



Planning for overlapping infectious disease outbreaks and weather-related disasters

Future scenarios

Acknowledgements

We extend our thanks to all interview participants in this project, and to the Climate CATCH Lab for funding this project through the Climate Change and Health Seed Funding 2023-24 round.

Use of the scenarios

These fictional scenarios are designed for use within organisations that work on health and wellbeing, disasters, or emergency management. For example, these scenarios can be used by state-level government departments, local public health units, non-governmental organisations, and any other organisations that may have a role in responding to infectious disease outbreaks and/or disasters. The purpose of the scenarios is to raise awareness of how different climate threats could overlap and to provide a resource to test current plans and policies. Please feel free to use these scenarios in your own staff meetings with the citation below. Questions and prompts for reflection are included with the scenarios.

How to cite this resource

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Introduction

Climate change is expected to increase the risk of infectious disease outbreaks and weather-related disasters happening at the same time. However, while research and practice have developed in response to each of these respective threats, there has been limited work to address them together. There is a lack of resources available to help researchers, government and the public prepare for infectious disease outbreaks and weather-related disasters that occur at the same time.

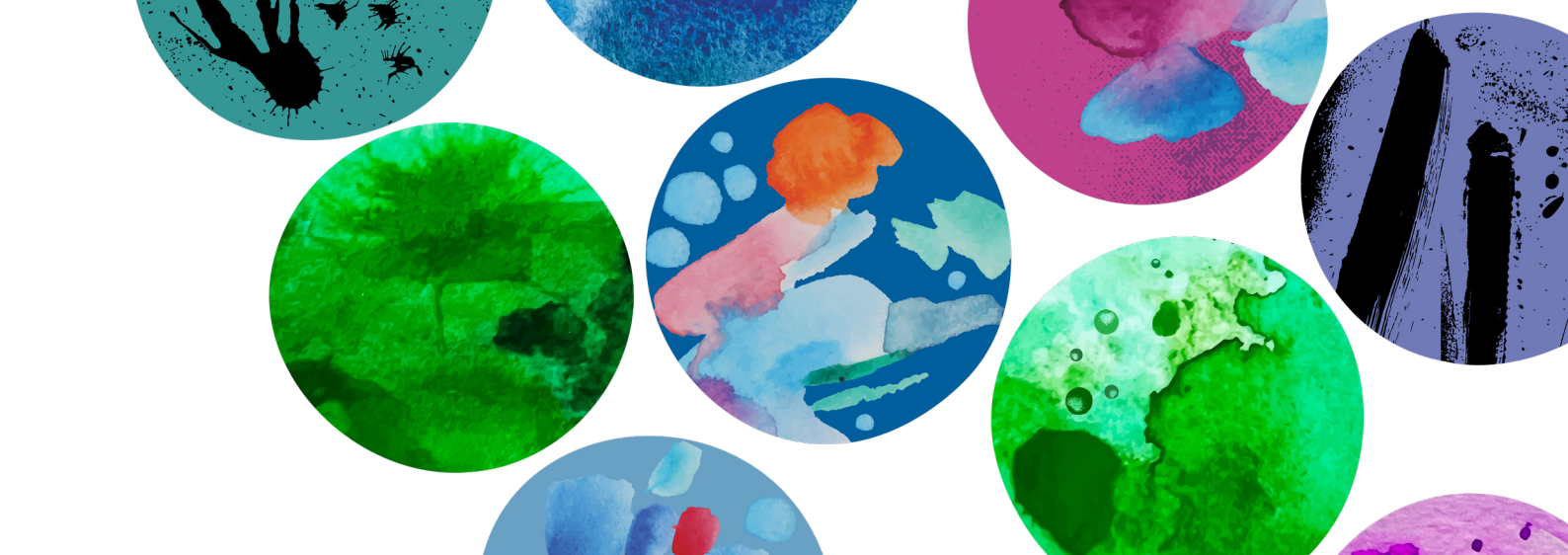
This project aimed to gather information on preparing for and responding to projected increases in overlapping infectious disease outbreaks and weather-related disasters within the state of Victoria. Expert interviews were conducted where researchers, practitioners, government workers and citizen scientists were asked to imagine the future. This project analyses and combines elements from expert perspectives to create three future scenarios using strategic foresight methodology.

The purpose of these scenarios is:

- To raise public awareness of the risks of overlapping infectious disease outbreaks and weather-related disasters
- To increase knowledge of these risks within government and non-government organisations that have a role in health and/or disaster management, and would be involved in prevention, preparedness, response or recovery from such events
- To identify areas in need of further study
- To be used in policy reviews within organisations (e.g. to identify the extent to which current preparedness planning accounts for these scenarios)

This project was funded through the Climate and Health Seed Fund (2023-24) at the Climate CATCH Lab, through the University of Melbourne Faculty of Medicine, Dentistry and Health Sciences.

This project is currently being expanded through a pilot trial of the COORDINATE (Co-occurring Disasters and Infectious Disease Outbreaks) Policy Toolkit, which tests a toolkit for government agencies to use together with the scenarios. In this pilot trial, we are seeking to partner with Victorian government organisations of all levels (from small units to state level departments). If you or your organisation is interested in participating, please contact Claire at claire.leppold@unimelb.edu.au.



Methods

This project gathered and combined the perspectives stakeholders in infectious diseases or emergency management in Victoria, to create three future scenarios. Interviews were conducted with 20 experts including researchers, practitioners, government workers and citizen scientists, about the likely scenarios they saw for how infectious diseases and disasters could overlap in the next 5-20 years. Through thematic analysis, we combined ways that experts imagined the future to create scenarios based on most common and salient themes.

This project utilises strategic foresight scenario development as a means to anticipate and better prepare for the future. Foresight methods have been advocated by the [World Health Organization](#) and [United Nations Development Program](#) and serve as a way to provoke imagination and challenge and enrich the way we tell stories about the future, to prompt action in the present. By giving readers a sense of having a 'memory of the future', foresight scenarios can be a starting point for then identifying what actions are needed now. This project has been approved by the University of Melbourne Human Research Ethics Committee (ref: 2023-27702-44521-2).

Scenarios

The following scenarios are fictional and were created based on the perspectives of experts who participated in interviews for this project. The scenarios are set approximately 5 years in the future, and cover three categories for overlaps in infectious disease outbreaks and weather-related disasters.

1. Coincidental (infectious disease outbreak and weather-related disaster happen to occur at the same time)
2. Cascading (weather-related disaster leads to secondary effects which lead to infectious disease outbreak)
3. Compounding (weather-related disaster and infectious disease outbreak happen at the same time, and the effects of each are made worse by the other)

The scenarios are not intended to be comprehensive, or to list all details of what might happen. Instead, they give a selection of critical information that can then be used in review and planning to identify next steps of action. Following each scenario, questions and prompts for organisations to consider are presented.

SCENARIO 1 – WOMBATVILLE



CATEGORY: COINCIDENTAL

(co-occurrence of infectious disease outbreak and weather-related disaster)

Welcome to Wombatville

The town of Wombatville is a regional Victorian town with a population of approximately 1,500 people. There is an aging population, with many farmers, although there are also some younger families who have moved to the area for a tree change in recent years.

Wombatville has a beautiful river running through it. There is a small primary school, and a community hall. There is no childcare centre, however one family runs a day care business. There are a small number of independent businesses, and a small caravan park and campground near the river. There is a small tourism industry, which is mainly active in holiday periods when people come to spend time by the river.

The main street in town has a small GP practice, a bakery, a pizza place, a newsagent, and an IGA. Many young people leave Wombatville to work in other areas when they reach working age, and the older generation worries about who will take over the farms in the community and surrounding areas. There are two GPs, who come from a larger town to see patients in Wombatville four days a week. Wi-fi is slow and mobile phone reception is not reliable.

The overlap

Early signs are not detected, and without warning, there is a high pathogenicity avian influenza outbreak in Victoria. Birds are dying at an unprecedented level. Wild birds die and flocks of poultry die on farms. There are thousands of bird carcasses across the state.

The first known case of human infection happens in Wombatville. The teenage son of a farming family, aged 17, becomes acutely ill and presents to the GP. There has not been any known spread of avian influenza to humans at this point. The GP suggests that they most likely have a virus and suggest they rest at home, however takes a swab out of extreme precaution. The next day, as the teenage son is resting at home, the PCR results come back positive for avian influenza.



The family of the teenager panics. Medical staff assure them over the phone that there is no known human-to-human transmission of the disease and that he will most likely recover after mild symptoms. The Chief Health Officer (CHO) releases a health alert, and the news cycle picks it up and begins reporting on the human case of avian influenza in Wombatville.

The town of Wombatville panics as they read the news. The identity of the case is not released, and speculation is rife about who has caught it, and at which farm.

On the same day as the news breaks about the positive human case in Wombatville, the weather forecast begins reporting that heavy rains are expected. As night falls, the rain begins and is heavier than expected. A yellow 'watch' alert is released on an emergency app at 9pm for flooding, however most people are focused on the news about the case of avian influenza in Wombatville and miss the flood watch information.

At 1am, the hard rain continues and the 'yellow watch' alert is upgraded to a red 'leave now' evacuation order. Most of the town is asleep and sees the the evacuation notice when they wake up in the morning. Some families pack up and leave the area first thing in the morning. However, by 9am, the 'leave now' order changes to 'no longer safe to leave' as roads are cut off and it is no longer possible to evacuate.

There are around 500 people stuck in Wombatville. The campground by the river is now underwater. Three homes near the river have the water rising rapidly around them. No emergency services have reached the area yet, and some agencies are scared to send their staff there because of the outbreak.

As flood waters rise, some residents rescue people from their homes in tin boats. The primary school is located on a small hill, and some families decide to shelter there, although they are nervous about whether they might catch avian influenza and still unclear on who has it. Neither GP is present in Wombatville, as both went back to their homes in a nearby larger regional town the night before. Bird carcasses float in the flood waters.

Reflection and planning prompts:

- What guidance is there within your organisation, right now, about how to respond to this scenario?
- What information would you try to find next?
- How would you uphold the goal of your organisation (e.g., protecting human health, protecting animal health, protecting environment, reducing disaster risk) in this scenario?
- What mechanisms are in place within your organisation for sharing information between health, environment, animal and emergency management agencies during this type of scenario?
- Are there any ethical dilemmas which you can identify in this scenario that would need to be managed in your work?
- Who can you speak to within your organisation about further planning for these risks?

SCENARIO 2 – BANDICOOT SPRINGS



CATEGORY: CASCADING

(weather-related disaster leads to secondary effects of animal movement, which leads to infectious disease outbreak)

Welcome to Bandicoot Springs

The coastal Victorian town of Bandicoot Springs has a population of around 2,000 people, although this population triples during the summer months when tourists come to stay near the ocean. During the rest of the year, Bandicoot Springs is a quiet place on the coast with lots of older couples, as well as some younger families. Some locals commute into a nearby city for work, and there are also people who work locally in fishing, tourism and food and drink industries. Bandicoot Springs has a small town centre that you easily walk around in, with a fish and chips shop that will give you extra potato cakes, a Thai restaurant, and a few cafes. There is also one local supermarket and a pharmacy. The local supermarket tends to be expensive, so some people drive to the nearby town 20 minutes away for their groceries. There is also a primary school and one childcare centre in Bandicoot Springs. There is no ambulance service in town, but there is a hospital in a larger town nearby. Phone reception and wi-fi are usually accessible.

There is a beach along the town centre of Bandicoot Springs. In addition to being located on the coast, many of the neighbourhoods in Bandicoot Springs back on to bush land. The weather can be wild at times, but it is a beautiful place.

The overlap

Bandicoot Springs locals have experienced back-to-back years of higher-than-average rainfall, leading to growth of plants and a burst of animal activity in the surrounding bush. Trees and scrub are dense, and birds and possums are abundant.

However, the wet weather came to an abrupt stop this spring, and the summer now has had record setting heat waves and some days of heavy winds. This has left the surrounding bushland dry and forced many animals to move from their natural habitats in search of water. There have also been some reports of mass animal deaths near the area, potentially due to stress from the heat waves, although there has not been any sampling of the animals to determine the cause of death.



People have been noticing that possums and other animals are now regulars in their back gardens, with many looking rough and unwell. Many locals are upset by seeing the unwell animals, and so are the tourists who are in the area this summer. Some people have been putting out water for the possums, and sometimes getting quite close to them. In previous years, locals were told to avoid interacting with possums as they are known to carry the infectious disease, Buruli ulcer, which can transmit to humans. Most people try not to touch the possums but some do. It's hard to know what to do with the dead possums in back gardens.

These problems grow when bushfires begin outside the township. There is smoke blowing into Bandicoot Springs, and animal activity increases with many animals seeking shelter in the township and close to the coastline. Locals are struggling with the smoke, with more than two hundred people presenting at the local hospital with symptoms of chest tightness, shortness of breath, wheezing or coughing, as well as sore throat and fatigue. Doctors begin noticing that increased numbers of people are also presenting with Buruli ulcers, which initially manifest with a nodule on the skin.

One person appears in the emergency department of the nearby hospital with possum bite and scratch, and symptoms of a sore throat, headache and fatigue. At first it seems that their sore throat, headache and fatigue may be caused by bushfire smoke, but tests reveal that they have been infected by Tularaemia: another disease that can come from possums. The Tularaemia case has happened at the same time that Buruli ulcer cases are continuing to increase. Mandatory reports are made to notify authorities of the Tularaemia cases and Buruli ulcer cases.

Unfortunately, the first case of Tularaemia is followed by seven more cases the next day. Mysteriously, the seven new cases were not directly scratched or bitten by any animals. Doctors are struggling to understand where the Tularaemia cases are coming from, and trying to find a way of managing the influx of locals who are presenting to the hospital with the similar symptoms that could be related to either the smoke or Tularaemia. One doctor in the hospital tries to learn more about Tularaemia, and finds a report online that it has become airborne before in other places. This would mean that it is possible to catch it by breathing infected air, but it is unclear if this is what is happening here, or how it is happening. The fires continue outside of Bandicoot Springs. Possums continue to appear in town in increasing numbers.

Reflection and planning prompts:

- What guidance is there within your organisation, right now, about how to respond to this scenario?
- What information would you try to find next?
- How would you uphold the goal of your organisation (e.g., protecting human health, protecting animal health, protecting environment, reducing disaster risk) in this scenario?
- What mechanisms are in place within your organisation for sharing information between health, environment, animal and emergency management agencies during this type of scenario?
- Are there any ethical dilemmas which you can identify in this scenario that would need to be managed in your work?
- Who can you speak to within your organisation about further planning for these risks?

SCENARIO 3 – WALLABY FLATS



CATEGORY: COMPOUNDING

(heatwave and infectious disease outbreak happen at the same time, exacerbate each other and both become harder to manage)

Welcome to Wallaby Flats

Wallaby Flats is a larger town in Victoria with a population of around 100,000 people, with a town centre surrounded by quiet neighbourhoods. There is a mix of new and old areas of town, and a block of social housing. Public transport is unreliable, but by car, you can go anywhere in the area within 10-20 minutes. There are multiple schools, and a university. Young people still often go to the capital city for university, with many finding jobs in the city and not returning. At the same time, there have also been many young families who have been moving to Wallaby Flats from the city. There are jobs in health, banks, tourism around the historical parts of the city, education, and some primary industries.

There is a public hospital which serves Wallaby Flats and many of the surrounding areas, and two aged care facilities. There is a well-known museum, a cinema, and train connection with the capital city which can be reached in a few hours. There's an Aboriginal community organisation which runs a co-operative offering a playgroup, youth groups, family services and a medical clinic, and consultation services for land and water management. There are restaurants and coffee shops, although many are only open Thursday through Saturday. The area around Wallaby Flats also has immense natural beauty. There is a national park near the town, known for its importance for three rare bird species. There is also a significant bat population. After land clearing in some of the areas around Wallaby Flats, more and more bats have moved into the city and the bat population is flourishing; you can watch them fly at dusk and you can hear them in the trees in most neighbourhoods at night.

The overlap

It's the beginning of the summer, and there has been an extreme heatwave that that has continued for four days in Wallaby Flats so far. The nighttime temperatures have remained hot, and there have been intermittent power outages.



Hospitals are seeing increased numbers of people presenting with heat-related illnesses. Sadly, five elderly people have died. Some babies and young children have become weak and dizzy, and the hospital has seen three cases of seizures in children that appear to have been caused by the heat. Everyone is doing their best to stay cool, but the heat is making it harder to eat, sleep or carry on with normal routines.

The heat has also stressed the animals. Some people start noticing that the bats are behaving strangely; they are not flying each night at dusk as normal. Dead bats are found in the parks, and in back gardens, and it seems that they have died in the heat. Bats aren't the only animals that are affected. At a farm just outside of town, one horse begins acting strangely and seems confused and sweaty. At first, it seems like this might be caused by the heat. One family member on the farm has been trying to cool down the horse, wiping it with cool towels and offering water. The next day, the horse's symptoms are worse, and it begins frothing at the mouth.

The family calls for an emergency veterinarian to come out, who is concerned about the horse and runs a panel of tests. Unfortunately, the horse is confirmed to have Hendra virus. The emergency veterinary suspects it has been spread by the bats they noticed near the farm. An emergency response is launched to monitor the farm and other horses in the area, but many horses are behaving strangely, and it is difficult to tell whether they are symptomatic for Hendra virus or experiencing heat related illness. It is difficult for the response team to monitor horses in full personal protective equipment (PPE) in the heat, and some start experiencing heat illness symptoms while on the job. Hospital staff are also struggling with heat illness symptoms, and some have not been able to report to work.

Unfortunately, the horse's handler begins to feel unwell and tests positive for Hendra virus. Health officials tell the public that they are at low risk and only those who have been in contact with ill horses are asked to come forward for testing. However, there continue to be many people presenting to hospital with heat-related illness, and some symptoms are similar to symptoms of Hendra Virus (headache, dizziness, weakness, confusion). Clinicians are starting to worry that they may be missing Hendra virus cases. The heatwave continues.

Reflection and planning prompts:

- What guidance is there within your organisation, right now, about how to respond to this scenario?
- What information would you try to find next?
- How would you uphold the goal of your organisation (e.g., protecting human health, protecting animal health, protecting environment, reducing disaster risk) in this scenario?
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- Who can you speak to within your organisation about further planning for these risks?

