

**Evaluation of Species and Ecosystems**

Code: 100842  
ECTS Credits: 6

Degree	Type	Year	Semester
2500251 Environmental Biology	OB	3	1

**Contact**

Name: Iñigo Granzow de la Cerda Roca de Togores  
Email: Inyigo.delaCerde@uab.cat

**Use of languages**

Principal working language: english (eng)  
Some groups entirely in English: No  
Some groups entirely in Catalan: No  
Some groups entirely in Spanish: No

**Teachers**

Mariona Ferrandiz Rovira  
Bernat Claramunt Lopez

**Prerequisites**

There are no official pre-requisites. However, familiarity with the basics of conservation biology as well as with experimental design and statistics are implied.

**Objectives and Contextualisation**

1192/5000

This subject is an introduction to the evaluation of the effects of human actions on the natural environment, considering this evaluation in its dual aspect of scientific activity and normative environmental evaluation of plans, programs and projects. Its general objectives are to train students in the biological aspects of environmental assessments, concepts and methods applicable to ecological restorations. It also aims to introduce the analysis and the conduct of regulated environmental assessments. The specific objectives are as follows:

- (1) To know the theoretical principles and practical aspects of ecological restorations.
- (2) Understand methods for detecting effects of human actions on the natural environment.
- (3) To know the contents of the environmental assessments, the methods available to them in their biological aspects (species, habitats and ecosystems), and the applicable legislation.
- (4) To recognize environmental impacts and introduce students to procedures that assist in decision making

that minimize the environmental impact

(5) To be aware of the main mitigating measures of impacts.

## Skills

- Adopt an ethical stance.
- Apply ICT resources pertaining to this field of study.
- Carry out services and processes related to environmental biology.
- Describe, analyse and assess the natural environment.
- Develop a sensibility towards environmental issues.
- Direct, draft and execute projects in environmental biology.
- Focus on quality.
- Make decisions.
- Participate in environmental impact assessments regarding the biological medium.
- Perform biological diagnoses.
- Solve problems.

## Learning outcomes

1. Adopt an ethical stance.
2. Apply ICT resources pertaining to this field of study.
3. Correctly process information on biological aspects to support environmental impact studies and environmental assessments.
4. Describe and assess the biotic components affected by a project.
5. Develop a sensibility towards environmental issues.
6. Establish the conceptual content and the methodological requirements for solving a specific environmental problem.
7. Focus on quality.
8. Identify effects of human interventions on species and their habitats.
9. Make decisions.
10. Participate in the monitoring of environmental surveillance programmes.
11. Solve problems.

## Content

GENERAL CONTENTS Course 2017-2018: 4 parts and 11 Themes

**A. Restoration Ecology and Ecological restoration:** What does restoring an ecosystem mean? How is it done?

**1. Introduction to Ecological Restoration: the essentials.** Definitions. Reasons to carry out a restoration. Restoration of species, soil, habitats and ecosystems.

**2. Reintroduction of species.** A case study: assessing the reintroduction of mammals [computer lab: predictive model for population growth of a re-introduced species]

**3. Restoration ecology and ecological restoration.** Goals of restorations. What should we have in mind when designing a restoration? Assessment of restoration success.

**4. River restoration.** Rivers as ecosystems: their elements and dynamics. What drives degradation. The fluvial space. Zonation of the river space. Stages in the restoration of rivers. Examples are river restorations. Examples of other actions.

**5. Restoration of wetlands.** Definition and types. The value of wetlands. Loss of wetlands: causes of destruction and degradation. Controlling factors. Stages in the restoration of wetlands. Case studies. Creation of wetlands: constructed wetlands.

**6. Specific actions for ecological restoration. Bioengineering:** Definition; Examples of bioengineering techniques for restoration; Context of their application, advantages and limitations. Case studies of ecological restorations through bioengineering.

**B. Environmental assessment as a normative instrument and scientific activity.** How is the environmental assessment of a project or plan carried out? What methods exist to identify, evaluate and assess impacts? How can we determine if an action has had an effect t?

**7. Basics environmental assessment.** Environmental evaluation of plans and programs: strategic environmental assessment. Environmental assessment of projects: environmental impact assessment (EIA): stages of the process. The environmental impact study (EIS). Declaration of environmental impact.

**8. Experimental designs to detect and evaluate impacts.** Reasons for experimental designs and their goals. Ideal designs: controls, replication and randomization. Identifying the problem. Designs to use when replication or randomization are not feasible. CI Design (Control-Impact). BA Design (Before-After). Simple BACI design. Association and causality.

**9. Identifying the impacts: quantitative assessment and evaluation.** Methods of identification of impacts. Methods for identifying impacts: actions and effects. Trees, identification lists, cause-effect matrices, network diagrams. Methods for quantitative evaluation of the magnitude of impacts. Assessment of impacts and significance. Ecological criteria to minimize impacts.

**C. Selection of alternatives.** How do we select the best alternative of a project or action among all those possible?

**10. Methods for selection of alternatives.** How do we choose and weigh the criteria for evaluating alternatives? : Multicriteria analysis: simple methods: Selection of alternatives. Selection of criteria. Scoring of alternatives. Weighting of criteria. Aggregation of results. Advanced Methods: The Hierarchical Analytical Process

**D. Mitigating measures.** Mitigation measures available to prevent, correct or compensate impacts. How can we know if they are effective?

**11. Measures to mitigate the environmental impacts of a project and biodiversity compensations.** Precautionary measures. Corrective measures. Compensatory measures. Environmental Monitoring Program. Biodiversity offsets: Conservation Banks, Land Custody

**Synthesis:** Conservation, restoration and mitigation. Alternative philosophies and strategies

## Methodology

The methodology used to achieve the learning process is based on the students working on the information relevant to the subject. The role of the teacher is to guide the students in their learning, stimulating reflection and discussion. Depending on the case, the teacher provides the necessary information directly or indicates where to find it. The class combines lectures, group discussions, assignments and practical classes:

(1) Lectures, where concepts and methods of the discipline are presented and explained. It will alternate with text discussion, usually by groups, on articles and documents (environmental impact assessments), with subsequent team presentations. The lectures will highlight and address the most complex and important points for each didactic unit, and case studies will be analyzed. Subsequently, the student, based on that conceptual map, can supplement it with bibliographic information during his/her independent work. Lectures will last 50 minutes, making the audiovisual material prepared by the teacher available in the Virtual Campus.

(2) Assignments to be conducted by students, will be oriented to apply to practical cases, concepts and methods explained in lectures.

(3) Computer-based labs models for evaluating species reintroduction actions will be used.

(4) Field trips: visits to places where ecological restoration actions have been carried out.

## Activities

Title	Hours	ECTS	Learning outcomes
<b>Type: Directed</b>			
Classroom lectures and discussions	35	1.4	4, 7, 8, 10, 6, 9, 11, 5, 3
Computer lab	3	0.12	2, 8, 11
Field trips	16	0.64	10, 11, 5, 3
<b>Type: Supervised</b>			
Writing research paper and various assignments	50	2	2, 7, 8, 9, 11, 5, 3
<b>Type: Autonomous</b>			
Study	42	1.68	4, 8, 10, 6, 5, 3

## Evaluation

The class will be graded according to the following elements and their respective relative weights:

1. First assignment (lab report) 15%
2. Research paper 30%
3. First mid-term exam 25%
4. Second mid-term exam 25%
5. Class assignments, exercises and participation 10%

In order to pass the class the student's grade, weighed as stated above, needs to be at least 5 (over 10), and the average for both mid-term exams (3 and 4) not less than 4 (over 10).

The No Grade score will be used when all gradable activities carried out do not reach a grade of 5 (over 10) overall if the sum of all activities graded were scored at their respective maximum.

Students who are unable to attend an individual test for a justified reason (such as illness, accident or death or grave illness or accident of a first-degree relative) and provide the official documentation to the Degree Coordinator, will be entitled to take the test at a different date.

## Evaluation activities

Title	Weighting	Hours	ECTS	Learning outcomes
1. First assignment (lab report)	15	0	0	2, 4, 8, 6, 9, 11, 3
2. Research paper	30	0	0	7, 10, 9, 11, 5, 3
3. First mid-term examen	25	2	0.08	1, 4, 7, 8, 6, 9, 11, 5, 3
4. Second mid-term exam	25	2	0.08	7, 8, 10, 6, 9, 11, 5, 3

## Bibliography

### SUGGESTED LITERATURE

#### Experimental design and criteria to detect effects in the environment

Downes BJ et al (2002) Monitoring ecological impacts: Concepts and practice in flowing waters. Cambridge university Press. (Disponible com a llibre electrònic de Google i, en versió paper, a la biblioteca de la Facultat).

Norton SB, Cormier SM, Suter GW II (eds)(2015) Ecological Causal Assessment. CRC Press.

#### Ecological restoration and restoration ecology

Agència Catalana de l'Aigua (2008a) La gestió i recuperació de la vegetació de ribera. Guia tècnica per a actuacions en riberes. [http://aca-web.gencat.cat/aca/documents/ca/actuacions/vegetacio\\_ribera\\_complerta.pdf](http://aca-web.gencat.cat/aca/documents/ca/actuacions/vegetacio_ribera_complerta.pdf)

Camprodon J, Ferreira MT, Ordeix M (eds) (2012) Restauración y gestión ecológica fluvial. Manual de buenas prácticas de gestión. Centre Tecnològic Forestal de Catalunya e ISA Press. Solsona. [http://www.ctfc.cat/docs/RICOVER\\_esp.pdf](http://www.ctfc.cat/docs/RICOVER_esp.pdf)

Clewell A, Aronson J (2013). Ecological Restoration, Second Edition: Principles, Values, and Structure of an Emerging Profession (The Science and Practice of Ecological Restoration Series). 2nd Edition. Society for Ecological Restoration. Island Press, Washington

Falk DA, Palmer MA, Zedler JB (eds) (2006) Foundations of restoration ecology. Island Press, Washington.

González del Tánago M, García de Jalón D (2007) Restauración de ríos. Guía metodológica para la elaboración de proyectos. Ministerio de Medio Ambiente.

Howell EA, Harrington JA, Glass SB (2012) Introduction to restoration ecology. Island Press.

Magdaleno F (2011) Manual de técnicas de restauración fluvial. Segunda edición. CEDEX, 294 p.

Montes C, Rendón-Martos M, Varela L, Cappa MJ (2007) Manual de restauración de humedales mediterráneos. Consejería de Medio Ambiente. Sevilla. (descarregable a internet)

Palmer, M.A., Hondula, K.L., Koch, B.J. (2014) Ecological restoration of streams and rivers: Shifting strategies and shifting goals. Annual Review of Ecology, Evolution, and Systematics 45:247-269.

Pereira HM, Navarro LM (eds) (2015) Rewilding European landscapes. Springer.

Prat N, Puértolas L, Rieradevall M (2008) Els espais fluvials. Manual de diagnosi ambiental. Diputació de Barcelona.

Rey Benayas JM, Espigares Pinilla T, Nicolau Ibarra JM (eds) (2003) Restauración de ecosistemas mediterráneos. Universidad de Alcalá, Alcalá de Henares.

Rieger J, Stanley J, Traynor R (2014) Project Planning and Management for Ecological Restoration (The Science and Practice of Ecological Restoration Series) 2nd Edition. Society for Ecological Restoration. Island Press, Washington

Society for Ecological Restoration (SER) International, Grupo de trabajo sobre ciencia y políticas (2004) Principios de SER International sobre la restauración ecológica. [www.ser.org](http://www.ser.org) y Tucson: Society for Ecological Restoration International. [www.ser.org/pdf/REV\\_Spanish\\_Primer.pdf](http://www.ser.org/pdf/REV_Spanish_Primer.pdf)

Van Andel J, Aronson J (eds) (2012) Restoration ecology: the new frontier. 2a edició. Blackwell, Malden.

Walker LR, del Moral R (2003) Primary succession and ecosystem rehabilitation. Cambridge University Press, Cambridge.

### **Environmental assessment**

Borrell J, Granyer O, Leonart I, Tarruella X (2000) Recull d'accions per minimitzar l'impacte de les infraestructures viàries sobre el territori. Documents dels Quaderns de medi ambient Núm. 5. Departament de Medi Ambient. Generalitat de Catalunya.

Conesa Fernández-Vitora V (2010) Guía metodológica para la evaluación del impacto ambiental. Mundi-Prensa. 4ª edición. Madrid.

Garmendia A et al (2005) Evaluación de impacto ambiental. Ed Pearson Educación, Madrid, 396p.

Gómez Orea D (2003) Evaluación de impacto ambiental, un instrumento preventivo para la gestión ambiental. 2ª edición ampliada. Editorial Mundi-Prensa. Madrid, Barcelona, México, 749p.

Ministerio de Medio Ambiente (2006) Prescripciones técnicas para el diseño de pasos de fauna y vallados perimetrales. Documentos para la reducción de la fragmentación de hábitats causada por infraestructuras de transporte, número 1. Organismo Autónomo Parques Nacionales, Ministerio de Medio Ambiente.

Ministerio de Medio Ambiente y Medio Rural y Marino (2008) Prescripciones técnicas para el seguimiento y evaluación de la efectividad de las medidas correctoras del efecto barrera de las infraestructuras de transporte. Documentos para la reducción de la fragmentación de hábitats causada por infraestructuras de transporte, número 2. Organismo Autónomo Parques Nacionales, Ministerio de Medio Ambiente y Medio Rural y Marino.

Ministerio de Medio Ambiente y Medio Rural y Marino (2010a) Prescripciones técnicas para la reducción de la fragmentación de hábitats en las fases de planificación y trazado. Documentos para la reducción de la fragmentación de hábitats causada por infraestructuras de transportes, número 3. Organismo Autónomo Parques Nacionales, Ministerio de Medio Ambiente y Medio Rural y Marino, Madrid.

Saaty TL (2000) Fundamentals of the analytic hierarchy process. RWS Publications, Pittsburgh, Pennsylvania.

Valls J, Infante O, Atienza JC (2014) Directrices para la evaluación ambiental de proyectos que puedan afectar a la Red Natura 2000. SEO/BirdLife, Madrid.  
<http://activarednatura2000.com/wp-content/uploads/2015/03/Directrices-para-la-evaluaci%C3%B3n-ambiental-de>

### **Suggested web pages on ecological restoration and environmental assessment**

1. Society for Ecological Restoration: [www.ser.org](http://www.ser.org)
2. MedWet: The Mediterranean Wetlands Initiative: [www.medwet.org](http://www.medwet.org)
3. CIREF: Centro Ibérico de Restauración Fluvial: [www.cirefluvial.com](http://www.cirefluvial.com)
4. European Centre for River Restoration: [www.ecrr.org](http://www.ecrr.org)
5. International Association for Impact Assessment: [www.iaia.org](http://www.iaia.org)
6. Departament de Territori i Sostenibilitat (Generalitat de Catalunya) --> Medi ambient i sostenibilitat --> Empresa i avaluació ambiental -->> Avaluació ambiental de plans, programes i infraestructures
7. Pàgina principal sobre avaluació ambiental de la Comissió Europea:  
[http://ec.europa.eu/governance/impact/index\\_en.htm](http://ec.europa.eu/governance/impact/index_en.htm)
8. Ministerio de Agricultura, Alimentación y Medio ambiente:  
[www.magrama.gob.es/es/calidad-y-evaluacion-ambiental/temas/evaluacion-ambiental](http://www.magrama.gob.es/es/calidad-y-evaluacion-ambiental/temas/evaluacion-ambiental)
9. Asociación Española de Evaluación de Impacto Ambiental: [www.eia.es](http://www.eia.es)

