

habitat fragmentation due to transportation infrastructure



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EDITORIAL

The prevention of habitat fragmentation in the framework of environmental assessment of projects

The Environmental Impact Assessment (EIA) is the key stage for assessing the impact that road network projects could have on ecological connectivity and for mitigating the effects of habitat fragmentation. Some of the most recent Environmental Impact Statements (EIS) have set a precedent for ensuring the coherence of the Natura 2000 network, as their lines of argument fully consider the Law 42/2007 on Natural Heritage and biodiversity, particularly in relation to aspects of ecological connectivity.

The EIA process is of particular interest when the routes of new roads pass close to or cross Natura 2000 Network areas. In such cases, there is an increasing focus on aspects related to ecological connectivity in the Environmental Impact Assessments and subsequent Environmental Impact Statements. Thus, in addition to preventing changes to the habitats and species of the Sites of Community Importance (SCI), the Special Areas of Conservation (SAC) and the bird's directive Special Protection Areas (SPA), attempts are made to guarantee the ecological coherence of the Natura 2000 network by indicating the analyses and subsequent measures that are required to maintain and conserve the ecological corridors.

These aspects are particularly well pointed out in the recent Resolution of 27 July 2010 on the Environmental Impact Statement for the Dos Mares Highway project to connect the Cantabrian axis with the Ebro Valley and the Mediterranean, in the stretch between the A-67 and Miranda de Ebro. The project, which has been promoted by the Spanish Ministry of Public Works and Transport's General Directorate for Roads, consists in constructing a highway to join the A-67 and the AP-68 and thus connect Cantabria and Asturias with the Ebro Valley. In light of the Motion for a Resolution made by the Spanish Ministry of the Environment and Rural and Marine Affairs' (MARM) Directorate General for Environmental Quality and Assessment, the Secretary of State for Climate Change stated that "the establishment of a new road corridor will lead to the deterioration and fragmentation of a large region with important natural assets, which is very well conserved and has a high degree of protection, and in which there are currently no high capacity road networks and even no road network at all in some stretches". On the basis of this, an unfavourable Environmental Impact Statement was drawn up for the project.

Some of the environmental administrations in the areas affected by the project had already stressed that the highway would have an impact on strategic ecological corridors that connect areas of the Natura 2000 Network, due to the barrier effect and the habitat fragmentation that it would cause. They requested specific studies on the impact of the highway on ecological functionality and connectivity. The EIS highlighted the impact of habitat fragmentation, due to the loss of extensive, well-conserved habitats, the edge and barrier effects, and the direct impact on SCI/SPA areas, on listed wetlands and on species of flora and fauna that are listed in the national Catalogue of Endangered Species as either in danger of extinction, priority species or species under strict protection.

In general terms, it is considered that acting in the early stages of infrastructure planning to halt the approval of specific stretches that have considerable environmental impact not only ensures the conservation of biodiversity, but also contributes to limiting public investment in expensive preventive, corrective or compensatory measures to reduce the impact.



WORKING GROUP

The activities of the working group in this second half of the year focused on two areas: the Technical Committee's work to prepare a document on the *Defragmentation of habitats affected by operating roads*; and the organization of a Technical Conference entitled "*Medidas compensatorias de proyectos de infraestructuras viarias que afectan a la Red Natura 2000*" (Compensatory measures for road infrastructure plans that affect the Natura 2000 network) (see the [News](#) section). The Group's next working meeting is scheduled for Spring 2011.



NEWS

Discussion on how to overcome obstacles to the application of compensatory measures in projects that affect the Natura 2000 network

The Technical Conference on "*Medidas compensatorias de proyectos de infraestructuras viarias que afectan a la Red Natura 2000*" (Compensatory measures for road infrastructure plans that affect the Natura 2000 network) was held in Gijón in November. It was organized jointly by the Spanish Ministry of the Environment and Rural and Marine Affairs and the Government of the Principality of Asturias' Regional Ministry of the Environment, Territorial Development and Infrastructures. The conference provided a space for discussing the main obstacles to the application of compensatory measures, which are an important tool for habitat defragmentation and re-establishing ecological connectivity.



Spanish Ministry of the Environment and Rural and Marine Affairs

The conference conclusions stressed the need to clarify and disseminate the required characteristics of such measures, as well as how to define and give greater legal support to implementation procedures. In particular, participants debated the difficulty of acting in areas far from the public domain of the roads. Participants also discussed various options for ensuring that implemented measures are maintained. These included relying on the entities that manage the protected spaces or on the organizations responsible for custody of the territory. Another aspect that was highlighted was the importance of cooperation between agents, and particularly between the various administrations, in order to coordinate the process of implementing measures and ensure that it flows smoothly.

The conference conclusions, conference abstracts and summaries of the presentations are available on the conference website: click [here](#).

Source: Georgina Álvarez, Ministry of the Environment and Rural and Marine Affairs.



Reduction of the effects of a dual carriageway on the Canarian Egyptian Vulture in Fuerteventura

Measures have been approved to ensure that the construction of a stretch of the Eje Insular de Fuerteventura dual carriageway does not affect a population of the Canarian Egyptian Vulture (*Neophron percnopterus majorensis*). To guarantee compliance with these measures, a monitoring committee was formed in 2009 to assess the impact of the road construction and use phases on this species of Egyptian Vulture, which is endemic to the Canarian Archipelago.



Government of the Canary Islands

In 1997, an *environmental impact study on the construction of the Eje Insular de Fuerteventura dual carriageway*, in the stretch between Caldereta and Corralejo, indicated that the population of Canarian Egyptian Vultures on the island could be affected. The Canarian Egyptian Vulture is a species listed as "in danger of extinction" in the Canary Islands Catalogue of Endangered Species (D.151/2001, 23 July). A recovery plan was drawn up for this species in 2006. According to data from 2002, there are only 25-29 reproducing pairs in the entire Canarian Archipelago.

The Environmental Impact Statement (EIS) that was issued in 2005 stated that the road construction project's Environmental Monitoring Programme should include the definition of proposals from the environmental impact study, as well as information on

how the efficacy of these measures would be monitored.

Consequently, the following measures were included in the construction project (approved in 2007) to protect the Canarian Egyptian Vulture population: no works facilities can be located in the areas closest to the roosts; no work can be carried out at night in these areas; a roost must be created for the species away from the new road; the existing roost in Huriamen should be monitored from the start of the construction work until five years after its completion. As a result of this programme, proposals should be made for compensatory measures to increase the population of the Canarian Egyptian Vulture in the surrounding area. In addition, in more general terms, no blasting can take place along the entire stretch of the road between 1 March and 15 July, as this is a critical period that can affect nesting of the species.

To ensure that the species monitoring was carried out, a monitoring committee was formed with the following members: a technical director, who was appointed by the Directorate General for the Environment; the works management; the contracted construction company; and the technical team responsible for monitoring the species. In its periodic meetings, this committee analysed the six-monthly reports on the monitoring process, in order to correct any incidents that may have occurred in relation to the Canarian Egyptian Vulture. As part of the collaboration agreement between the Island Council of Fuerteventura and the construction company, a protocol was drawn up for emergencies, damage or death to specimens as a result of the construction work.

Source: Samira Moujir Nasser-Eddine (Department of Public Works and Transport, Government of the Canary Islands).



Monitoring of the migration of black stork specimens to Africa to compensate for the construction of the CL-501 road in Castilla y León

The natural environment in which the Ramacastañas–Candeleda stretch of road is being built in Castilla y León combines a series of singular environmental conditions and assets. Hence, highly specific measures are needed to protect and monitor wildlife. These measures include the capture, tagging and telemetric monitoring of 4 black stork (*Ciconia nigra*) specimens.

In parallel to the construction work, an extensive series of measures for protecting and improving the habitat are being undertaken. These include: a study of bird mortality due to electrocution or collisions with power lines; The natural environment in which the Ramacastañas–Candeleda stretch of road is being built in León combines a series of singular environmental conditions and assets.

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In parallel to the construction work, an extensive series of measures for protecting and improving the habitat are being undertaken. These include: a study of bird mortality due to electrocution or collisions with power lines; measures to improve the habitat of the Spanish Imperial Eagle, such as establishing and strengthening populations of wild rabbits; studies to reduce the use of pesticides in the area; monitoring of nesting and feeding of the black stork (by tagging and radiotracking specimens); as well as various complementary activities such as checking wildlife passages, drawing up a list of overhead power lines that represent a risk for wildlife, and setting up bat nesting boxes, among others.

Of all these measures, perhaps the most representative that has provided the most interesting results to date is the capture, tagging and monitoring of black stork specimens, as this species is in danger of extinction. Its population in Castilla y León (where there are around 60 pairs) represents 20% of the total Spanish population.

After a study of reproducing pairs in the environment, several capture sites were selected where it was quiet enough to carry out the activities without human interference. In March 2008, two reproducing adults were captured using a tilting trap that was sprung from a distance. In July 2008, two chicks were captured in the last stage of development, by accessing the nesting platforms using tree climbing techniques.

The four specimens were fitted with satellite/GPS transmitters that included solar powered chargers to increase the battery life. Every two hours, the transmitters registered the exact position of the bird as well as other variables. As a result, over



Directorate General of Roads and Infrastructures, Department of Public Works and Transport, Government of Castilla y León

11,000 locations have been recorded to date. When the sampling is designed and planned appropriately, this technique is the best tool for assessing the potential impact of specific activities on wildlife. This was the aim of the programme to track black storks, which was one of the measures to compensate for the new road CL-501.

The information obtained confirmed the migratory nature of the species. After reproducing, the birds head for their winter quarters. One of the adult specimens and one of the chicks spent the winter in Sub-Saharan Africa, between Mauritania and Senegal, whilst the other chick remained the area of the Straits of Gibraltar (crossing various wetlands in northern Morocco and southern Spain). The other adult began the wintering period in the wetlands of Seville and at the end of 2009 was found dead in a pasture to the north of this city.

Source: Directorate General of Roads and Infrastructures, Department of Public Works and Transport, Government of Castilla y León.



An analysis of functional connectivity was carried out in the Basque Country using territorial and genetic information on the European Pine Marten

In 2005, a network of ecological corridors was established under the Basque Country's Environmental Framework Programme. In this Programme, various areas of the region were identified as of special interest to ensure ecological connectivity between Natura 2000 areas and a group of target species was selected. Of these, the European Pine Marten (*Martes martes*) is the species that is most dependent on forest habitats. Between 2006 and 2009, research was undertaken to assess the genetic structure of Pine Marten populations in the Basque Country and to validate whether the aforementioned network of ecological corridors matched the dispersal patterns of the species. This was achieved through the use of genetic distances between individuals and various connectivity models obtained using GIS.



Naturesfera Association

Non-invasive techniques were used to obtain the Pine Marten samples. These involved the extraction of DNA from faeces, its analysis to precisely identify the species and a subsequent analysis with microsatellite markers.

At least three core populations of European Pine Marten were found: central, southern and Navarrese. A fourth group (eastern) still has to be confirmed. The limits of the populations coincided with areas in which urban developments and infrastructure predominated.

The study empirically validated that the parameterization of the map of resistance used to design ecological corridors in the Basque Country was suitable for the Pine Marten, as it explained the genetic pattern observed.

In addition, land uses that facilitate or hinder the dispersion of the Pine Marten were identified. When the barrier effect of the main roads was taken into account, a clearer explanation of the genetic pattern was found. This reconfirms the importance of using wildlife passages to ensure that road networks are permeable.

This leading study forms part of an emerging discipline called landscape genetics. The field combines population genetics and landscape ecology and can be used to determine the effect of regional heterogeneity on ecological and functional connectivity.

The study was carried out by the University of the Basque Country's research group "Systematics, Biogeography and Population Dynamics", in collaboration with IKT SA. Funding was provided by the University of the Basque Country and the Basque Country's Biodiversity and Environmental Participation Directorate.

The resulting document can be accessed [here](#).

Source: Ruiz-González, A., Gurrutxaga, M., Madeira, M.J., Lozano, P.J., Fernández, J.M. y Gómez-Moliner, B. 2010. Estudio de la conectividad ecológica en la CAPV. Genética del paisaje aplicada sobre una especie-objetivo de la red de corredores ecológicos: la marta europea (Martes martes). University of the Basque Country, IKT SA and the Basque Government's Department of the Environment, Land Planning, Agriculture and Fisheries.



The International Conference on Ecology and Transportation, which was organized by IENE and held in Hungary, attracted professionals from 32 countries

In the last week of September, around 200 people from universities, research centres, governments, companies and NGOs came together in the city of Valence to present the latest research and projects in the field of ecology and transport networks.

Many contributions were focused on wildlife mortality due to road networks and on the effectiveness of wildlife passages. Other topics included were the edge effects of roads, disturbance along the verges, effects in high speed railways and habitat defragmentation.

The lectures in the plenary sessions were given by Lenore Fahrig from the University of Carleton (Canada), who presented a review on mitigating road effects on wildlife, and by Michael Below, who discussed data on the effects of high speed railways on biodiversity.

The conference included 3 oral presentations and 10 posters on studies carried out in Spain. These were presented by representatives from the universities of Barcelona, Navarra, Salamanca, Autonomous University of Madrid and the Technical University of Valencia; the Centre of Local Initiatives for the Environment; the Spanish Ministry of the Environment, Rural and Marine Affairs; the Spanish Natural Sciences Museum; and the companies ADIF, Minuartia and Saitec. Most of these presentations (9 in total) were on aspects related to studies of wildlife mortality. A further four were on: reducing the effects of operating roads (defragmentation), the application of compensatory measures, the participation of local governments in the processes of planning and designing new roads, and cooperation between different stakeholders. In this area, one poster was presented on the activities of the Working Group on Habitat Fragmentation caused by Transport Infrastructure.

The prize for best poster was given to a presentation of the impact of constructing a highway, between Madrid and Guadalajara, on great bustard populations in the "Talamanca-Camarma" special bird protection area. The poster was prepared by a team from the Department of Evolutionary Ecology at the Madrid Museum of Natural Sciences, and its main author, Aurora Torres, received the prize.

All of the presentations, posters and other documents generated during the conference will soon be posted [here](#).

The IENE General Assembly was held after the conference. In this meeting, new strategies and goals were established for the organization and the new steering committee was elected.

Source: Carme Rosell. IENE. Minuartia.



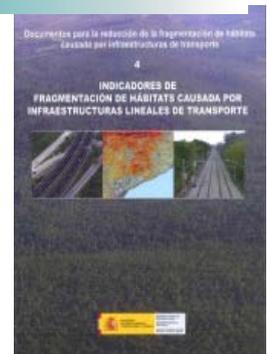
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PUBLICATIONS

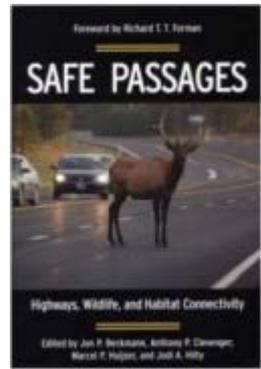
Indicadores de fragmentación de hábitats causada por infraestructuras lineales de transporte (*Indicators of habitat fragmentation caused by linear transport infrastructure*) is the fourth issue in the series *Documents for the reduction of habitat fragmentation caused by transport infrastructure*. This new issue, which is highly practical in nature, describes a set of specific indicators that can be used to assess the state of fragmentation and fragmentation trends associated with linear transport. The aim was to compile and systematise existing indicators and to include new ones to cover aspects that have not been extensively addressed to date. The indicators can be applied in different areas for environmental assessment and monitoring. Some of them can even be included in more general systems of environmental indicators.

Reference:

Ministry of the Environment and Rural and Marine Affairs (MARM), 2010. *Indicadores de fragmentación de hábitats causada por infraestructuras lineales de transporte*. Documents for the reduction of habitat fragmentation caused by transport infrastructure, Number 4. Autonomous Organization of National Parks (OAPN), Ministry of the Environment and Rural and Marine Affairs (MARM). Madrid. 133 pp. The document can be purchased from the [Publications Service](#) Autonomous Organization of National Parks (OAPN), MARM.



Safe passages. Highways, Wildlife and Habitat Connectivity includes practical information on instruments that can be used to reduce the impact of roads (and particularly high capacity roads) on wildlife. There is a particular emphasis on measures to maintain connectivity between land and water habitats. Many examples are given of projects undertaken in the United States. In addition, some sections deal with different aspects of public participation in the planning and design phases. The book follows on from *Road Ecology*, which was published by Richard Forman and other collaborators in 2003, and reflects the dynamism of research in the field of transport ecology as well as solutions that reduce the barrier effect of roads.



Reference:

Beckmann, J.P., Clevenger, A.P., Huijser, M.P. & Hilty, J.A. (Eds.). 2010. *Safe passages. Highways, Wildlife, and Habitat Connectivity*. Island Press, Washington, 396 pp.



EVENTS

The 8th IALE World Congress. Beijing (China), 18 to 23 August 2011. Organized by the International Association for Landscape Ecology.

4th SER International World Conference on Ecological Restoration. Mérida (Mexico), 21 to 25 August 2011. Organized by the Society for Ecological Restoration International (SERI).

ICOET 2011. International Conference on Ecology and Transportation "Sustainability in Motion". Seattle (Washington), 21 to 25 August 2011. Organized by the Center for Transportation and the Environment.

XXXth IUGB Congress. Human-wildlife conflicts and peace-building strategies. Barcelona, 5 to 9 September 2011. Organized by the International Union of Game Biologists and the University of Barcelona.

The 24th World Road Congress. Mexico, 26 to 30 September 2011. Organized by the World Road Association (AIPCR/PIARC).

Events that have already taken place

7th SER European Conference on Ecological Restoration. Avignon (France), 23 to 27 August 2010. Organized by the Society for Ecological Restoration (SER) Europe. Further information available [here](#).

International conference in Landscape ecology. Middle-European IALE Conference 2010. Brno/Prague (Czech Republic), 3 to 7 September 2010. Organized by the Czech Regional Organization of the International Association for Landscape Ecology (CZ-IALE). Further information available [here](#).

IENE 2010 International Conference on Ecology and Transportation. Velence, Hungary, 27 September 1 October 2010. Organized by Infra Eco Network Europe. Further information available [here](#).

Medidas compensatorias de proyectos de infraestructuras viarias que afectan la red Natura 2000. (Compensatory measures for road infrastructure plans that affect the Natura 2000 network). Gijón, 4 to 5 November 2010. Organized by the Ministry of the Environment and Rural and Marine Affairs and the Government of the Principality of Asturias. Further information available [here](#).

10 Congreso Nacional del Medio Ambiente (CONAMA). (Tenth National Environment Conference). Madrid, 22 to 26 November 2010. Organized by the Fundación CONAMA. Further information available [here](#).



DOCUMENTS OF WORKING GROUP AND ACTION COST 341

Within the framework of the European project and the Working Group, which has given continuity to the project, various materials have been generated which contribute to the knowledge and reduction of the effects of habitat fragmentation caused by transport infrastructures. Specifically, the following documents have been published:

- **COST 341. La fragmentación del hábitat en relación con las infraestructuras de transporte en España.** Revision of the State of the Art published in 2003.

COST 341. Fauna y Tráfico. Manual europeo para la identificación de conflictos y el diseño de soluciones  (33 MB). Published in 2005; translation of the document *Wildlife and Traffic* editay el 2003 as colophon of the project.

- **Prescripciones técnicas para el diseño de pasos de fauna y vallados perimetrales**  (1,8 MB) Published in 2006 and constitutes the first in the series **Documents of the reduction of habitat fragmentation**.
- **Prescripcions tècniques per al disseny de passos de fauna i tancaments perimetrals**. Published in 2008 by Departament de Medi Ambient i Habitatge (Generalitat de Catalunya); translation of the document in spanish edited in 2006.
- **Prescripciones técnicas para el seguimiento y evaluación de la efectividad de las medidas correctoras del efecto barrera de las infraestructuras de transporte**  (2 MB) Published in 2008; second issue of the series **Documents for reduction of the habitats fragmentation**.
- **Prescripciones técnicas para la reducción de la fragmentación de hábitats en las fases de planificación y trazado**  (45 MB). Published in 2010; third issue of the series **Documents for reduction of the habitats fragmentation**.
- **Indicadores de fragmentación de hábitats causada por infraestructuras lineales de transporte**. Published in 2010; fourth issue of the series **Documentos para la reducción de la fragmentación de hábitats causada por infraestructuras de transporte**.

Further information on the products drawn up in the Framework of the COST 341 project and the Working Group on Habitat Fragmentation caused by Transport Infrastructures can be found at [MARM](#) website and the [IENE](#) website.



- This publications comes within the framework of the Fragmentation Habitat Due to Transportation Infrastructure Project. It is promoted by the Dirección General de Medio Natural y Política Forestal of the Ministerio de Medio Ambiente y Medio Rural y Marino. The technical secretary's office of the project runs in charge of MINUARTIA.
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