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Possible New File

**Hydroelectric Dams at Kárahnjúkar and Nordlingaalda
(Iceland)**

**Report of the on-the-spot appraisal
(18-21 July 2004)**

by

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*Secretariat Memorandum
prepared by
The Directorate of Culture and Cultural and Natural Heritage I*

On-the-spot appraisal report on Hydroelectric Dams at Kárahnjúkar and Nordlingaalda (Iceland)

(18 – 21 July 2004)

1. INTRODUCTION

BirdLife International informed the Secretariat of the Bern Convention of the possible consequences for avifauna if two large dams were constructed at Kárahnjúkar and Nordlingaalda, in Iceland and that it was quite concerned regarding the cumulative effects arising from other installations.

In April 2003, the Bureau of the Secretariat came to know that all decisions regarding the construction of the two dams had already been taken and that according to the preliminary evaluation reports, already drawn up, these projects should not have too great impact on natural assets, particularly birds. However, it was made to believe that if many other proposed projects were implemented, the overall impact could be significant and species and habitats, which were protected by the Convention, could be affected. Consequently, the Bureau instructed the Secretariat to write to the Icelandic Government, informing it that the Bureau was closely monitoring these projects, and asking what long-term projects were foreseen for the areas concerned.

At its following meeting, in September 2003, the Bureau taking note of the Icelandic authorities reply and of further information reported by NGOs, decided to submit this issue to the Standing Committee of the Convention as a possible file. A letter followed this from the Secretariat to the Icelandic authorities asking if a strategic environmental assessment of the energy developments had been carried out.

At the 23rd meeting of the Standing Committee, held in December 2003, six Icelandic and international NGOs brought up this case concerning the building of two hydropower stations in areas of interest for bird species in Iceland and the development of a national Master Plan for hydro- and geo-thermal energy resources.

The delegate of Iceland asked the Committee to bear in mind that the Icelandic economy was mainly based on two major resources: fish and energy. Iceland had made concerted efforts in the last three decades to replace dependence on imported oil products with energy generations from domestic sources, mostly hydro- and geothermal power. Today around 70 % of all energy consumption in the country comes from renewable sources, which do not emit detrimental gasses. The delegate informed the Committee that his government was well aware of the possible impacts on wildlife of hydro-electric dams, so a scientifically based assessment of roughly 40 potential energy projects (both hydro- and geothermal) had been carried out in what constitutes a very important part of a complete strategic environmental assessment of energy development plans in Iceland (this part known as Master Plan for Hydro- and Geo-thermal Energy Resources – first phase). This exercise was near completion and resulted in protecting some areas in the highlands. The delegate of Iceland maintained that in the two cases of Kárahnjúkar and Nordlingaalda, no severe impact on Bern Convention species or habitats (Bern Convention Appendices and Resolutions) had been identified, that the NGO's reports were somewhat misleading and exaggerated, and that both projects had been carried out in full accordance with the environmental legislation of Iceland and international obligations.

The representative of BirdLife disagreed with the figures assessed by the government and claimed that impacts will be strong for the Pink-footed goose (*Anser brachyrhynchus*) and for Harbour (Common) Seals (*Phoca vitulina*), among other species. The Kárahnjúkar project and 15 of the hydropower projects in the first phase of the Energy Master Plan will have a significant negative impact on wildlife in the second largest wilderness area in Europe, affecting as much as 10 % of the pink-footed goose population.

At this stage the delegate of Iceland invited the Standing Committee to carry out an on-the-spot appraisal in 2004. After taking note of all the information presented, the Committee accepted the invitation so that it could have a precise idea on the different data presented.

2. TERMS OF REFERENCE

The Director of Culture and of Cultural and Natural heritage asked the undersigned to carry out an on-the-spot appraisal, that is, to visit the area, make a short report on the subject, and to present it at the next meeting of the Standing Committee to the Bern Convention scheduled later this year. The terms of reference for the on-the-spot appraisal were to:

- Examine the construction projects of the two hydro-electric dams at Kárahnjúkar and Nordlingaalda;
- Assess the possible threats to the local flora and fauna (particularly birds' populations) and habitats;
- Discuss with all relevant authorities, as well as representatives of associations and NGOs;
- Make appropriate recommendations to be transmitted to the authorities.

During the on-the-spot appraisal Gianluca Silvestrini of the Natural Heritage and Biological Diversity Division of the Council of Europe accompanied the undersigned.

3. PROGRAMME OF VISIT

We arrived at Reykjavik on 17 July and were met by Jón Gunnar Ottósson, Director General of the Icelandic Institute of Natural History, who discussed with us the details of our programme, which was as follows:

19 July: Day visit to Nordlingaalda/ Thúfuver.

We were led by Snorri Baldursson, Acting Director General Icelandic Institute of Natural History, and accompanied by Jóhann Óli Hilmarsson, Chairman Fuglvernd – BirdLife Iceland, partners of BirdLife International. We visited the Ramsar site, as well as the dams that were built some 20 years ago on the eastern side of the site. We discussed at length the proposed project for the area.

20 – 21 July – Two days visiting Kárahnjúkar and Héradsflói .

We flew by plane from Reykjavik to Egilsstaðir (east of Iceland) early on 20th for a day visit to Kárahnjúkar Dam area. We could see the works that have already been carried out (new roads, tunnels and the preparatory works at the site of the proposed dam). We visited several parts of the area, which will be inundated by the Hálslón reservoir, and had an overview of the important extensive area of Eyjabakkar, where some 10,000 Pink-footed Geese spend their two-month moulting period. We also visited the public interpretive centre of the whole project set up by Landsvirkjun.

During the day we were accompanied by

Ingimar Sigurdsson, Director at the Ministry for the Environment,
Jón Gunnar Ottósson, Director General of the Icelandic Institute of Natural History,
Gudmundur A. Gudmundsson animal ecologist from the Icelandic Institute of Natural History,
Skarphédinn G. Thórisson from the East Iceland Environmental Research Institute,
Jóhann Óli Hilmarsson, Chairman of the Icelandic Society for the Protection of Birds, and
Kristján Kristinsson, Environment and Safety Co-ordinator for Landsvirkjun.

On 21st we visited the site where the Power-generating Station is going to be built within a tunnel. Then travelled to Héradsflói where we could have an overview of the immense delta from a high point. We visited several sites in the area, which are very important for a variety of bird species, as well as a farm (Húsey) in the heart of the Delta. WE also had long discussions regarding the possible impacts on the whole area. We flew back to Reykjavik in the evening.

During the day we were accompanied by

Jón Gunnar Ottósson, Director General of the Icelandic Institute of Natural History,
Gudmundur A. Gudmundsson animal ecologist from the Icelandic Institute of Natural History,
Skarphédinn G Thórisson from the East Iceland Environmental Research Institute,
Jóhann Óli Hilmarsson, Chairman of the Icelandic Society for the Protection of Birds, and
Kristján Kristinsson, Environment and Safety Co-ordinator for Landsvirkjun.

22 July – a day of meetings and discussions.

The first appointment was with the Minister for the Environment, Ms. Siv Fríðleifsdóttir. During an-hour-long meeting the Minister dwelt on the background information regarding the Kárahnjúkar project and on the Ministry for the Environment's ruling on the assessment plan for the project. She also spoke about the Ministry's proposal for the founding of a National Park north of Vatnajökull Glacier. Ingimar Sigurdsson, Director at the Ministry for the Environment, Sigurdur Armann Thráinsson Head of Division of Nature and Natural resources at the Ministry, and Jón Gunnar Ottósson, Director General of the Icelandic Institute of Natural History were also present. Afterwards Sigurdur Ármann Thráinsson gave us a power point appraisal of the Kárahnjúkar Hydropower Plant.

The next meeting was held at the Icelandic Institute of Natural History where we had long discussions regarding the population of the Pink-footed Goose in Iceland and the impact of these projects on the species. Present for this meeting were

Jón Gunnar Ottósson, Director General of the Icelandic Institute of Natural History;
Snorri Baldursson, Acting Director General Icelandic Institute of Natural History;
Kristinn Haukur Skarphéðinsson, chief of animal ecology division, Icelandic Institute of Natural History; and
Sigurdur Ármann Thráinsson, Head of Division of Nature and Natural resources at the Ministry for the Environment

The last meeting was with representatives of various stakeholders. The meeting was chaired by Jón Gunnar Ottósson, Director General of the Icelandic Institute of Natural History. The participants at this stakeholders meeting were:

Snorri Baldursson, Acting Director General Icelandic Institute of Natural History;
Kristinn Haukur Skarphéðinsson Project Leader for nature research related to the EIA for Kárahnjúkaproject (on the Pink-footed Goose);
Helgi Jensson from the Environment and Food Agency of Iceland;
Thóroddur F. Thóroddson from the National Planning Agency;
Gunnar Gudni Tómasson from VST Consulting Engineers Ltd.;
Sigurdur Ármann Thráinsson from the Ministry for the Environment;
Johann Oli Hilmarsson and Olafur Einarsson from the Icelandic Society for the Protection of Birds (partners of BirdLife International);
Eysteinn Hafberg from Landsvirkjun;
Pétur Ingólfsson from Landsvirkjun
Heiðrún Guðmundsdóttir from Landvernd (NGO)

A long discussion took place about various matters relating to the Kárahnjúkar project as well as the need for monitoring and research, with the salient item being a short paper distributed by BirdLife Iceland representatives regarding measures to reduce and compensate for the environmental impacts on bird life by the hydroelectric project. The points were taken up one by one and discussed and there seemed to be a consensus regarding at least 6 of them.

During the whole programme Gianluca Silvestrini accompanied me at all times for all the site visits, meetings and discussions.

4. BRIEF DESCRIPTION OF THE PROJECTS

4.1 Kárahnjúkar hydropower project

The project consists mainly of damming the river Jökulsá á Dal at Fremri-Kárahnjúkar, and digging a 40-km headrace tunnel from the dam site to the powerhouse in Fljótssdalur. The dam together with two others at Desjarárdalur and Saudárdalur will form a 57-km² reservoir (Hálslón) reaching up to the glacier. The river Jökulsá í Fljótssdal will also be dammed at its upper part, to form another reservoir (Ufsarlón) from which water will be diverted through another headrace 13.5 km tunnel to run into the tunnel from Hálslón. The water would then be discharged from the power station into the river Jökulsá í Fljótssdal. These works also entail the building of some 100 km. of roads and tracks to reach the dams' sites and tunnel openings.

4.2 Nordlingaalda hydropower dam (Thjórsárver)

An original plan in the 1960s by Landsvirkjun to construct a reservoir, which would have virtually inundated the Thjórsárver wetlands, was abandoned in the 1980s due to public pressure. Again, plans in 2001 by Landsvirkjun proposing a reservoir that would cover an area of more than 60 km² were reduced to a reservoir of 29 km². In January 2003 the Ministry for the Environment ruled that the project could only proceed with a reservoir of 3 km², entirely outside the protected area, but it included the provision for an upstream sedimentation basin. Two months later Landsvirkjun submitted a different proposal to Parliament for a dam that would create a reservoir larger than 6,4 km², but in the following September, it announced that it will shelve its plans for the project for at least four years.

5. DISCUSSION, CONCLUSIONS & RECOMMENDATIONS

In this discussion I shall of course refrain from conversing on the social and economical benefits, or otherwise, of the projects, or on any other subject related to the projects, other than those specified in my terms of reference.

I must state from the onset that the examination of the construction projects and the discussions with the authorities and NGOs were not complicated tasks to achieve, particularly due to the high level of organisation of our visit. But the task of assessing in a three-day visit the possible threats to the local flora and fauna, particularly birds' populations, and habitats resulting from such projects, particularly from the mega-one at Kárahnjúkar, cannot be flawlessly accomplished. In such circumstances one has to rely unequivocally on the information from and the assistance of the relevant local authorities and experts. Fortunately these were not lacking during our visit and together with the discussions held, and the assimilation of a number of documents we could comprehend the complexity of the situation. But even here we were confronted with expressions of "maybe", "probably", "could be", "possibly", etc. which bring us to the conclusion that, in spite of the amount of data compiled and the high-level of ongoing research that has been and still is being carried out by the relevant institutions, there are still several gaps to fill. In this scenario there is indeed a strong case for more vigorous research and monitoring.

We have also come to realise that in many cases, particularly regarding the data on birds, as well as in the identification of the impacts on the flora, fauna and habitats, there is hardly any contestation between the various parties. More often than not the disputes exist due to the difference in the application and interpretation.

I shall deal with each of the projects separately, however the situation of the Pink-footed Goose (*Anser brachyrhynchus*) in relation to the two projects will be presented independently. I shall end this discussion by presenting three sets of recommendations – one dealing with general aspects, a set referring to Kárahnjúkar, and another set referring to Nordlingaalda.

5.1 Kárahnjúkar hydropower project

The main facts, in the case of the Kárahnjúkar hydropower project, are *inter alia* that

- The Hálslón reservoir will have a surface area of 57 km²;
- Increased blowing of dust and sand from the Hálslón shores can harm vegetation on Vesturöræfi;
- 32 km² of vegetated land will be submerged, 93.7% of which is dryland vegetation;
- 137 species of vascular plants, 175 species of moss, 124 species of lichens, 36 fungal species, at least 296 species of small animals were found in the reservoir site (a few species were new for Iceland and new for science).
- Analysis of the vegetation and classification into habitat types show that 11 habitat types are involved;
- Some 24 species of birds breed in the reservoir area, including the Pink-footed Goose (*Anser brachyrhynchus*) (about 570 pairs);
- Important spring and summer grazing grounds for reindeer will be lost, including calving areas for part of the Snæfell herd;

- Changes in the flow and water surface level of Lagarfljót will impact vegetation and birdlife along the banks of the river;
- The basic flow and water conditions of Jökulsá á Dal will be changed and may result in changes to the flora and bird life of Úthérad;
- Changes to the alluvial flats at Héraðsflói are likely to cause a reduction in the number of Harbour Seals (*Phoca vitulina*) in the area.

In a ruling statement by the Ministry for the Environment in January 2001, the proposed project, Kárahnjúkar Power Plant, was accepted on 20 conditions. The developer was requested, amongst others, to:

- Refrain from constructing the diversions at Hafursá, Laugarfell, Bessastaðaa, Gilsárvötn, Sultarranaá and Fellsá and to review the arrangement for the Kelduá dam spillway with a view to reducing as much as possible the environmental impact of the project;
- Investigate, in consultation with the Icelandic Institute of Natural History, the vegetation and bird life in the proposed Kelduárlón reservoir site prior to commencing the building of the power plant's second phase;
- Sponsor, in consultation with the Nature Conservation Agency, the monitoring of selected bird populations by Lagarfljót, in Úthérað and on Héraðssandur during the first ten years of plant operations;
- Monitor, in consultation with the Marine Research Institute, the typical communities of benthic animals in Héraðsflói during the first ten years of operation of the power plant.
- Sponsor, in consultation with the East Iceland Environmental Research Institute, the necessary supplemental monitoring of reindeer during the first ten years of power plant operation;
- Prepare a comprehensive plan showing the exact implementation of the measures for reducing soil erosion and deposition by wind from Háslón and an evaluation of their effectiveness.

In its ruling the Ministry evaluated thoroughly all the reports and appeals received regarding this project and always requested the relevant institute or association to assess the impacts. Following are a few examples of brief excerpts from some of their assessments regarding some species:

➤ *Phoca vitulina*:

The Marine Research Institute reported that the changes to the flow of Jökulsá á Dal could conceivably result in a decrease in the number of this species, but on the other hand the impact on the stock on a national scale would not be great.

➤ *Rangifer tarandus*:

The Icelandic Institute of Natural History is of the opinion that Kárahnjúkar Power Plant could affect as much as half of the present reindeer stock. Its size and distribution is determined primarily by hunting. The objective is to maintain the stock of around 3000 animals. These limits are based on maximising the returns from hunting, without putting too much pressure on vegetated areas. It is clear that returns from the reindeer stock will be considerably less following Kárahnjúkar Power Plant than they are today, since reindeer will decrease in number (conceivably by several hundred) in the wilderness areas around Snæfell. More information needs to be gathered on the animals' behaviour if the hydroelectric development takes place and this knowledge should be used to manage hunting in such a way that the future of the stock will not be jeopardised.

- *Species found in the reservoir (regarded either as new for Iceland and/or as new for science):*

On further investigation, the Icelandic Institute of Natural History Institute, states that the two insect species regarded as new for science have been found at other places in the country, while another two that are new for Iceland, *Brevicorum bipartitum* and a parasitic wasp of the genus *Ichneumonidae*, have not been found elsewhere in the country. The two species of lichen new for Iceland, *Collema polycarpon* and *Arthonia glebosa*, have also not been found elsewhere in the

country. However, it must be mentioned that it is not uncommon to find new species when areas such as the reservoir site of Háslón are studied for the first time as thoroughly as was the case here. It is very probable that new species will be found when regional studies are increased, and it is the view of the Institute that the reason these species have not been found here in this country before may be due first and foremost to a shortage of biological research.

One of the bones of contention in this whole saga concerns the amount of impact on vegetation and birds in Úthérad. Substantial changes are expected in the estuary area of the river Jökulsá á Dal, with reefs and islets becoming fewer due to less transport of sediment. Úthérad, is an important bird area, particularly for Red-throated Diver *Gavia stellata* (nesting in unusual density), Arctic Skua *Stercorarius parasiticus* and Whimbrel *Numenius phaeopus* (both species also nesting with unusual density), Greylag Goose *Anser anser* 1600 pairs, c. 10% of the Icelandic population, breed here, and 6000-10000 moulting birds have been counted, and Great Skua *Stercorarius skua* (5% of the Icelandic population), amongst others, breed here.

In its ruling the Ministry for the Environment, stated that it realises that changes in the flow of Jökulsá á Dal will lead to changes in the flora and bird life of Úthérad, but in its estimation the impact has been sufficiently explained, and is of the opinion that no drastic changes are probable in the area biosphere due to the proposed development, taking mitigating measures into consideration. The Icelandic Society for the Protection of Birds (partners of BirdLife International) contends otherwise. Whilst the Institute of Natural History reaffirms that there will be an impact along the rivers on each side of the Úthérad area and on the shores' side, BirdLife Iceland claims that the impact will be on all the bird life in the whole area of Úthérad.

The logic behind the "go ahead" for the Kárahnjúkar hydropower project by the Ministry for Environment *vis-à-vis* the Bern Convention can be summarised by quoting from the ministry's ruling the following extract. In the document this relates to the Háslón area but reflects the Ministry's views for the whole project: *"The biological diversity of the area is great and, pursuant to the Convention on Biological Diversity, Iceland has certain obligations to fulfil concerning the conservation and sustainable use of biological diversity, which in part includes preventing insofar as possible the extinction of species. The Convention entails that, to show regard for conservation and sustainable exploitation, decisions on use, which may impact biological diversity, should be taken in accordance with environmental impact assessment. On the other hand, the Convention does not entail the unconditional protection of species. The Bern Convention on the Conservation of European Wildlife and Natural Habitats entails comparable provisions regarding conservation of the habitats of all species, although emphasis is placed on species in the Annexes to the Convention"*.

Works on this project are in full swing at various sites, digging tunnels, preparations for the building of the dam itself, and digging shafts. The building of the main roads has been completed.

The decision of the Ministry for Environment to give the clearance for the project with a number of conditions referred to above, was given a boost by an independent report "Review and Verification of the EIA for the Kárahnjúkar hydropower project" by the Review and Verification Task Force composed of Stein Hansen, of the Nordic Consulting Group AS, Peter Johan Schei from the Direktoratet for Naturforvaltning, and Bernt Malme of Hydro Aluminium, all hailing from Norway.

The Task Force concluded *inter alia* that:

- It finds that the approach and mitigating measures will be in line with best practice internationally as regards soil erosion and deposition from the Háslón reservoir site.
- Considering the likelihood and uncertainties associated with the various outcomes as regards migratory routes of the reindeer, breeding grounds for birds, and downstream effects on seals and marine life in coastal waters, the experts consulted have concluded that none of these are likely to be of such a nature that it should lead to shelving of the project. This Task Force finds that none of the anticipated impacts on biodiversity in the project will be of a magnitude that violates Iceland's obligations according to international treaties.

- It concludes that the project seems to have limited or insignificant impacts on biodiversity components of international importance. Furthermore, Iceland's obligations under biodiversity related treaties, like CBD, Ramsar and the Bern Conventions cannot be considered violated by the implementation and operation of this project.

5.2 Nordlingaalda hydropower dam (Thjórsárver)

Thjórsárver is fed by the Thjórsá River and is a complex of tundra meadows, with glacial streams, ponds, pools, lakes, marshes, and palsa mires, covering an area of some 120 km² in the central highlands of Iceland. It is a wetland of international importance, designated as a nature reserve (1981) and a Ramsar site (1990). This unique highland oasis is the home of the world largest breeding colony of Pink-footed Goose *Anser brachyrhynchus*. About 6,800 pairs (1996 figures) are known to breed there, and up to 4000 non-breeding birds have been known to congregate to moult in the area. It is also significant for other tundra breeding birds, such as Purple Sandpiper *Calidris maritima* and Red-necked Phalarope *Phalaropus lobatus*.

The developer's latest proposal, which presently has been shelved for the next four years, would dam the river to create the Nordlingaalda reservoir, which would inundate an area of 6,4 km², including a vegetated area of about 0,7 km². Thjórsárver Nature reserve (a Ramsar site) lies immediately upstream of Nordlingaalda. The proposal also includes the provision for an upstream sedimentation basin, which would in reality diversify a high percentage of the flow of the last two remaining unregulated tributaries flowing alongside the protected area.

To my mind this proposal (see description of project – 4.2 above) is somewhat enigmatic. There have been so many changes in the original proposal that one loses track of how the whole thing has reached such an advanced stage. The upstream sedimentation basin, for example, has not yet undergone an EIA.

This highlights and begs the necessity of a cumulative EIA of all hydro and geothermal projects planned. The Master Plan for Hydro and Geothermal Energy Resources in Iceland, which was initiated in 1999, is not yet complete. It should have a definite schedule and, hopefully, some form of legal obligation.

5.3 Pink-footed Goose (*Anser brachyrhynchus*)

The Iceland-Greenland population of Pink-footed Goose *Anser brachyrhynchus* winters in Scotland and England, while that of Svalbard (population estimated at 37,000 birds, and stable) winters in Denmark, Netherlands and Belgium. According to Wetlands International (2002) the population of the Iceland-Greenland population has been estimated at 240,000 birds, with an increasing trend. It has increased very rapidly since 1982, when it stood at about 80,000 birds. Its breeding range is in Iceland and extending into east Greenland.

In a report, which was commissioned by Landsvirkjun as a part of an Environmental Impact Assessment for the Nordlingaalda reservoir, Frederiksen *et al.* (2002) calculate that probably 80-90% of the population nest in Iceland, as the breeding population of Greenland was estimated at 5,000 pairs. The breeding distribution in Iceland ranges from a few pairs at sea level to 800 m high, but most nests occur at a height ranging from 300 to 600 m.

Data available of non-breeding moulting birds date back to 1992. 21,000 were counted all in the highlands, representing some 20% of the non-breeding population at that time. 9000 were found at Eyjabakkar, not far from the Kárahnjúkar hydropower project area, and 4000 at Thjórsárver.

About 14,000 Pink-footed Geese are hunted annually in Iceland, and it is estimated that hunters in Britain take about 25,000. Of these ca. 12,000 are juveniles. There is no sufficient data to find out whether the geese taken by hunters would have died anyway from natural causes.

While it is a fact that the Háslón reservoir will destroy some 570 nesting sites, the proposed hydro-projects, according to the Institute of Natural History, will have little impact on moulting grounds of non-breeding birds.

In the near future the central highlands will be more accessible as better roads are planned. The roads built as a result of the Kárahnjúkar hydropower project have already made large unspoiled areas

accessible. The report by the Institute of Natural History warns that these and other roads will also lead to better access to hunters, and if there are no mitigating efforts applied, there will be more hunting pressure on these geese in Iceland. Recently the Minister for the Environment has proposed a national park that would encompass the whole area.

The degree to which the proposed development will affect Pink-footed Geese is contested between the Icelandic Government and others. In the case of Kárahnjúkar hydropower project, the Institute of Natural History doubts that destroying the nesting sites of 500 pairs of pink-footed geese will lead to a decrease in the stock. Experts claim that the decline in the whole population would be difficult to detect with current monitoring methods. They also would not rule out the possibility that some displaced geese, in spite of being very faithful to their breeding quarters, may start to breed elsewhere.

However one must not view in isolation these projects (i.e. Kárahnjúkar hydropower project and the Nordlingaalda hydropower dam (Thjórsárver)), each of which may not spell any noticeable decrease in the whole population of geese. There is a crying need for an overall assessment, including a risk analysis for the species that should encompass all hydro and geo-thermal plants planned for the country.

5.4 Recommendations

Having taken in consideration

- (a) The documents and reports that I have seen;
- (b) The discussions held with various Government officials and experts, and with representatives of NGOs;
- (c) The site visits of Kárahnjúkar hydropower project and the Nordlingaalda hydropower dam (Thjórsárver);
- (d) The fact that the Kárahnjúkar hydropower project has been given the go ahead by Icelandic authorities and work is in progress;
- (e) The fact that the proposed Nordlingaalda hydropower dam (Thjórsárver) has been shelved for at least four years;

I have come to the conclusion that the following recommendations, if taken up and applied, would go a long way to help in mitigating negative impacts that are likely to result from the projects. The rationale behind these recommendations is found above in the text.

5.4.1 General recommendation

- A well planned, cumulative, environmental assessment, addressing all the impacts of all proposed Hydro and Geo-thermal projects, as well as all those already implemented, should be urgently conducted, and integrated into the Master Plan.

5.4.2 Recommendations relating to Kárahnjúkar hydropower project

- A monitoring board, composed of representatives of relevant Institutes and NGOs should be set up:
 - (a) To see that the developer adheres to all the conditions laid down by the ruling of the Ministry of Environment, giving special attention to the measures for reducing soil erosion and deposition by wind from Hálslón; and to all the commitments regarding the sponsorships, monitoring and investigations related to the vegetation, bird life, reindeer and typical communities of benthic animals in the impacted areas.
 - (b) To monitor at all times for any negative impacts resulting from the project and to take the immediate and adequate mitigation measures.
- Disturbance and pressures in the area of Eyjabakkar should be avoided by restricting access during the moulting period of the Pink-footed Goose *Anser brachyrhynchus*.

- The Úthérad Important Bird Area should be declared legally a protected area, backed by a management plan to ensure the ornithological integrity of the whole area, and particularly to address the problem resulting from afforestation projects in the area.
- Forestry in the Úthérad IBA should be restricted as otherwise it would affect the access of flightless Greylag Geese *Anser anser* (moulting adults and goslings) to lakes and feeding areas.
- Wetland restoration in the Úthérad IBA should be highly taken in consideration to compensate for any negative impacts resulting from the project.
- The possibility of directing part of Lagarfljot through Geirastadajkvisi so it can run the last few kilometres as it used to do should be investigated and taken in consideration.
- All vegetation restoration efforts should be properly planned using only native plants.

5.4.3 Recommendations relating to Nordlingaalda hydropower dam (Thjórsárver)

- The sedimentation basin included in the outline approval of a reservoir of only 3 km², entirely outside the protected area, as ruled on 30 January 2003, should be subjected to a comprehensive and thorough impact assessment.
- The project should be shelved indefinitely if it is found that it would cause irreparable damage to the ecological integrity of the site.
- An extension to the boundaries of the Nature Reserve, which would secure its ecological integrity, should be highly taken in consideration.

6. ACKNOWLEDGEMENTS

I would like to put on record my thanks to the

- Minister for the Environment, Ms. Siv Fridleifsdóttir for giving us the opportunity to meet her and discuss at length the Kárahnjúkar hydroelectric project;
- Ingimar Sigurdsson, Director at the Ministry of Environment and Sigurdur Ármann Thráinsson Head of Division of Nature and Natural resources at the Ministry for the information and documents they made available to us.
- Jón Gunnar Ottósson, Director General of the Icelandic Institute of Natural History, for the excellent way he organized the visit;
- Snorri Baldursson, Acting Director General Icelandic Institute of Natural History, for organizing the day visit to Thjórsárver;
- Gudmundur A. Gudmundsson, Skarphédinn G. Thórisson, Kristinn Haukur Skarphedinsson, and Jóhann Óli Hilmarsson and Ólafur Einarsson from the Fuglavernd – BirdLife Iceland (partners of BirdLife International) for all the information they shared with us;
- All the participants who attended the stakeholders meeting.

They all had to be patient with us and were kind to answer all our questions. Last but not least my personal thanks to Gianluca Silvestrini of the Natural Heritage and Biological Diversity Division of the Council of Europe for his unfailing assistance throughout the visit.

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APPENDIX 2



Convention on the Conservation
of European Wildlife and Natural Habitats

Standing Committee

**Draft Recommendation No. ... (2004) of the Standing Committee, examined on
3 December 2004, on hydroelectric dams at Kárahnjúkar and Nordlingaalda (Iceland)**

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

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

Recalling that under Article 3, paragraphs 1 and 2 of the Convention, the Parties agree that “*Each Contracting Party shall take steps to promote national policies for the conservation of wild flora, wild fauna and natural habitats, with particular attention to endangered and vulnerable species, especially endemic ones, and endangered habitats, in accordance with the provisions of thie Convention*” and that “*Each Contraction Party undertakes, in its planning and development policies and in its measures against pollution, to have regard to the conservation of wild flora and fauna*”;

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

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

Referring to the other Convention provisions regarding the protection of habitats and conservation of species;

Referring to the report of Mr Joe Sultana drawn up following his on-the-spot appraisal ({document T-PVS/Files ‘2004) 5];

Considering that the sites concerned by the hydropower projects contain species and habitats of European importance listed in the Appendices to the Convention, in particular the Pink-footed-goose (*Anser brachyrhynchus*) and the Greylag goose (*Anser anser*), the Harbour seal (*Phoca vitulina*) and important mosses, lichens and invertebrates;

Noting that the hydropower projects are motivated by the with of the Icelandic Government to promote increased utilisation of renewable energy resources in harmony with the Environment;

Sharing this concerns but desirous to reduce and compensate the negative impacts that they are likely to have on the biodiversity;

Noting that each project has been evaluated with respect to its impact on nature, cultural heritage, alternate land-use potential, economic gain and regional development, according to the Master Plan for Hydro- and Geothermal Energy Resources;

Noting that the Kárahnjúkar hydropower project has been given the go-ahead by the authorities and work is in progress; noting also that the proposed Nordlingaalda hydropower dam (Thúfuver) has been shelved for at least four years;

Recommends that the Government of Iceland:

1. Conduct, as a matter of urgency, a well planned, cumulative, environmental assessment, addressing all the impacts of all proposed Hydro- and Geo-thermal projects, as well as all those already implemented, integrated such environmental assessment into the Master Plan;

Relating to Kárahnjúkar hydropower project:

2. Set up a monitoring board, composed of representatives of relevant Institutes and NGOs with following tasks:
 - i. To see that the developer adheres to all the conditions laid down by the ruling of the Ministry of Environment, giving special attention to the measures for reducing soil erosion and deposition by wind from Hálslón; and to all the commitments regarding the sponsorships, monitoring and investigations related to the vegetation, bird life, reindeer and typical communities of benthic animals in the impacted areas;
 - ii. To monitor at all times for any negative impacts resulting from the project and to take the immediate and adequate mitigation measures;
2. Avoid disturbance and pressures in the area of Eyjabakkar by restricting access during the moulting period of the Pink-footed goose (*Anser brachyrhynchus*);
3. Give the appropriate legal protection to the Úthérad Important Bird Area, backed by a management plan to ensure the ornithological integrity of the whole area, and particularly to address the problem resulting from afforestation projects in the area;
4. Restrict forestry in the Úthérad Important Bird Area (IBA) so as to avoid it may affect the access of flightless Greylag geese (*Anser anser*) (moulting adults and goslings) to lakes and feeding areas;
5. Consider wetland restoration in the Úthérad IBA to compensate for any negative impacts resulting from the project;
6. Consider the possibility of directing part of Lagarfljot through Geirastadajkvisi so it can run the last few kilometres as it used to do;
7. Assure that all vegetation restoration efforts should be properly planned and use as far as feasible only native plants;

Relating to Nordlingaalda hydropower dam (Thjórsárver):

8. Carry out a comprehensive and thorough impact assessment of the sedimentation basin included in the outline approval of a reservoir of only 3 km², entirely outside the protected area, as ruled on 30 January 2003;
9. Abandon the project if it is found that it would cause irreparable damage to the ecological integrity of the site;
10. Consider an extension to the boundaries of the Nature Reserve, which would secure its ecological integrity.