Educational Proposal:
Wildlife Vehicle Collisions

7 ACTIVITIES

EnVeROS Project

Vocational Training

Erasmus+

Activity leading organization

Participating organizations

This activity guide is part of IO3 within the ERASMUS+ Enveros project, targeting hunters, foresters, drivers, cyclists, runners, and citizens. The material can be used for vocational training, either as a complete education package comprising all proposed activities or separately as a number of self-standing activities for a diverse range of audiences and training events. This is the reason why some of the information is repeated in each activity. Although there are many examples from Cyprus, these can be easily adapted to other countries or areas.

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Contents

1. THE ROADKILL

Age:
18-99

Duration:
40 – 45 minutes

Intended for:
Hunters, foresters, drivers, cyclists, runners (or group which might be interested from a citizen science point of view)

1.1. Aim

The aim is to familiarize trainees with roadkills monitoring on the road network, through the EnVeROS wildlife vehicle collision (WVC) application. The action will teach trainees to process and record data / information from various maps and enable them to think of proper mitigation measures. A target also, is to create groups of citizens that will be able to contribute WVC data for a better management of the problem.

1.2. Educational Objectives

By the end of the session trainees, should be able to:

- Use the EnVeROS web map and app for reporting WVCs from their areas.
- Familiarize with the data required to report a WVC and contribute to environmental protection.
- Understand how the use of EnVeROS map and app can provide valuable information for WVC management.

1.3. Introduction for educator

Visit www.enveros.eu

- e-Learning course, lessons 6 and 7;.
- EnVeROS App and Web Map: https://www.roadkill.enveros.eu/?lang=en
- Download Framework Analysis Report on http://www.enveros.eu/?wpdmpro=enveros-framework-analysis-report and take a look to pp. 27-32.

1.4. Implementation of activity

- The trainees are divided into groups of maximum six people. Three maps, three datasheets and a map of Cyprus with questions (see supporting material 1.4.1-2) will be provided to each group.
- The trainees are asked to fill in the datasheets according to the information of each map. In this way, they will be familiarized to record roadkill incidences in several areas/ countries and try to think and suggest possible solutions or mitigation measures.
- When information is filled, trainees will identify the species that are most likely affected by the vehicle collisions and the areas of high risk.
- After the activity, lessons 06 and 07 (www.enveros.eu) will be given which present, exact information about the process for submitting a sighting in the WVC platform, and an introduction to mitigation measures.
- Trainees will be asked to report any wildlife vehicle collision they encounter in their daily life for a period of at least a month. For this purpose, the training team will provide support whenever required.

1.4.1. Supporting material

Questions

- Mammals
- Birds
- Reptiles

Which category of species is the most affected?:

……

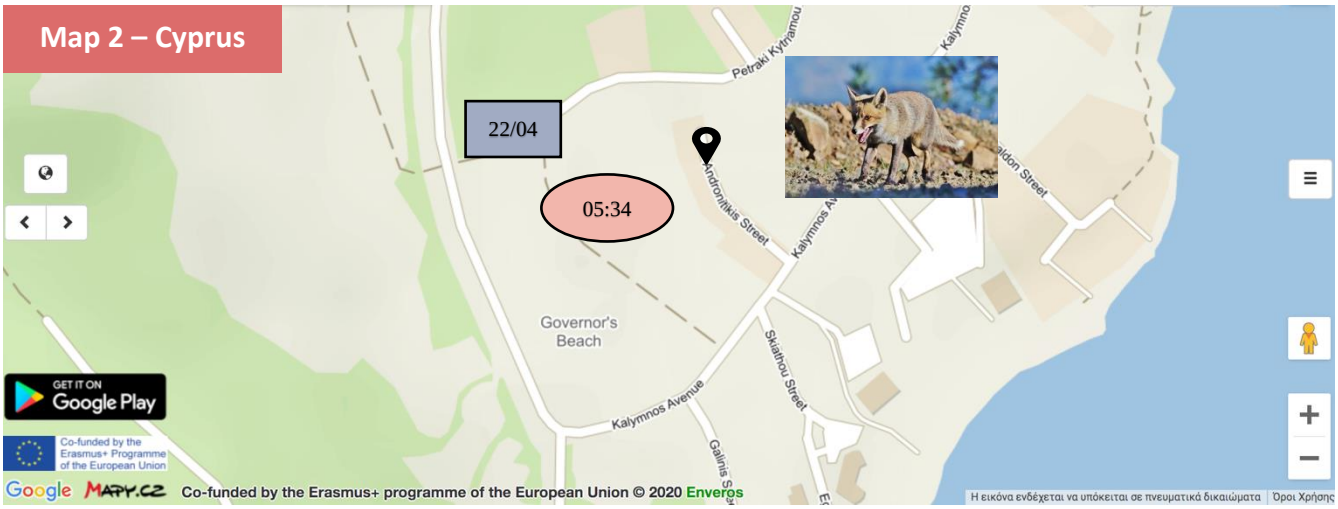
……

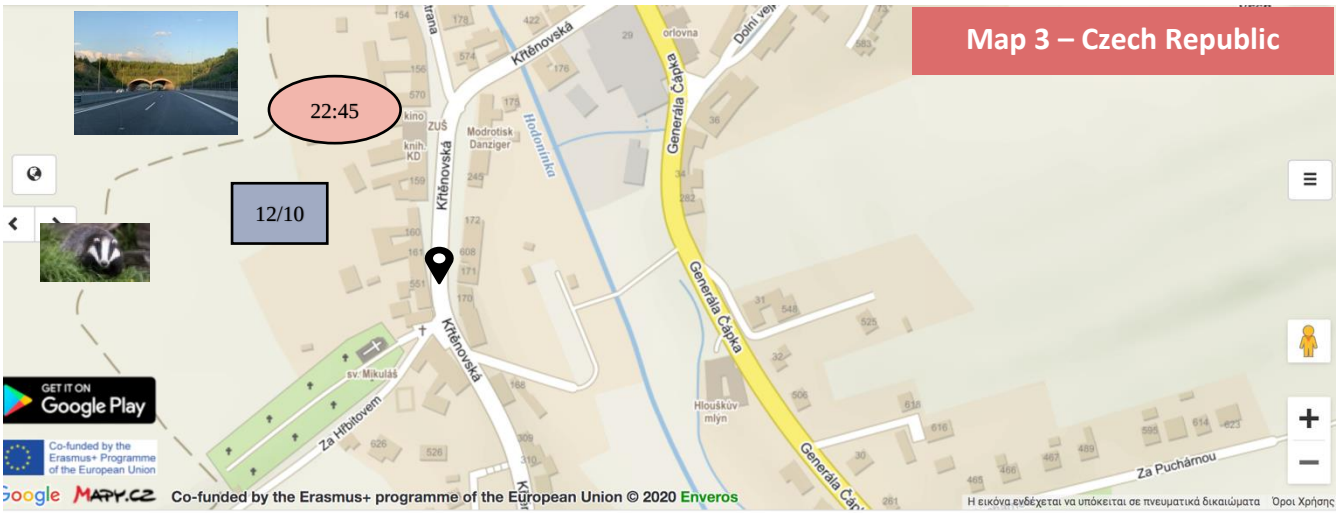
Which area is the "hotspot" of Wildlife Vehicle Collisions?

……

……

1.4.2. Supporting material






Map 4 – United Kingdom
03/09
07:05
B3335
M3
E 05
A3090
Hockley Link
Otterbourne Road
Winchester Road
Itchen Navigation
White Lane
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Map 5 – France
17:30
13/05
La Villatte
Le Grand Moulin
La Joubarderie
Route de la Guerche
Rue des Velours
Rue des Réaux
Rue du Moulin
Rue du Château
Grande Rue
Rue des Tanneries
Le Grand-Pressigr
L'Aigronne
La Claise
D 42
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Map 6 – Ireland
09/06
04:55
N85
R474
Ennis Western Relief Road
Golf Links Road
Drumbiggle Road
Cahercalla Road
Beechpark
Claureen River
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Datasheet

Species class: .....

Species name: .....

How certain are you?

Absolutely certain (100%)	Almost sure	Not sure

Date: .....

Time: .....

Location: .....

Mitigation Measure (if any) .....

Propose any mitigation measures and justify:

.....

.....

2. HIDDEN MESSAGES

Age:
18-99

Duration:
35 – 40 minutes

Intended for:
Drivers, cyclists, runners, scouts

2.1. Aim:

This activity aims at sensitizing young drivers, scouts, cyclists and groups that are doing outdoor activities on the issue of wildlife vehicle collision (WVC). In addition, they will get knowledge on some safety or behaviour rules to be applied when an accident with a wild animal occurs.

2.2. Educational Objectives

By the end of this activity trainees should be able to:

- Familiarize with the EnVeROS application and map.
- Present the impacts of roads on biodiversity and ecosystems.
- Discuss the causes and factors of WVC.
- Understand how to avoid a WVC

2.3. Introduction for educator

Visit www.enveros.eu → Lessons 1, 2, 3, 4, 6, 7

2.4. Activities implementation:

- The instructor hides each paper from supporting material 2.4.1. at the appropriate point, so that each team can find them later on.
- The trainees are split into 4 – 5 groups and assign a coordinator for each group.
- Each group gets a working sheet (Supporting material 2.4.2.).
- The instructor informs them that they have 25 minutes to complete the working sheet with hidden messages and then announces the beginning of the game.
- Each group is asked to fill in their working sheet by finding the hidden messages that are hidden (see point 1). They can start by using the help provided in the working sheets.
- Once all the groups have finished with the hidden messages, they return to their seats.
- Each group discuss the hidden messages found with the whole group and, in this way, all the information is shared on the issues of: factors and consequences of WVC, safety measures and rules that are best followed after an incident as well as WVC application.

**The points where the information is located can be altered or adapted according to the building/room/space the meeting is conveyed.*

2.4.1. Supporting material

Blue team – Information about WVC

Wildlife vehicle collisions (WVC): Collisions with all species of wild animals.

Wildlife vehicle collisions can cause substantial vehicle damage, human injuries and, consequently represents a relevant issue to public safety, economic and social concern.

Road mortality can have a significant impact on the number of individuals of a species, especially in small populations.

Snakes and lizards are frequently involved species in WVC in Cyprus because they are slow moving animals.

Red and roe deer are frequently involved species in WVC, because they are crepuscular and have a large home range.

Factors contributing to WVC (depends on the region): Traffic volume, vehicle speed, road width, animal speed, roadside vegetation.

Some mitigation measures of WVC: Wildlife warning signs, Wildlife fencing, Olfactory repellents, Wildlife underpasses and overpasses.

Yellow team – Advice on how to avoid a collision

Slow down! Speed below 45 /50 km/h results in fewer accidents.

Drive with increased awareness when traveling in wildlife signed areas. Crossing signs are generally placed in known wildlife movement areas and wildlife vehicle collision hot spots.

Make sure you and your passengers wear seatbelts.

Limit driving in natural areas (or roads inside of forests) at night.

Don’t litter. Some species will be attracted to roadsides if they smell food containers or remaining.

If an animal crosses safely in front of your car, proceed with caution because it may turn and try to cross back, or others could be close.

Green team – WVC

Swerving is not the best option. Slow down as much as possible as soon as you see the animal.

If a collision is unavoidable, slow down as much as possible and brace yourself for the impact.

After an impact with a large animal, try to regain control of your vehicle and pull off the road at the first safe space. You and your vehicle may have suffered damage that requires assistance. Call the emergency number of your country to get assistance in these circumstances.

After crashing into a large animal, if you see that the animal is injured and still moves, stay inside your vehicle. An injured deer, moose, or elk could be very dangerous. Turn on your emergency flashers to warn other drivers of your accident.

If you hit a wild animal with your car, contact your automobile insurance agent as soon as possible to file a claim for any damage to your vehicle (*if your insurance covers).*

Do not touch injured animals, they could fight back. Instead, keep your distance so that the stress of the animal does not increase.

Red team – Observation System for wildlife

Platforms and Smartphones (www.env\eros.eu)

Data collection of WVC: Species class

Data collection of WVC: Date and Time

Data collection of WVC: Location

Data collection of WVC: Estimated collision date

Data collection of WVC: Take a photo

2.4.2. Supporting material

1. Under the table

2. Behind the door

3. Under the chair

4. Next to the window

5. On the wall

6. Look at the entrance/outside

3. TRAFFIC SIGNS

Age:
18-99

Duration:
60 minutes

Intended for:
Drivers, motorists, young adults.

3.1. Aim:

The following activity is addressed to young drivers and motorists to become aware and conscious about the issue of wildlife vehicle collision and be informed about the road signs that indicate the danger of crossing animals and consequently the risk of a WVC. Also, the trainees learn about the responsible behavior and best practices of a driver to minimize the risk of WVC.

3.2. Educational Objectives

By the end of this activity trainees should be able to:

- Understand the meaning of different traffic signs used worldwide as one of mitigation measures for WVCs.
- Recognize the reasons of the speed limits depending on the characteristics of each area and type of road.
- Learn about the responsible driver behaviour and how it can contribute to the decrease of WVC.

3.3. Introduction for educators

Visit www.enveros.eu → Lessons 3, 4, 6, 7, 8

- Road signs are country specific. However, they are very similar in appearance and meaning, yet they are not the same everywhere.

3.4. Implementation of activity

- The instructor shows the following video that contains basic information for WVC avoidance: (https://www.youtube.com/watch?time_continue=5&v=9o8O2XdMQ8k&feature=emb_logo).
- The instructor mentions specific road signs that indicate danger of WVC, as well as signs (e.g. road turn) that indirectly link to higher risks for WVC.
- Then, the instructor gives to the trainees a datasheet with a table (supporting material 3.4.1. – example with the case of Cyprus which can be adapted accordingly for each country) which they have to fill with the missing speed limits and symbols depending on each type of road.

- The instructor presents the correct speed limits for each case and then gives to the trainees a second paper sheet (supporting material 3.4.2.) which contains factors of WVC and their descriptions. The trainees will be asked to rank each factor according to their importance for WVC avoidance.
- Through the last exercise, the trainees will receive important information about factors that contribute to WVC and how to avoid them. A plenary talk will be followed by all trainees and instructor to share opinions and insights from the exercise.

Introduction for trainees

There is a variety of traffic signs in different colors and shapes that indicate different meanings.

A road sign warns drivers to beware of migratory toads crossing the road.

The hedgehog road sign will warn motorists of hazards involving small animals (Department for Transport UK).

1. Regulatory Signs

Also known as traffic control signage, regulatory signs are by their nature, less informational, and more directorial. They include stop signs, yield signs, turn and lane use signs and traffic signal signs. If you are a driver looking for parking, regulation signs provide the information you need to avoid.

2. Warning Signs

Maybe the most likely to save your life in a vehicle, warning signs do exactly as their title suggests – warn drivers about upcoming hazards, lane merges or necessary speed changes. Warning signs include turn and curve warnings, intersection signs, merge and lane transition warnings, bridge clearances, divided highway warnings, hill warnings and pedestrian crossing notices among others.

3. Guide Signs

When you are taking a road trip, guide signs are the holy grail of navigation. Yes, GPS navigation can take you just about anywhere nowadays, but fumbling with your phone while you are approaching a confluence of two or three highways can be dangerous. Guide signs, such as diagrammatic guide signs, roadway junction signs, destination distance signs and mile markers help motorists navigate interstate highways without taking their eyes off the road.

Sign Colors

1. Red and white signs indicate rules you MUST follow.

These signs are typically restrictive, often featuring phrases that begin with the words “Do Not” or “Wrong.” They also contain various commands. The color red, synonymous with anger, hostility and immediacy, will deliver a message before the driver even reads the sign.

2. Yellow signs are meant to be cautionary.

If we were to liken these traffic signs to sayings, we would say they were: “Always be prepared,” or “Look both ways before crossing the street”. Yellow traffic signs signify that a slowdown is coming or that caution is required.

3. Green does not always mean go.

Green signs fall under the guide signs category – for the most part. Used to give directions through highway interchanges, they tell the driver where they are in relation to various markers.

4. Blue signs help motorists find basic services.

Looking for lodging or trying to make a quick pit stop before getting back on the road? These signs give information about where to find commercial services.

5. Construction signs rely on orange to keep you alert.

Road work can be a major hassle, but it is a necessity. Orange traffic signs alert drivers to slow down before passing major construction projects. They are also a source of information for helping drivers navigate through and around these work zones.

Sign Shapes

Contrary to public perception, sign shapes are not arbitrary. They are chosen with visibility in mind. In cases of heavy fog, snow or precipitation, drivers may not be able to read signs, or make out basic colors. Shapes are a final fail – safe to maintain traffic safety.

1. See an octagon shape in the distance? Stop immediately.

Octagons are used exclusively for stop signs.

2. A triangular sign is only used for yielding.

Yield signs mean slow down, get ready to stop and let traffic pass before continuing onward.

3. Round means railroad.

An attention-grabbing “X” adorns the front of these signs, indicating a railroad crossing.

4. Diamond signs should grab your attention.

Typically, yellow-colored, diamond-shaped signs alert drivers to existing or seasonal hazards on the road, before they are encountered.

5. Vertical rectangular signs are also regulatory signs.

These signs tell about important rules to follow on motorways, including messages like “Keep Right”.

To avoid WVC, we need to be conscious and aware of all road signs meaning, especially those related to speed limits, animal presence, as well as those that indirectly increase the risks for WVC (e.g. dangerous turns).

Examples of speed limit signs:

Speed limit 50km/h

Speed limit 30km/h

Speed limit 80km/h

Warning signs for wildlife presence:

Deer Crossing Warning Sign

Frog Crossing Warning Sign

Horse Crossing Warning Sign

Examples of general signs that might indirectly link to higher risks for WVC.

Vehicles are not allowed into the approaching area

Warning right hand bend ahead

Additional Panels

These signs serve as a supplement to danger, priority, restrictive, mandatory, information and directional signs. The additional panel notes approximate distance until the approaching obstacle, distance until the advised service or the length of the restricted travel zone.

Examples of additional panel:

Additional panels will advise of the particular form of danger for a given danger sign, in this example: deer and wild boar.

3.4.1. Supporting material

Speed limits in Cyprus as per type of road:

Type of Road	Symbol	Speed limit symbol	Speed limit
Highway (Motorway):			
Built up Areas:			
Country Roads:			
Hazards:			
National Speed Limit:			

Answer:

Type of Road	Symbol	Sign	Maximum speed limit
Highway (Motorway):			100 km/h
Built up Areas:			50 km/h
Country Roads:			65 km/h
Hazards:			30 km/h
National Speed Limit:			80 km/h

3.4.2. Supporting material

A. Vehicle speed		**E. Road turns**	
B. Animal abundance		**F. Time of year**	
C. Litter		**G. Non-awareness**	
D. Time of day		**H. Careless driving**	

A

Speed is one of the most common factors in vehicle collisions. Reducing your speed from 100 km/h to 80 km/h gives 30 extra metres to stop – that's several car lengths.

B

Some animals travel in groups – where there is one animal, there may be more. So watch for animals following behind the first one.

D

5 to 8 am
5 to 11 pm

Dusk and dawn are traditionally times of high wildlife vehicle collisions. Light levels are low, and animals are active at these times.

E

Beware of dangerous turns because they pose risks of collision with animals.

H

It is easy to be distracted by a phone call or text message, as it affects the ability to concentrate and anticipate the road ahead.

C

An apple core tossed from a car can bring hungry animals like mice or predators that hunt them dangerously close to the road.

G

Recording observations of dead wild fauna throughout the road network. Data collected will be used to understand the factors which influence road kills, the impacts of roads on fauna in general and contribute to better infrastructure planning.

F

Spring: early plant growth near roads attracts wildlife. **Summer**: drought and forest fires affect animal movement. **Autumn:** wildlife is very active during mating season. **Winter:** road salt and better forage in the valley bottoms attracts wildlife to the road and snow hinders movement.

4. WVC Factors

Age:
18-99

Duration:
40 – 45 minutes

Intended for:
Foresters, drivers, cyclists, runners

4.1. Aim

This activity aims to sensitize young drivers, cyclists and groups that are doing outdoor activities. Specifically, trainees will get informed about the issue of Wildlife Vehicle Collisions (WVC) and the factors that might contribute to WVC and be educated about best – practices and behaviour to avoid WVC.

4.2. Educational Objectives

By the end of this activity trainees should be able to:

- Describe the effect of the road network development and increase of vehicles in an area on the WVC cases.
- Name factors that contribute to WVC.
- Present ways to minimize the risks of WVC and mitigation options.

4.3. Introduction for educators

Visit → Presentations 2, 3, 4.

4.4. Activities implementation:

- The instructor presents basic information about WVC and major factors that contribute to it.
- Then, he/she gives to the trainees a working sheet (supporting material 4.4.1.) and ask them to indicate the factors that increase or decrease the chances of WVC using the symbols + (increase), – (decrease) and +- (possibilities for both increase or decrease).
- After the trainees fill the working sheet with their opinions, the instructor provides the correct answers together with justifications. The justifications are followed by a plenary discussion with all the group so that the trainees can get informed and become aware about the ways that can decrease WVC according to the supporting material 4.4.3.
- Finally, trainees are asked in an open discussion whether they should swerve or not in different circumstances (supporting material 4.4.4.). The latter activity will allow trainees to understand the potential safety and economic consequences that might be caused by the swerving and the environmental, economic and safety consequences that can be caused from a WVC.

Introduction for trainees:

- WVC is an important issue in road ecology because of its consequences to many species.
- WVC impact species conservation and management, public safety, animal welfare, and the economy.
- Mortality resulting from roadkill can be very significant for species with small populations.

Factors contributing to WVC:

Traffic

- Traffic generates many problems to large and medium – sized mammals, and even common game species. Therefore, road mortality can be of significance to the management of local populations.
- For many rare species worldwide, especially amphibians and reptiles, traffic is considered a threat to their survival.
- Increased traffic on a road is indicative of the number of WVCs, even though high volumes of traffic can also discourage species from crossing at all.

Environmental Characteristics:

- WVC are common in areas where the road verges are planted with hedgerows, , or there are large areas of natural habitat used by species as nesting ground, shelter or migration routes.
- Heterogeneous landscapes might create natural corridors for animal movements, while more homogeneous landscapes encourage a more random WVC distribution.
- Wetlands, which typically host a variety of species, when located adjacent to roads, run a high roadkill risk since many animals are lingering by the roadside.

Other factors: Driver experience, animal abundance, number of vehicles, vehicle speed.

4.4.1. Supporting material

Factors contributing to wildlife vehicle collisions increasing incidents (+), decreasing incidents (-), not clear contribution (+-)

1. Driver awareness	
2. Vehicle speed	
3. Roadside vegetation	
4. Time of day/year	
5. Animal abundance	
6. Road turns	
7. Road width	
8. Animal speed	
9. Road fences	
10. Road lights	

4.4.2. Supporting material

Factors contributing to wildlife vehicle collisions increasing incidents (+), decreasing incidents (-), not clear contribution (+-)

1. Driver awareness	**-**
2. Vehicle speed	**+**
3. Roadside vegetation	**+-**
4. Time of day/year	**+-**
5. Animal abundance	**+**
6. Road turns	**+**
7. Road width	**+**
8. Animal speed	**-**
9. Road fences	**-**
10. Road lights	**+-**

4.4.3. Supporting material

- Vehicle speed: Keep your speed low as indicated by the road signs.
- Driver behaviour: Don't be distracted by activities/situations such as a phone call or a text message, as it affects the ability to concentrate and anticipate unfortunate events.
- Roadside vegetation: Be careful when you are driving in areas where the roadside is forested for protection.
- Time of day/year: Be careful when at dusk or dawn because they have been proved as times with higher chances of wildlife vehicle collisions.
- Animal abundance: Watch for animals and animal signs.
- Road turns: An animal may be present after a dangerous turn.
- Animal speed: Be careful of slow-moving animals, they are usually unable to evade vehicles and are inconspicuous to oncoming vehicles.
- Road lights: Road lights sometimes might attract animals.

4.4.4. Supporting material

To swerve or not to swerve?

A myth: Just swerve to miss the animal and you'll be OK.

1. Wrong! Secondary crashes can occur when drivers attempt to avert an initial crash by swerving and then collide with another vehicle or object.
2. Drive slowly enough so that you have time to react without swerving.
3. If a smaller animal is in your way, consider using your brakes instead of your wheel. Consider swerving only if it is a larger animal.

5. Consequences

Age:
18-99

Duration:
50 minutes

Intended for:
Hunters, foresters, drivers, cyclists, runners, young adults, citizens.

5.1. Aim

This activity aims to familiarize the trainees with the importance of animal traits such as size and speed and highlight the importance of drivers' conscious behaviour to avoid WVC. Through this activity, the trainees will become more aware about the potential monetary and non – monetary costs of WVC.

5.2. Educational Objectives

By the end of this activity trainees should be able to:

- Present WVC as a key public safety, economic and social issue.
- Differentiate among the different risks posed by each animal, and the importance of factors such as animal speed, vehicle speed and animal size.
- Familiarize themselves with the costs of WVC; both in monetary and non – monetary value.

5.3. Introduction for educators

Visit www.enveros.eu → Lessons 4, 5, EnVeROS layman booklet.

5.4. Activities implementation:

- The instructor presents to the trainees the consequences of WVC for human safety, as well as their socioeconomic implications at a national and international level.
- Then, the instructor provides them with a working sheet (supporting material 5.4.1.) at which they have to fill the consequences that are likely to occur in each case; depending on the species involved and the vehicle speed.
- In the end, the group discusses and elaborates on their responses with the aim to reflect on the various consequences that can be caused from a collision with a wild animal, focusing on the importance of vehicle speed to each situation.

Introduction for trainees

Wildlife vehicle collisions involving large mammal species, can cause substantial vehicle damage and human injuries, and consequently are a key public safety, economic and social concern.

WVC can have a broad range of **consequences** for both motorists and animals. These consequences can be divided into major categories according to their characteristics:

- **Vehicles** (damage to vehicles, infrastructure)
- **Health and safety** (injuries, hygiene – dead bodies in the roads, emotional trauma, delay in work/ schedule)
- **Species** (economic loss, e.g. game species and impact for the hunters)
- **Financial cost** for the **public sector**.

1. Vehicle repair costs

- **In Spain:** Mean vehicle reparation **6.425,17 €**
- **Canada:**

Estimated costs for property damage, human injuries, and human fatalities for the average AVC.

Maximum Severity	Cost ($)
Property damage only	2,570
Possible human injury	24,418
Evident human injury	46,266
Incapacitating/severe human injury	231,332
Human fatality	3,341,468

2. Health and safety

Human injuries due to WVC

- Czech Republic in 1125 injuries (22 fatal) during 2007 – 2013.

Removal and disposal costs of carcasses

- In Canada (Federal Highway Administration Research and Technology):

1. The clean – up
2. Removal
3. Disposal costs for animal carcasses

$100 for deer, $350 for elk, and $350 for moose

3. Monetary value of animals (e.g. game species):

Case study in British Columbia

The monetary value of wildlife has many different components including:

1. License fees.
2. Costs associated with hunting (e.g., materials, transport, lodging, meals).
3. Recreational wildlife viewing.

Examples of costs that are not quantifiable:

- Emotional distress of people involved in WVC.
- The expenses involved with conservation efforts for threatened or endangered species.
- The costs of the distress of injured animals.
- The costs associated with the rehabilitation of injured animals.
- The cost of cultural values impacted by wounded animals (e.g. symbolic species).

5.4.1. Supporting material

Case	Direct and indirect effects
Snake / vehicle 30km/h	
Fox / vehicle 50 km/h	
Mouflon / vehicle 100 km/h	
Gyps fulvus / vehicle 80 km/h	
Hedgehog / 45km/h	

(a) Human fatality (b) Human injury

(c) Vehicle repair costs (d) Road damage

(e) Fatality of animal (f) Cost for insurance

(g) Road maintenance cost (h) Removal and disposal costs of carcasses

(i) Secondary accident (j) Travel delays

(k) Emotional distress of people involved in WVC.

(l) Costs associated with the rehabilitation of injured animals.

(m) Expenses deriving from conservation efforts for threatened or endangered species.

(n) Monetary value of the animal itself, value associated with its hunting or license fees or recreational attraction for wildlife viewing.

5.4.2. Supporting material

Case	Direct and indirect effects
Snake / vehicle 30km/h	e, k
Fox / vehicle 50 km/h	b, e, f, h, i, j, k, l
Mouflon / vehicle 100 km/h	a, b, c, d, e, f, g, h, i, j, k, l, m, n
Gyps fulvus / vehicle 80 km/h	b, c, e, f, i, j, k, l, m, n
Hedgehog / 45km/h	e, k

(a) Human fatality (b) Human injury

(c) Vehicle repair costs (d) Road damage

(e) Fatality of animal (f) Cost for insurance

(g) Road maintenance cost (h) Removal and disposal costs of carcasses

(i) Secondary accident (j) Travel delays

(k) Emotional distress of people involved in WVC.

(l) Costs associated with the rehabilitation of injured animals.

(m) Expenses deriving from conservation efforts for threatened or endangered species.

(n) Monetary value of the animal itself, value associated with its hunting or license fees or recreational attraction for wildlife viewing.

6. SPECIES IDENTIFICATION AND RECORDING

Age:
18-99

Duration:
40 - 45 minutes

Intended for:
Hunters, foresters, drivers, cyclists, runners, citizens

6.1. Aim

This activity aims to familiarize trainees with the identification and the proper recording of animals that have been involved in a WVC case. This will be done by providing knowledge and photographs of fauna species involved in roadkills and by following some activities that will give them the necessary tools to act independently when found at a WVC site.

6.2. Educational Objectives

By the end of this session trainees should be able to:

- List the species most affected by WVC in their country
- Identify animals found killed at the road network
- Monitor WVC in their areas of interest.

6.3. Introduction for educator:

1. Visit → Lessons 2, 3, 4
2. Consult the introduction for trainees

6.4. Activities implementation:

- The instructor gives a presentation (5-6 slides) about some basic morphological and ecological characteristics of species that are involved in WVC in his /her country (should include appearance and size, life history, abundance and distribution). This will help trainees understand the likelihood of them encountering a specific animal at a specific landscape.
- The trainees are asked to perform an exercise where they have to match the (1) word of the animal together with the (2) picture of the living animal and the (3) picture of the dead animal found on the road (supporting material 6.4.2).
- Each trainee is given a picture of a different roadkill and is asked to fill in the information required in the sheet (supporting material 6.4.1). This will let them familiarize with the actions required when submitting a new entry at the EnVeROS website (www.enveros.eu).

Introduction for trainees

Which wildlife animals of Cyprus are most frequently found dead on the road?

Mouflon

Mammal, wild sheep
Mean shoulder height: 68 cm (males)
Weight (mean): 36 kg (males); 23,9 kg (females)

Characteristics:
(1) Colour: Reddish – brown.
(2) Horns: Only males have them.

Habitat: The mouflon habitat lies within mountainous, wooded terrain. Some parts border on agricultural land.
Movement: They are flexible and move very fast.
Mortality due to collisions with vehicles: 13%

Hare

Length (mean): 48 – 75 cm
Weight (mean): 2,5 – 6kg
Colour: Yellow – brown, grey – brown.

Characteristics:
(1) Long ears
(2) Long back feet

Habitat: All types
Movement: Mostly active at night and runs up to 70 km/h.

Fox

Length: 60 – 95 cm, Height: 40 – 55 cm, Length of tail: 90 cm
Weight: 7 – 10 kg

Characteristics:
(1) **Fur:** Rich and soft, yellow – red on the back, grey – white on the belly.
(2) **Bushy tail**

Habitat: Adapted to many different habitats
Active at night
Movement: Fast and agile

Hedgehog

Size: 18 – 25 cm

Characteristics:
(1) Covered with light – yellow spines.
(2) White fur belly.
(3) Small body and head.

Habitat: agricultural land, coast, bushy vegetation, mountainous areas and salt lakes.
Movement: Active at night and inactive during winter.
When scared, remains motionless and curls into a ball.
Hedgehogs are endangered by vehicles, pesticides used in crops and poisoned baits.

Snakes

Length: up to 3 meters
8 different species

Characteristics:
(1) No legs.
(2) Very flexible, S – shape movement.
(3) In winter they are inactive.

Habitat: From the coast up to the highest peak of Troodos.
Movement: April – May are the most active months.

Swamp Frog

Size: Usually up to 10 cm

Characteristics:
(1) Green – brown colour on the back with dots.
(2) White – yellow belly.

Habitat: found in rivers, tanks or dams up to 1000m above sea level.
Movement: Slow moving

Lizards

11 different species.

Chameleon: The slowest species and most likely to be killed on the road.
Chameleon: It has the ability to camouflage.

Starred Agamas: Reach about 30cm in length and can be found everywhere, especially in fields and ruins of houses.
Movement: Very fast reptile - when it does not run, it remains still with its head held upwards.

6.4.1. Supporting material

Hypothetical scenario

You are driving or cycling along a road when you suddenly hit or see an already dead wild animal. Fill in the sheet below to give the type of animal you have encountered, the date and time of encounter, the estimated collision date and the location on the map.

For the estimated collision date consider the following information:

(1) Fresh blood and clear eyes indicate that the animal has died very recently (https://journals.sagepub.com/doi/full/10.1177/0300985816629720).
(2) Fresh stage: death until bloating begins (4–36 days).
(3) Bloated stage: onset of bloating until resolution of bloating (3–19 additional days).
(4) Decay stage: resolution of bloating until drying of carcass (6–183 additional days).
(5) Dry stage: drying of carcass until no evidence of carrion insects (13–27 additional days).

Data required when making an entry

Animal:

Date and time:

Estimated collision date:

Location on the map:

6.4.2. Supporting material

Name	Alive	Dead
Snake		
Fox		
Deer		
Hare		
Hedgehog		
Chameleon		
Mouflon		
Swamp frog		

A

B

C

C

D

E

F

G

H

I

J

K

L

M

N

O

P

Q

6.4.3. Supporting material

Name	Alive	Dead
Snake	I	G
Fox	L	C
Deer	Q	E
Hare	F	P
Hedgehog	C	O
Chameleon	D	J
Mouflon	M	H
Swamp frog	A	N

7. HOW TO ACT IN A WVC INCIDENT

Age:
18-99

Duration:
60 - 90 minutes (presentation) and 60 minutes (field activity).

Intended for:
Hunters, foresters, drivers, cyclists, runners.

7.1. Aim

The aim of this activity is to educate the stakeholders and the public about Wildlife Vehicle Collisions, how they are caused, how to prevent them, what to do if they encounter WVC incident, and what to do if they are involved in a WVC.

7.2. Educational Objectives

By the end of this activity trainees should be to:

- Report WVC and understand when, where and how they occur.
- List the best reactions to avoid a WVC.
- Explain what drivers' behaviour after a WVC should involve.

7.3. Introduction for educator

1. Visit www.enveros.eu → Presentations 4, 5, 6, 7, 8.
2. Consult the introduction for trainees.

7.4. Implementation of activity

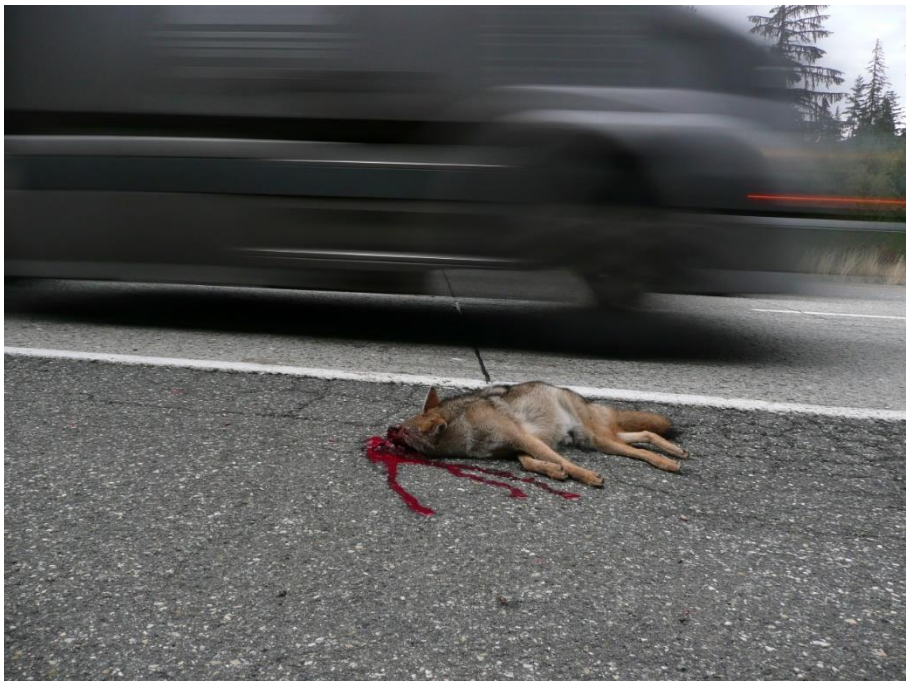
- The instructor gives an introduction on wildlife vehicle collision and then provides trainees with information about when, where and how they occur. Finally, trainees learn about responsible behaviour and best – practices of a driver after a WVC.
- After the introduction, the instructor takes the group out on a specific route observing the road signs and wildlife warning signs, making sure they are aware of the law and ask questions along the way what the signs might mean.
- Along the route trainees are asked to look for WVC, use the proper procedures described in the class on how to behave during an encounter with a WVC and record the incident on the application so for the group to experience the practical skills needed.

Introduction for trainees

What are Wildlife Vehicle Collisions (WVC)?

WVC are collisions between a vehicle and a wild animal. It does not necessarily mean that the collision will have any damage on the car as some smaller animals can be run over (i.e. mice, hedgehogs, lizards, snakes). These are still considred wildlife collisions.

Heavy wildlife collision with a moose in Canada. Both the driver and the animal were affected.



Jackal on the side of the road after a collision with a passing car. The car was unharmed but the collision was fatal for the jackal.

When, where and how they occur?

Mostly they occur in roads where animals/ birds try to go across and gets hit by a passing car. This can be unpredicted events as an animal might jump in or cross the road at a random time in front of a speeding car increasing the chances of a collision, especially during low visibility such as in bad weather (i.e. heavy rain, fog) and night time.

The reason that WVC occur are due to the fact that the roads fragment the natural habitat of the surrounding wildlife forcing them to cross the road during migration, in search of a mate or foraging. Therefore, increasing their chances of getting hit by a car.

Also, in some areas there are none or limited mitigation measures to warn drivers about animals crossing the road (i.e. speed bumps, stop signs, speed limits, crossing animal signs) and also safe passes for animals to cross the road (i.e underpass, overpass). Due to that the WVC are more frequent and quite hazardous for both the wildlife and humans.

Most WVCs occur when light levels are low (e.g. dawn and dusk) and most animals active. Also, many animals are on the move during the spring season causing an increased hazard.

Animal examples

Deer: May and November have the highest rates of deer collisions.
Moose: December and January, with the rest occurring between October and March. There is also a collision peak in June/July.
Elk: December and February, with a secondary peak in May.
Bears: August, September and October are the peak months for bear-vehicle collisions.
Bighorn sheep: Between November and February, with intermittent peaks in April and June.

Mitigation Measures

Warning signs

The drivers need to be more watchful about the upcoming signs on the road. These signs can indicate that the driver is approaching an area where wildlife tends to cross the road often. This might include signs such as reduced speed limit, road bumps and most importantly wildlife warning signs. The shape, colour and design of each sign might differ from each country so the drivers need to familiarize themselves with the road signs of the country they are driving at.

Animal crossing road signs installed in Costa Rica to warn drivers about animals crossing the road.

There are different designs of wildlife warning signs in each country, therefore drivers must familiarize themselves with their country's warning signs and learn about the new signs when they go abroad.

Speed

The speed is the most common factor of WVC. Most of the times the drivers do not obey the speed limit. With higher driving speeds the harder it is to control and stop the car in case of an animal encounter in the road resulting in a WVC which can be proved fatal for both the animal and the driver. By maintaining the imposed speed limit, the drivers have a higher chance of reacting quickly in case of an animal crossing or jumping in the road reducing the risk of a collision.

Speed limit of 50km/h in a UK road.

Looking for signs of animals

It is important that both the driver and any other passengers in the car are familiar with signs that animals are nearby. All shall keep an eye out for any animals on the side of the road, on the road itself and in the ditches next to the road. In case they spot an animal that is walking or running next or along the road they should reduce speed and try to predict whether the animal might cross the road or not.

During the night where the visibility is low they shall look for signs such as shining eyes which will indicate an animal on the side of the road or on it and therefore reducing the car's speed.

In case that the driver spots an animal that was on the road or next to it and passes away from it safely he/she shall warn other drivers approaching that spot by flickering their headlights to signal to upcoming drivers to slow down.

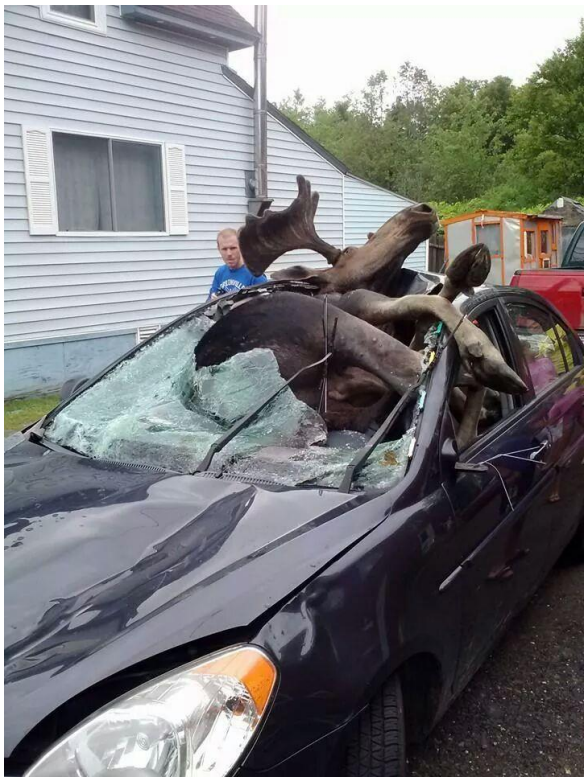
There are animals that travel in groups. In this case if a driver sees an animal he/she might expect others to follow behind it (i.e. a group of wild hogs, a mother dear with a fawn).

Eyeshine of deer by the road during the night.

Avoiding the animal

- A way to avoid a WVC is by steering the car around it. Usually though this requires steering quite sharply and fast and this can be quite hazardous for the driver as it is easier to lose control of the car and crash on the side of the road on a tree, lamp post or even collide with another upcoming car on the opposite direction.
- It is better to obey the speed limit as it will give the driver more time to react and might be able to avoid the collision just by braking. And in case that it is quite a large animal that will impose a big hazard for the car and the driver, such as a bear or a moose, then steering around it during driving in lower speed will allow the driver to have more control of the car and reach much better avoiding and fatal crashes.
- Keep the vehicle in good condition and use it in encounters with wildlife on the road
- The driver needs to make sure that his/her vehicle is always in driving condition and works properly. Needs to check if the breaks are working properly, the headlights and the windshield wiper blades are working, that the seatbelt is working and the driver wears it at all times.
- In case of an animal on the road the driver can scare it by flashing the headlights and by honking with the horn.

- The driver always needs to be focused on the road and obey the law.
- If the crash is inevitable, the driver shall stay calm and steer the car towards the direction where the animal was coming from rather where it is headed.
- Just before the collision it is advisable to let go of the brake even the last minute it will force the nose of the car to dip and increase the chances of the animal going over the hood and break through the windshield during the collision. If the break is let loose at the last minute the nose of the car will be lifted a bit higher reducing the risk of the animal going over the hood and into the windshield.



Dead moose through the windshield while the car was speeding.

If the drivers encounter a WVC (please consult your version of the legal procedure post collision of your country, if there is any)

In case of a driver finds a wildlife on the road that has been hit by another car they should:

- Pull off the road
- Turn on their hazard lights
- If it is dark, try to illuminate the animal with the car's headlights
- Warn upcoming drivers of the animal on the road, especially if it is a large one
-

In case you have to approach the animal to determine whether it is dead or alive, do it with caution as if the animal is still alive its movements might be unpredictable. If the animal is injured and in a shocked state it might even attack. Do not touch an injured animal at all costs.

Contact the appropriate authorities of that country to take care of the situation:

- Call 911 or 112 (in the EU), explain the situation and ask for ambulance and police.
- Give them clear instructions of:
- In what area the collision occurred?
- Name of the road/address

- Closest town or village
- The direction that the driver was travelling from and headed to
- Any obvious landmarks nearby (i.e. bridges, road signs, river, supermarket, gas station, etc.)
- Record the WVC in the appropriate application so to help with the collection of data on WVC if possible

Give them clear instructions of:

- What area the animal is locate?
- Name of the road/address
- Closest town or village
- The direction that the driver was travelling from and headed to
- Any obvious landmarks nearby (i.e. bridges, road signs, river, supermarket, gas station, etc.)
- Record the WVC in the appropriate application so to help with the collection of data on WVC.

In case that the animal is dead and the driver finds it necessary to remove it from the road:

- They should make sure that they wear cloves before touching the animal. Usually animals can carry diseases or viruses and open wounds pose a huge hazard while handling an animal without any protecting gear.
- If the driver does not have any disposable gloves then he/she can use a big stick or a branch to push or carry the animal off the road.

In case the animal is a large one, such as a bear or a deer, it would be difficult for a person to move it off the road. Contact the appropriate authority of that country to take care of the situation and dispose the animal. Give them clear instructions of:

- What area the animal is locate?
- Name of the road/address
- Closest town or village
- The direction that the driver was travelling from and headed to
- Any obvious landmarks nearby (i.e. bridges, road signs, river, supermarket, gas station, etc.)
- Record the WVC in the appropriate application so to help with the collection of data on WVC.
- If the driver is involved in a WVC

In case the driver is involved in a wildlife collision they should:

- Remain calm
- Make sure they are unhurt. If they are hurt they shall immediately call an ambulance
- Pull off the road if the car is not that damaged.
- Turn on their hazard lights
- If it is dark try to illuminate the animal with the car's headlights
- Warn upcoming drivers about the collision.

BIBLIOGRAPHY

- Bíl, M., Andrášik, R., Svoboda, T., Sedoník, J., 2016. The KDE+ software: a tool for effective identification and ranking of animal-vehicle collision hotspots along networks. Landscape Ecology 31, 231–237. doi: 10.1007/s10980-015-0265-6
- Bissonette, J. A., Kassar, C. A., & Cook, L. J. (2008). Assessment of costs associated with deer–vehicle collisions: human death and injury, vehicle damage, and deer loss. Human-Wildlife Conflicts, 2(1), 17-27.
- Brooks, J. W. (2016). Postmortem changes in animal carcasses and estimation of the postmortem interval. Veterinary pathology, 53(5), 929-940.
- Camps F, Rosell C, Boronat C, Fernández-Bou M, Martínez M, Navàs F, Serra V (2012). Estudi de l'accidentalitat provocada per animals en llibertat a la xarxa de carreteres de la Generalitat de Catalunya, Generalitat de Catalunya, 9 Departament de Territori i Sostenibilitat, Direcció General de Carreteres, Unpublished report. 212 pp
- Huijser, M.P., P. McGowen, J. Fuller, A. Hardy, A. Kociolek, A.P. Clevenger, D. Smith and R. Ament, 2008. Wildlife-Vehicle Collision Reduction Study: Report to Congress. Federal Highway Administration.
- Huijser, M. P., McGowen, P. T., Fuller, J., Hardy, A., & Kociolek, A. (2007). *Wildlife-vehicle collision reduction study: Report to congress* (No. FHWA-HRT-08-034).
- Litvaitis, J. A., & Tash, J. P. (2008). An approach toward understanding wildlife-vehicle collisions. *Environmental Management*, *42*(4), 688-697.
- Mrtka, J., & Borkovcová, M. (2013). Estimated mortality of mammals and the costs associated with animal–vehicle collisions on the roads in the Czech Republic. *Transportation research part D: transport and environment*, *18*, 51-54.
- Sáenz-de-Santa-María, A., & Tellería, J. L. (2015). Wildlife-vehicle collisions in Spain. *European Journal of Wildlife Research*, *61*(3), 399-406.
- van der Ree, R., Jaeger, J. A., Rytwinski, T., & van der Grift, E. A. (2015). Good science and experimentation are needed in road ecology. *Handbook of road ecology*, 71-81.
- Zotos, S., Vogiatzakis, I., 2018. CyROS: Towards a common methodological framework for roadkills recording in Cyprus. Ecologia Mediterranea, 44: 109-114.

Pictures

- Carol Dunbar (https://www.wisconsinlife.org/story/what-does-a-vegetarian-do-with-roadkill/)
- CHANJ Guidance Document
- Courtesy of MINAE (https://ticotimes.net/2015/04/23/new-traffic-signs-aims-to-reduce-wildlife-deaths-on-costa-ricas-roads)
- Dave Young (www.flickr.com)
- DeFacto (https://en.wikipedia.org/wiki/Road_speed_limits_in_the_United_Kingdom#)
- George Konstantinou (https://politis.com.cy/web-tv/i-agria-fysi-tis-kyproy)
- Jason Batterham
- Jean-Jacques Boujot (https://en.wikipedia.org/wiki/European_hare)
- Jörg Hempel (https://el.wikipedia.org/wiki/Αγριό)
- Kirsty Faulkner/Mercury
- Michael Penn – Juneau Empire

Webpages

- http://reptilescyprus.blogspot.com/2016/08/cyprus-whip-snake-hierophis-cypriensis.html
- https://politis.com.cy/web-tv/i-agria-fysi-tis-kyproy
- https://www.cyroadkills.org/home/
- https://www.independent.co.uk/news/uk/home-news/hedgehog-road-sign-small-wildlife-chris-grayling-transport-department-a8962966.html
- https://animalhow.com/glowing-animal-eyes-night/
- https://boston.cbslocal.com/2014/07/09/several-crashes-involving-moose-reported-in-maine-in-past-week/
- www.shutterstock.com
- https://www.trafficsigns.com/regulatory-signs
- https://www.fhwa.dot.gov/publications/research/safety/08034/03.cfm
- https://driving-tests.org/beginner-drivers/how-to-avoid-animals-on-the-road
- https://www.wildlifecollisions.ca/