



# River ecosystems: animal biodiversity

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Module:

**Impacts of human intervention  
on river ecosystem**

**River Management**

**Total duration:** 9 hours

**Field work:** Yes

**List of materials:**

PC

Insect nets

Pots

Conservation solution

Plastic bags

Notebook

Pen and pencil

Magnifying glass

Binoculars

Photographic camera

GPS (on the mobile phone)

**Worksheets:** 6

**Students' age:** 15-18

**Use of apps/software:** Google  
maps/Siftr

## Brief disciplinary introduction

The water is a welfare source in all civilizations, which usually establish on the river banks and floodplains. *Acequias* (irrigation channels) and *azarbes* (draining channels) as well as the *ramblas* (temporary water courses) are singular ecosystems with large plant and animal biodiversity.

Keywords: *acequia* (irrigation channel), *azarbe* (draining channels), *rambla* (temporary water course), fauna, insects, larva, dragonflies, mollusks, invertebrates, vertebrates, identification, biodiversity.



## Objective of the learning unit

To learn about:

- ✓ Plan and carry out a research project following the steps of the scientific method
- ✓ Animal diversity on studied ecosystems
- ✓ Water quality

To be able to:

- ✓ Develop a research project following the steps of the scientific method.
- ✓ Become aware of animal diversity on the studied ecosystems.
- ✓ Relate animal species to water quality

## Introduction (orientation)

**Time estimated:** 55 minutes

**Where the activity takes place:** in the classroom

**Method (how the students have to work):** work-groups

**Instructions for the teacher:**

After an introduction by the teacher (Annex I), the students form groups to answer the following questions after consulting several webpages (Worksheet 1)

1. *What is the irrigation system (the network of acequias)*
2. *What is the difference between acequias and azarbes?*
3. *Do indicate some of animals living in the current of the acequias*
4. *Do indicate vertebrates living in the acequias*
5. *Could you name some animals living in the water surface, using its superficial tension?*
6. *What the ramblas are?*
7. *Locate some ramblas close to Murcia*
8. *What vertebrate and invertebrate fauna are associated to the ramblas?*
9. *How could you define the water quality, turbidity, other parameters... in relation to the present species?*

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## Conceptualization

**Time estimated:** 55 minutes

**Where the activity takes place:** in the classroom/computers lab

**Method (how the students have to work):** work-groups

**Instructions for the teacher:**

After the orientation on the biodiversity of these ecosystems, the students should elaborate one hypothesis or one question to be solved along the research (Worksheet 2). For instance:

*What is the animal biodiversity on open acequias?*

*What is the animal biodiversity on the closed acequias?*

*Animal biodiversity is higher on open acequias than in closed ones?*

*What is the animal biodiversity in the ramblas?*

*Is biodiversity higher on the uppermost reaches or in the lowermost ones of the ramblas?*

*What is the relation the water parameters to animal biodiversity?*

## Investigation

**Time estimated:** 2 hours in the classroom and one day field trip

**Where the activity takes place:** in the classroom, field work by the river

**Method (how the students have to work):** group-work

**Instructions for the teacher:**

In the classroom, the students are divided in groups for starting “*Studying the plant biodiversity on ramblas (ephemeral and intermittent streams) and acequias and azarbes (irrigation and draining channels)*”

### 1) Planning

**Duration:** 2 sessions of 55 minutes

In Planning, students should form groups of 5 students and think about an hypothesis about the relationship between animal biodiversity and acequias that will push them toward “*Studying the animal biodiversity of the acequias (or ramblas)*”

The students should plan the steps to the experimental part of the research before carrying out it (Worksheet 3). They should come out with the following questions:

1. *In which points do we sample animals?*

With the support of Google Maps and other similar tools on Internet, they have to be located several points along the acequias, azarbes and ramblas to collect samples and photographs. Each group locate a different site under the teacher's supervision to organize the fieldwork.

2. *What material do we need to collect samples on the field?*

Students have to list the necessary material to collect and conserve in good conditions the collected animals.

Material:

- Insect nets
- Pots
- Conservation solution
- Plastic bags
- Notebook
- Pen and pencil
- Magnifying glass
- Binoculars
- Photographic camera
- GPS (on the mobile phone)

3. *What is the method to collect and conserve the specimens?*

It is convenient to know the steps for a good sampling (collect specimens, to photograph them and from the environment, location, etc.)

#### 4. *How can specimens be identified?*

Students have to learn how to use identification guides. Also they have to consult identification online.

#### 5. *How a collection is created?*

Once the specimens were collected and identified the students can create a collection and/or specific taxa files with the compiled information.

#### 6. *How are the taxa files elaborated?*

Taxa files will include information about taxonomy, habitat and animal characteristics, as well as photography.

#### 7. *Data collection and processing*

Define variables to be recorded like environmental data (water variables) and taxa variables like animal taxa abundance per point.

## 2) Performing

**Duration:** one day

**Organization:** In the field each group work in sampling point

**Duration:** One field excursion. Preferably on spring when animal activity is higher-

**Materials:** Materials proposed by the students for the collection and conservation of invertebrate specimens.

## 3) Data analysis

**Duration:** two sessions of 55 minutes each one.

**Organization:** In the classroom and/or home, in groups of 5.

**Materials:** the collected material in the excursion, computers, identification guides, material for making collections, taxa files

Samples taken in each sampling point will be separated in order to identify taxa with identifying guides and the support of webpages. It was counted each taxon and calculations of diversity per points will be carried out. Finally a file per taxon will be elaborated (Worksheet 4)

## Conclusion

**Time estimated:** 2 hours

**Where the activity takes place:** in the classroom

**Method (how the students have to work):** group-work

**Instructions for the teacher:**

### **Part 1. Draft the conclusions of the experimentation**

**Duration:** One session of 55 minutes

**Materials:** data tables, collections and taxa files as well as fieldwork notes.

The different groups of students expose conclusions, They will compare animal biodiversity on the different points and answer to the questions formulated in the phase of conceptualization. The conclusions must determine animal diversity on the studied ecosystems (Activity 5; student's booklet) as well as the relationship between biodiversity with environmental variables using scatter plots of diversity and species abundance against environmental variables like water pH, vegetation cover of the bank, etc.

### **Part 2. Development of the presentation:**

**Duration:** 1 hour

**Organization:** In the PC room and at home.

**Materials:** computers with presentations software (Powerpoint; Prezi)

Each group will expose a presentation explaining the steps of the research process and the results (Worksheet 6). The group will have a maximum of 12 slides in the presentation and no more than 30' for the exposition.

## **Discussion and communication**

**Time estimated:** 60 minutes

**Where the activity takes place:** in the classroom, or in a public event (Multipurpose Classroom, Cultural Week, meeting with parents, etc.)

**Method (how the students have to work):** group-work or with the whole group

**Instructions for the teacher:**

Each group will present their study in 10 minutes. Apart of the presentations the students can carry out an exhibition of the collections and taxa files, explaining them accepting questions from the public belonging to the educational community.