**Environment in the Classroom**

[www.umwelt-im-unterricht.de](http://www.umwelt-im-unterricht.de)

Teaching materials (for secondary schools)

**Analyse an interview: A scientist talks about coronavirus and zoonotic diseases**

*What are zoonotic diseases? What causes them? And how do humans influence the risk that they will spread? With the aid of this interview and additional information, the students find answers to these questions and produce a definition of the term “zoonotic disease”.*

### Guidance for teachers

**What else can I find in this package of teaching materials?**

### The following pages contain teaching materials on the topic: “Zoonotic diseases: When environmental crises lead to health crises” from the Environment in the Classroom initiative. The materials include background information and a lesson plan and can be downloaded here: <https://www.umwelt-im-unterricht.de/wochenthemen/zoonosen-wenn-umweltkrisen-zu-gesundheitskrisen-fuehren/>

**Content and use of the teaching materials**

### The teaching materials include an interview with Professor Josef Settele, a scientist at the Helmholtz Centre for Environmental Research in Germany.

### The package also includes a worksheet that the students can use to analyse the interview. The students’ task is to produce a definition of the term “zoonotic disease”.

### Overview of teaching materials

[Worksheet 1 Quiz: Viruses, animals and people 1](#_Toc46580485)

[Worksheet 2 From animals to humans: the virus’s journey 2](#_Toc46580488)

[Solutions for Worksheet 2 6](#_Toc46580491)

[Image rights 6](#_Toc46580492)

# Worksheet 1Interview with Professor Josef Settele

**Environment in the Classroom**: The COVID-19 pandemic has drawn attention to the fact that most infectious diseases originate from animals. The novel coronavirus is believed to have originated in bats. Experts indicate that nature conservation can help reduce the risk of future pandemics. What does the transmission of diseases from animals to humans have to do with how we interact with nature? We put this question to Professor Josef Settele, an agrobiologist who studies the link between biodiversity and land use.

*What causes the frequent emergence of new diseases that originate from animals?*

**Professor Settele**: Diseases have jumped from animals to humans many times throughout history. We call them zoonotic diseases. In fact, it is a natural phenomenon that has occurred many times before.

**Environment in the Classroom:** *Is it possible that after the new coronavirus, other equally dangerous diseases will emerge?*

**Professor Settele:** We must assume that new diseases can emerge at any time. Indeed, the rate at which diseases are emerging has increased sharply in recent decades. Between 1980 and 1985, there were around one thousand serious outbreaks of zoonotic diseases. From 2005 to 2010, the number of outbreaks was almost three times as high. We therefore have to expect that such diseases will emerge more frequently in future.

**Environment in the Classroom:** *The coronavirus is thought to have originated in bats. What are the possible pathways for its transmission to humans?*

**Professor Settele:** The coronavirus was first identified in Wuhan in China. All indications suggest that the virus originated in bats and was then passed onto humans via civets or some other animal. This may have happened due to a mutation of the virus before transmission or a mutation in the human organism.

**Environment in the Classroom:** *Are there any other examples of this type of transmission causing serious illnesses?*

**Professor Settele:** We know of various examples of major pandemics over the course of history. In the Middle Ages, for example, there was the plague, as we know. That was a zoonotic disease caused by bacteria spread by rats. And, in the modern age, we know about the SARS virus, with the outbreak in South-East Asia in 2002, and the MERS virus, which emerged in Saudi Arabia in 2012.

**Environment in the Classroom:** *One of the topics being discussed in connection with the COVID 19 pandemic is that human interaction with nature plays a role in the spread of new diseases. Is there any truth to that?*

**Professor Settele:** The transmission of viruses from animals to humans increases when we come into very close contact with nature and animals. High species density is a key factor: in other words, when many people and many animals come into contact. If we destroy certain habitats that are still in a near-natural state – for example, by clearing or encroaching on forests – we create favourable conditions for certain species, which can then reproduce rapidly and reach high population densities. It is these high densities of a single species that enable viruses to spread and mutate more quickly. Looking at it from another angle: if we have a greater diversity of life forms, there are fewer animals of a single species. This is known as the dilution effect. It means that there is less probability of virus transmission. And the reverse also applies: with large concentrations of animals, there is a greater probability that pathogens will spread and mutate. And that increases the risk of viruses passing from animals to humans.

**Environment in the Classroom:** *Can you give examples of when this has been a factor?*

**Professor Settele:** One example is the Ebola virus in Africa. This outbreak was linked to rainforest destruction. The virus initially spread among apes and then jumped from apes to humans. This is a very clear example of how habitat destruction was a key factor in the spread of a virus.

**Environment in the Classroom:** *Do livestock also pose a risk?*

**Professor Settele:** In principle, all groups of mammals are potential risk groups to a greater or lesser extent. Bats are known to be virus carriers, but rats pose an even greater risk. In fact, rats carry the largest number of viruses. But, livestock are important vectors as well, as we know from the recent past. For example, the MERS epidemic in Saudi Arabia originated in bats and then passed through dromedary camels to humans. The livestock in this instance were the camels.

**Environment in the Classroom:** *Alongside medical precautions such as vaccination, how should we change our interaction with nature in order to prevent further epidemics as far as possible?*

**Professor Settele:** Of course, there are always going to be epidemics, also in future. By looking at our approach to nature, in particular, by reducing the interaction between humans and many animals of a single species we can help lower the probability of epidemics. How we interact with animals that we eat is critical. Large wildlife markets like the wet market in Wuhan pose a risk. It is likely that the virus was able to spread from one animal to another here and then jump to humans. This ultimately means that a respectful approach to nature is important. As a general principle, conservation of near-natural ecosystems, avoidance of excessively high animal densities and conservation of biodiversity play a key role in reducing the risk of epidemics.

**Environment in the Classroom:** *Do we need to change our approach to livestock as well?*

**Professor Settele:** Excessively high densities are also a problem in relation to livestock. Intensive livestock farming enables pathogens to multiply very quickly. Preventing contact between livestock and wild animals as far as possible is important as well.

# Worksheet 2Analyse an interview: a scientist talks about coronavirus and zoonotic diseases

**Task**

1. Read the interview with the scientist to the end and make a note of the key information about zoonotic diseases.
2. Explain the term “zoonotic disease” in your own words. Your explanation should answer the following questions:
	* What is a zoonotic disease? (definition)
	* What are some examples of zoonotic diseases?
	* Which conditions are needed for a virus to pass from animals to humans?
	* Which conditions encourage the spread of zoonotic diseases?
	* What can be done to reduce the risk of zoonotic diseases emerging and spreading?