskyi</i>	End	DD	Coruh Valley	Limited to study area & surroundings	
24	<i>Alyssum artvinense</i>	End	LR (cd)	East Anatolia	1-2 locations*	
25	<i>Chesneya elegans</i>	End	LR (cd)	East Blacksea		Europe-R*
26	<i>Tripleurospermum fissurale</i>	End	LR (cd)	Artvin-Erzurum		Europe-R
27	<i>Paracaryum artvinense</i>	End	LR (cd)	Coruh Valley	1-2 locations*	Europe-R
28	<i>Veronica oltensis</i>	End	LR (cd)	Coruh Valley	1-2 locations*	Europe-R
29	<i>Salvia huberi</i>	End	LR (cd)	Artvin-Erzurum		Europe-R
30	<i>Isatis erzurumica</i>	End	LR (nt)	East Anatolia		
31	<i>Verbascum naticum</i>	End	LR (nt)	Widely distributed		
32	<i>Ballota rotundifolia</i>	End	LR (nt)	Artvin-		Europe-R

				Erzurum		
33	Campanula betulifolia	End	LR (lc)	Yusufeli & its vicinity		
34	Micromeria elliptica	End	LR (lc)	Coruh Valley	1-2 locations*	Europe-R
35	Allium sosnowskyanum	End	LR (lc)	Coruh Valley	1-2 locations*	Europe-R
36	Anacamptis pyramidalis	No		Widely distributed		
37	Orchis punctulata	No		Widely distributed		

- 1 End = Endemic to Turkey
- 2 **CRITICALLY ENDANGERED (CR)** - A taxon is Critically Endangered when it is facing an extremely high risk of EX in the wild in the immediate future.  
**ENDANGERED (EN)** - A taxon is Endangered when it is not Critically Endangered but is facing a very high risk of EX in the wild in the near future.  
**VULNERABLE (VU)** - A taxon is Vulnerable when it is not Critically Endangered or Endangered but is facing a high risk of EX in the wild in the medium-term future.  
**LOWER RISK (LR)** - A taxon is Lower Risk when it has been evaluated, does not satisfy the criteria for any of the categories Critically Endangered, Endangered or Vulnerable. Taxa included in the Lower Risk category can be separated into three subcategories:
  1. **Conservation Dependent (cd)**. Taxa which are the focus of a continuing taxon-specific or habitat-specific conservation programme targeted towards the taxon in question, the cessation of which would result in the taxon qualifying for one of the threatened categories above within a period of five years.
  2. **Near Threatened (nt)**. Taxa which do not qualify for Conservation Dependent, but which are close to qualifying for Vulnerable.
  3. **Least Concern (lc)**. Taxa which do not qualify for Conservation Dependent or Near Threatened.**DATA DEFICIENT (DD)** A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of EX based on its distribution and/or population status
- 3 E - Endangered, Ex – Extinct, I – Indeterminate, K – Insufficiently known, nt – widespread, abundant, O – out of danger, R – Rare, V – Vulnerable.

## Appendix B: Threatened Mammal species by Yusufeli Dam & HEPP

Source: IUCN 2006\*, ENCON 2006, pp. V 73-75, Demirsoy 2002\*\*

Species	Scientific name	IUCN <sup>1*</sup>	AD (2002) <sup>2**</sup>	Use of site	Threats IUCN*
Lesser Horseshoe Bat	Rhinolophus hipposideros	LC	V		1Habitat Loss/Degradation (human induced) (ongoing) 6.2.1Pollution (affecting habitat and/or species) - Land pollution - Agriculture (ongoing) 8.3Changes in native species dynamics - Prey/food base (ongoing) 10Human disturbance (ongoing)
Mediterranean Horseshoe Bat	Rhinolophus euryale	VU	V		12 Unknown (ongoing)
Wild Goat	Capra aegagrus	VU	Nt/E	Feeding Drinking	1.1.4Habitat Loss/Degradation - Agriculture - Livestock (ongoing) 1.3.3Habitat Loss/Degradation - Extraction - Wood (ongoing) 3Harvesting (hunting/gathering) (ongoing) 8.1Changes in native species dynamics - Competitors (ongoing) 8.4Changes in native species dynamics - Hybridizers (ongoing) 10.1Human disturbance - Recreation/tourism (ongoing)
Greater Mouse-Eared Bat	Myotis myotis	LR(nt)	V		NL (not listed)
Schreiber's Bat	Miniopterus schreibersi	LR(nt)	V		NL
Persian Squirrel	Sciurus anomalus	LR(nt)	R/I	Feeding Drinking Nesting	12 Unknown (ongoing)
Forest Dormouse	Dryomys nitedula	LR(nt)	R	Feeding Drinking Nesting	NL
Wolf	Canis lupus	LR(lc)	R (V)	Feeding Drinking Nesting	1Habitat Loss/Degradation (human induced) (ongoing) 5.1Persecution - Pest control (past, present)
Grizzly bear	Ursus arctos	LR(lc)	V		NL
Alpine Chamois	Rupicapra rupicapra	LR(lc)	Nt/E		3Harvesting (hunting/gathering) (ongoing) 8.2Changes in native species dynamics - Predators (ongoing) 11Other (ongoing)
Pipistrelle bat	Pipistrellus pipistrellus	LR(lc)	V	Feeding Drinking Nesting	0No threats (ongoing)
Eurasian Badger	Meles meles	Lr(lc)	R		NL

- 1 **CRITICALLY ENDANGERED (CR)** - A taxon is Critically Endangered when it is facing an extremely high risk of EX in the wild in the immediate future.  
**ENDANGERED (EN)** - A taxon is Endangered when it is not Critically Endangered but is facing a very high risk of EX in the wild in the near future.  
**VULNERABLE (VU)** - A taxon is Vulnerable when it is not Critically Endangered or Endangered but is facing a high risk of EX in the wild in the medium-term future.  
**LOWER RISK (LR)** - A taxon is Lower Risk when it has been evaluated, does not satisfy the criteria for any of the categories Critically Endangered, Endangered or Vulnerable. Taxa included in the Lower Risk category can be separated into three subcategories:  
1. **Conservation Dependent (cd)**. Taxa which are the focus of a continuing taxon-specific or habitat-specific conservation programme targeted towards the taxon in question, the cessation of which would result in the taxon qualifying for one of the threatened categories above within a period of five years.

2. **Near Threatened (nt).** Taxa which do not qualify for Conservation Dependent, but which are close to qualifying for Vulnerable.

3. **Least Concern (lc).** Taxa which do not qualify for Conservation Dependent or Near Threatened.

**DATA DEFICIENT (DD)** A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of EX based on its distribution and/or population status

2 E - Endangered, Ex – Extint, I – Indeterminate, K – Insufficiently known, nt – widespread, abundant, O – out of danger, R – Rare, V – Vulnerable.