**IAIA'12 Energy Future: The Role of Impact Assessment**

# Expected and actual impacts of infrastructure

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## Abstract

Many human interventions in the environment in the past form valuable and protected habitats today. There are many areas, changed by the human, populated with endangered species. Those examples show that nature adjusts to human activities in a relatively short time period. For planned electrical infrastructure many EIA do not predict any positive impacts on nature. This raises some doubts about their appropriateness; we believe that if we are to start the same project as it is already implemented and it also had positive impacts on the nature, its impacts would be evaluated negatively today. We suggest that before evaluating planned projects, evaluation of implemented ones should be performed. We also believe that evaluation of impacts and also mitigation measures for the same species differ from country to country; we think that the criteria should be standardised. Some endangered species in particular countries are common in other countries. Some reasons for the species' rarity are also inappropriate living conditions. We think that a red list of endangered species is to be prepared on the basis of data for the whole continent or, even better, for the whole planet.

**Key words:** biodiversity, infrastructure, impact assessment

## 1. Introduction

Human's impact on nature in the past was small and limited to the immediate environment, but lately it has been constantly growing, especially since the beginning of industrial revolution. In Slovenia, larger changes of the environment due to operation of different types of infrastructure have started to show more than half a century ago, often negatively, especially impacts on nature. Thus impacts of infrastructure and other human activities had to be studied before implementation, so SEA and EIA were performed, where experts estimate expected impacts and propose mitigation measures. Many of the impacts are not measurable within time and financial constraints, so they depend on experts' knowledge but are seldom verified in the time of stable operation of the infrastructure. SEA and EIA

are inherently biased to looking at negative impacts and are always finished before the construction of infrastructure starts, so the loop of learning from verifying expectations from SEA and EIA comparing to impacts of infrastructure is not closed. SEA and EIA documents are written in national language of the country where infrastructure is located and usually only the summary is published, so they are not easily accessible for analysis of current practice. Usually documents are not translated, so comparison between them for example for the same animal or plant species is difficult unless you have an international team, the exception being cases with transboundary impacts. At least certain types of projects bring also positive effects within a certain time period. The problem might be that they affect positively different species than the ones on which it has negative effect.

## 2. Evolution of both conservation policies and impact assessment methods

Nature conservation has a 200-year long tradition and it has shifted from strict protection to more flexible forms. Environmental management has evolved, too; European Union (EU) has designed a set of policies that ensure good quality of environment and natural resources in the Member States. In this article, we shall focus on Birds Directive and Habitat Directive and Natura 2000 network.

Birds Directive and Habitat Directive are not prohibitive, but contain a set of measures that ensure good status of species and habitats, important on the EU level, through Natura 2000 network. As a result, a series of steps and procedures is devised in each country in order to ensure full consideration of potential impacts of development as well as management practices of Natura 2000 areas. Monitoring of priority species and habitats provides information on how successful these procedures are.

New conservation practices and policy measures bring ever tighter considerations in project planning. In each planning process, there are numerous planning limitations, protection regimes, etc. that has to be considered in the plan or project design and in the SEA and EIA process. In the new Member States the relatively rapid introduction (compared to old member states) of entire EU legislation caused considerable confusion: with such fast process, it is all the more obvious that nowadays some of the past (i.e. already implemented) projects, especially large infrastructure would not be feasible anymore without elaborate impact assessments and mitigation measures designed in the planning process. This puzzles the investors, including state institutions and public utilities in charge of large infrastructure (transmission lines, roads, flood protection measures etc.). Due to lack of monitoring of actual, especially long-term impacts of existing infrastructure there is little information on both negative and positive impacts of them that would help to better plan the new infrastructure. Monitoring is improving, but as the cases of on-line GIS monitoring tool SOS M.A.G.O.[1] (Mussin et al., 2010) and Egnatia Motorway Observatory (Fourkas, 2006), monitoring of complex issues such as impacts on vegetation, flora and fauna is difficult. Gkillas (2010) has shown on the case of windfarms in Norway that both the investor and the authorities and NGOs were aware that there is lack in existing knowledge on birds and their functions and that affects the quality of assessment as well as mitigation measures.

[1] http://webgis2.como.polimi.it:8080/sosmago/

## 3. Examples of Infrastructure and areas changed by human in Natura 2000 and other protected areas

Slovenia has established first nature protected areas several decades ago. In the EU approximation process, Slovenia has established Natura 2000 areas on more than one third of its area by 2004. Many protected areas include infrastructure and places changed by human activities.

One of the most important Natura 2000 areas for birds is Drava River, where eight hydro power plants are operating. The most populated is the Ptuj Lake, which is the biggest artificial lake in Slovenia, and is a part of channel-type power plant Formin, which is in operation from 1978[2]. In less than 35 years birds started to use the lake as a stop-over on their migration path or live there constantly (Figure 1). We don't have data available of habitats and their quality before hydro power plants were built, but we can confirm the importance of artificial lakes for birds in present time (Elektro-Slovenija, d. o. o., 2012 and Environmental Atlas of Slovenia, 2012).

Figure 1: 110 kV Overhead line crossing Ptuj Lake with swans on the surface and other birds sitting on the second tower (Elektro-Slovenija, d. o. o., 2012)

[2] http://www.dem.si/eng/hydropowerplantsandgeneration/158

In the last two decades there are several hydro power plants under construction on Lower Sava River, which is also an important area for some protected species. For several hydro power plants SEA and EIA were prepared, in which severe negative impacts on nature were shown to likely happen, therefore extensive mitigation measures were proposed (EIA for Hydro power plant Krško and bypass Krško, 2006 and SEA for Hydro power plant Brežice, 2011). None of the studies expects any positive contribution of new infrastructure on nature.

In Slovenia there are many abandoned open-cast clay excavation pits like Bilje or Gaj near Pragersko and sandpits like Dobrovnik, Tropovci or Pleterje, which are now included in protected areas as habitats of some rare or endangered species (Environmental Atlas of Slovenia, 2012). Those valuable habitats developed in relatively short time period that show fast adjustment of nature to human activities.

All human interventions presented above were made before these areas were settled by endangered species and are included in protected areas and their inclusion was justified by renowned experts in this field.

400 kV overhead transmission line Cirkovce-Pince has been in preparation stage for more than ten years. The line should cross several protected areas like Drava and Mura River, which are both parts of SPA Natura 2000 sites (Environmental Atlas of Slovenia, 2012). EIA was prepared and the project design was completed (Oikos, 2012). The area is also important habitat of white stork (Ciconia Ciconia). As mitigation measures on the whole length of the line bird flight diverters and extensive compensatory habitat was proposed.

Portugal has also areas with important habitats for white storks. According to available data towers of some transmission lines in Portugal are used as nesting places for white storks and nesting platforms are installed as a mitigation measure (dos Santos, 2004). Difference in estimating of impacts of transmission lines on same species and different mitigation measures are obvious; these can only partly be attributed to the differences in populations.

Rajwaneshi (2011) has shown that there are many successful examples how projects mitigation measures could tweak the design of the infrastructure in such a way that not only negative impacts are avoided, but also the recognised positive impacts are enhanced. However, it seems there studies that would deal with positive impacts of infrastructure as a side effect are not widely available.

## 4. Discussion

Are trade-offs possible? Projects usually affect different species in different phases, and if there are positive impacts they often affect different species than the ones that are impacted in a negative way. Can we be sure, that the negatively affected species are more valuable than positively affected ones? Is it possible, that the area is not suitable anymore for negatively affected species because of other reasons (eg. cumulative pollution, climate change)? We know that some species became extinct in the past before human started to change environment in wider extent, but we don’t know which ones are disappearing today without human intervention.

Would the expert opinion on necessary mitigation measures be the same when preparing SEA or EIA, if the expert had access to studies, assessments or reports on the same species or habitat in another country? There is a lack of consistent case studies or best practice examples despite numerous SEA and EIA are continuously being prepared. These are often not easily available (except during public consultation), are in different languages or are very narrow in scope. Besides, the investors are focused on the outcome – the completed project and not on the knowledge value of the process.

There are local and regional differences as there are different ecosystems and climate, but there are also differences in practice between countries. In EU countries the SEA and EIA Directives give a common framework, but the methods of assessments, the level of detail and length of procedures are very different. In the countries with very small share of Natura 2000 sites, infrastructure planning can generally avoid these sites and therefore infrastructure is rarely sited in them - only when other options are really not feasible; the assessment of impacts on priority species and habitats tend to be very detailed and prescribe elaborate mitigation measures and vast compensatory habitats. In the countries with large share of Natura 2000 sites creates complex stakeholder conflicts as it is virtually impossible to design infrastructure, especially large-scale linear infrastructure so that it would completely avoid Natura 2000 sites. There is not only lack of resources, but also suitable locations for compensatory habitats.

Several projects could be combined so that positive impacts of one project could be used for compensation of another project. There is a lack of information on this – information is shared mostly among/within the NGOs and in within sectors, but not between sectors and rarely with scientific community.

## 5. Conclusions

Operation of infrastructure in the last half century shows some positive impacts on nature which are seldom predicted by the SEA and EIA. Human interventions have negative and positive effects on the environment and also on nature, but the latter are often neglected. Positive impacts cannot compensate for negative impacts (especially not for fragmentation), but should be better recognised and considered to a larger extent – not to justify a project/a plan and advocate its implementation, but to better consider all its impacts. Positive experience of operating infrastructure should be incorporated in SEA and EIA for similar projects/plans.

Criteria for determining impacts of similar infrastructure on same species should be standardised and comparable between SEA and EIA from different countries. Quantification of impacts should be developed and used on international level and lists of endangered species should be harmonised accordingly. Better exchange of information, case studies and best practice would improve project design, impact assessment and decision making.

## References

dos Santos, José Amarante (2004): Storks and Transmission - Finding a Middle Ground. Transmission and Distribution, 1st June 2004. Available from http://tdworld.com/mag/power_storks_transmission_finding/ . Acessed on 2nd April 2012.

EIA for Hydro power plant Krško and bypass Krško (2006). Imos Geateh, Ljubljana, June 2006. (only in Slovene)

EIA for High-voltage overhead-line 2 x 400 kV Cirkovce-Pince (2012). Oikos, Kamnik, project number 345/02, draft. March 2012. (only in Slovene)

Elektro-Slovenija, d. o. o. (2012). Database, accessed on 6th April 2012.

Environmental Atlas of Slovenia (2012). Slovenian Environment Agency, Ljubljana, available from http://gis.arso.gov.si/atlasokolja/profile.aspx?id=Atlas_Okolja_AXL@ARSO&culture=en-US. Accessed on 2nd April 2012.

Fourkas, V. (2006): Egnatia Motorway Observatory: Monitoring of Spatial Impacts of Transport Infrastructure. 3rd International Congress on transportation research in Greece, Thessaloniki, 19-20 May 2006

Gkillas, S. (2010): Norwegian wind energy development and bird interactions in the context of Environmental Impact Assessment. Bodø Univerrsity College, Bodø Graduate School of Business, MSc thesis.

Kuijken, E. (2009): On-the-spot appraisal: Wind farms at the Smøla Archipelago (Norway), Convention on the Conservation of European Wildlife and Natural Habitats, Standing Committee 29th meeting, Bern, 23-26 November 2009

Mussin et al. (2010): WEB geoservices for monitoring the environmental impact of large infrastructures, http://webmgs2010.como.polimi.it/presentations/3_Mussin.pdf

Rajvanshi, A.(2011): Mitigation and compensation in environmental assessment. TwoEA-M project, http://www.twoeam-eu.net/

SEA for Hydro power plant Brežice (2011). Geateh, Ljubljana and Aquarius, Ljubljana (draft), September 2011. (only in Slovene)

Tillman, J. E. (2005): Habitat Fragmentation and Ecological Networks in Europe. GAIAEA 14/2, 81–200 (2005)