

How can we manage Hendra virus in Australia?



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Abstract

Bats are very important for the environment, but they can transmit several dangerous viruses, including not only the dreaded Ebola but also Hendra virus. Hendra virus affects both horses and people and can be lethal. The measures Australia (where the virus is present) has so far taken include horse *vaccination* and safer practice promotion among horse owners. Additional ecological approaches such as bat *habitat* protection and creation could enhance Hendra

virus management, since the underlying cause of Hendra virus emergence seems to be *habitat loss*. To find out what Australian citizens think about it, we asked three *community juries* whether they think such a strategy is appropriate. Even though they all agree the government should implement ecological approaches to manage Hendra, the juries prioritize increasing resources for the current measures: horse vaccination and safer practices among horse owners.

Introduction

There are several myths surrounding bats, such as that they will attack you or even want to drink your blood! Many people also see them as pests, but in fact they are very helpful creatures. The bats known as *flying foxes* in Australia eat nectar and pollen and are essential to pollinating plants, especially in hardwood forests. Nevertheless, some bats do carry some dangerous viruses such as Ebola, Marburg, Nipah and Hendra.

Scientists have been studying Hendra virus (HeV) in Australia. It can cause fatal neurological and respiratory disease in both humans and horses. And bats (Figure 1) are the one carrying the virus. However, unlike its close international relative the Nipah virus, HeV doesn't transmit directly from bats to humans as far as we know. Instead, horses become infected by sniffing or eating bats' body fluids (like urine) when they are grazing. Then humans catch the virus from infected horses.

So what measures have people taken against this dangerous disease? The government has promoted safer practices among horse owners such as covering water troughs (so that the water can't get contaminated with HeV) and fencing off fruit trees (so that the bats won't come near any horses underneath). In recent years researchers also developed a horse vaccine, but some horse owners don't want to vaccinate their horses.

All of these measures are still not enough to manage HeV. They don't take into account the underlying cause for the emergence of HeV: bats' *habitat loss*. People clear forests for agriculture, which forces bats to move closer to our food sources. And the more closely bats live and feed to us, the more likely we are to catch a virus from them (directly or indirectly). That's why ecological approaches such as habitat conservation or creation could usefully complement the other measures.

But what does the Australian public think about this? That's what we wanted to find out.



Figure 1:

The *Pteropus conspicillatus* family of bats, locally called spectacled flying foxes, can carry Hendra virus.

Methods

To answer this question we consulted with three *community juries* from three regions in eastern Australia: two smaller cities in rural areas affected by HeV outbreaks (Rockhampton and Lismore) and one large metropolitan city so far unaffected (Sydney). We made sure that the juries included people from different age groups, with different education and, importantly, both people who own or work with horses and others who don't.

So how did the jury sessions proceed? First, experts presented information regarding:

- basic HeV biology
- the threat it poses to human and animal health
- the *socio-economic impact* of the virus
- measures to prevent the disease and their strengths and weaknesses
- the challenges with diagnosing HeV in horses
- the horse vaccine
- basic HeV ecology
- the strengths and weaknesses of ecological approaches to manage HeV

We then asked the jurors:

1. whether they think it's appropriate to add ecological approaches for managing HeV in addition to the vaccination and safer practices among horse owners
2. to consider and prioritize six different potential ecological strategies (Fig. 2)
3. to give reasons for all their decisions

To reach a verdict, the juries debated and discussed the questions among themselves

Which strategies allow people to choose whether or not they will help to provide ecological benefits to bats?

Figure 2:

The prioritization task for the community juries.

Strategy	Is it voluntary?	Does it limit economic development?	Who pays?
Further restrictions on land clearing	no	yes	landholders
Incentives for landowners to maintain bats' habitat	yes	no	taxpayers
The government protecting remaining bats' habitat	no	yes	landholders
Increasing resources to promote vaccination and safer practices	yes	no	horse owners and taxpayers
The government taking more land to increase bats' habitat	no	yes	taxpayers
Increasing protection for bats' populations	no	no	people who live near bats' colonies

Results

All three juries were certain that the government should add ecological strategies to manage Hendra. The reasons they gave for this decision were:

1. Ecological strategies take into account the cause for diseases emergence.
2. They can help prevent other similar (carried by bats) diseases from emerging in the future.
3. There are other benefits for the community.

For all three juries the current measures (horse vaccination and safer practices) were the most important, since the jurors saw them as the most efficient ones. Nevertheless, they all favored different ecological approaches to manage HeV disease. The final priorities of each jury are shown in Figure 3.

Which strategy did all three community juries rank the highest?

Figure 3:
The final rankings of each jury for different approaches.

Rank	Jury 1: Rockhampton	Jury 2: Lismore	Jury 3: Sydney
1	vaccination and safer practices	vaccination and safer practices	vaccination and safer practices AND government protection of bats' habitat
2	government taking land to increase bats' habitat	protection of bats' habitat AND protection of bats' colonies AND incentives for landowners to maintain bats' habitat	further restrictions on land clearing
3	protection of bats' habitat AND protection of bats' colonies	further restrictions on land clearing	incentives for landowners to maintain bats' habitat
4	incentives for landowners to maintain bats' habitat	government taking land to increase habitat of bats	protection of bats' colonies
5	further restrictions on land clearing		government taking land to increase bats' habitat

Discussion

The verdicts of our community juries show us that the Australian public would most likely accept the addition of ecological approaches to help manage the risk of Hendra virus. However, we can see that this acceptance depends in part on how the people perceive the threat. The juries from the affected cities of Rockhampton and Lismore were strongly in favor of the more immediate measures which will prevent the transmission of HeV: increased resources for horse vaccination and safer practices among horse owners. Both rural areas also concluded that not the landholders but the government should be responsible for funding.

The jury in the metropolitan city of Sydney, on the other hand, believed that the landholders should pay for the management and protection of bats' habitat. They also ranked the ecological approach as high as increasing the resources for horse vaccination. They believed this is the first step towards longer term measures of prevention.

These disagreements between the different groups suggest that even though they all believe in the need for ecological approaches towards the HeV problem, the government should negotiate with the people affected most by the virus to reach a fair and effective solution

Conclusion

Treating the current consequences of a problem may seem to be an efficient enough measure. But removing the problem requires dealing with its cause as well. Habitat loss poses a great threat to a lot of species. And in most cases, we humans are at least partially to blame.

There are many things that even individuals can do to help with this problem:

- Learn about the natural habitats in your area and tell others about their importance.
- Find out more about planning and development in your area: what are people planning to build and how might this impact your local wildlife?
- Help reduce pollution.
- Plant native vegetation: it provides habitat for native animals

Glossary of Key Terms

Community jury – a group of citizens who come together to receive detailed evidence about and deliberate on a specific issue.

Flying fox – a genus of bats, also known as fruit bats, which are quite large. They live in the tropics and subtropics of Asia, Australia and East Africa. They eat fruit and sometimes insects.

Habitat – the place or type of place where a living creature lives or hangs out.

Habitat loss – natural or human activities damage the habitat so that it can no longer support the species and populations.

Incentive – a payment or other motive that stimulates someone to do something.

Socio-economic impact – all the social, environmental, economic and financial consequences of a project or public policy.

Vaccine, Vaccination – a person receives parts of virus/bacteria or weakened versions of pathogens and develops antibodies against them: the immune system now knows how to fight this type of infection. For instance, most children receive Measles, Mumps and Rubella vaccine (MMR) to prevent getting these diseases in the future.

Voluntary – doing something out of one's own free will (in our case, meaning the government doesn't require it).

Check your understanding

- 1 How can you get Hendra virus?
- 2 What is the primary cause of Hendra virus emergence and why?
- 3 According to our study, are people in Australia inclined to accept ecological approaches to manage HeV emergence?
- 4 Would killing the bats be another solution? Why or why not?

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2018 PLoS ONE 13(12): e0209798

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