

# Rapid Monitoring of Bioaerosols from Industrial, Rural and Urban environments (RAMBIE)

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## Context

Biological particles such as **pollen**, **bacteria** and **fungal spores** are released to the atmosphere from water, soil and vegetation surfaces becoming **airborne**. Once in air, they can be inhaled by humans and animals causing **adverse health effects** (skin and eye irritation, asthma, allergies, infections). In association with soil dust particles, microbes impact cloud glaciation and are "rained" out of the clouds through wet deposition, beginning another colonization.

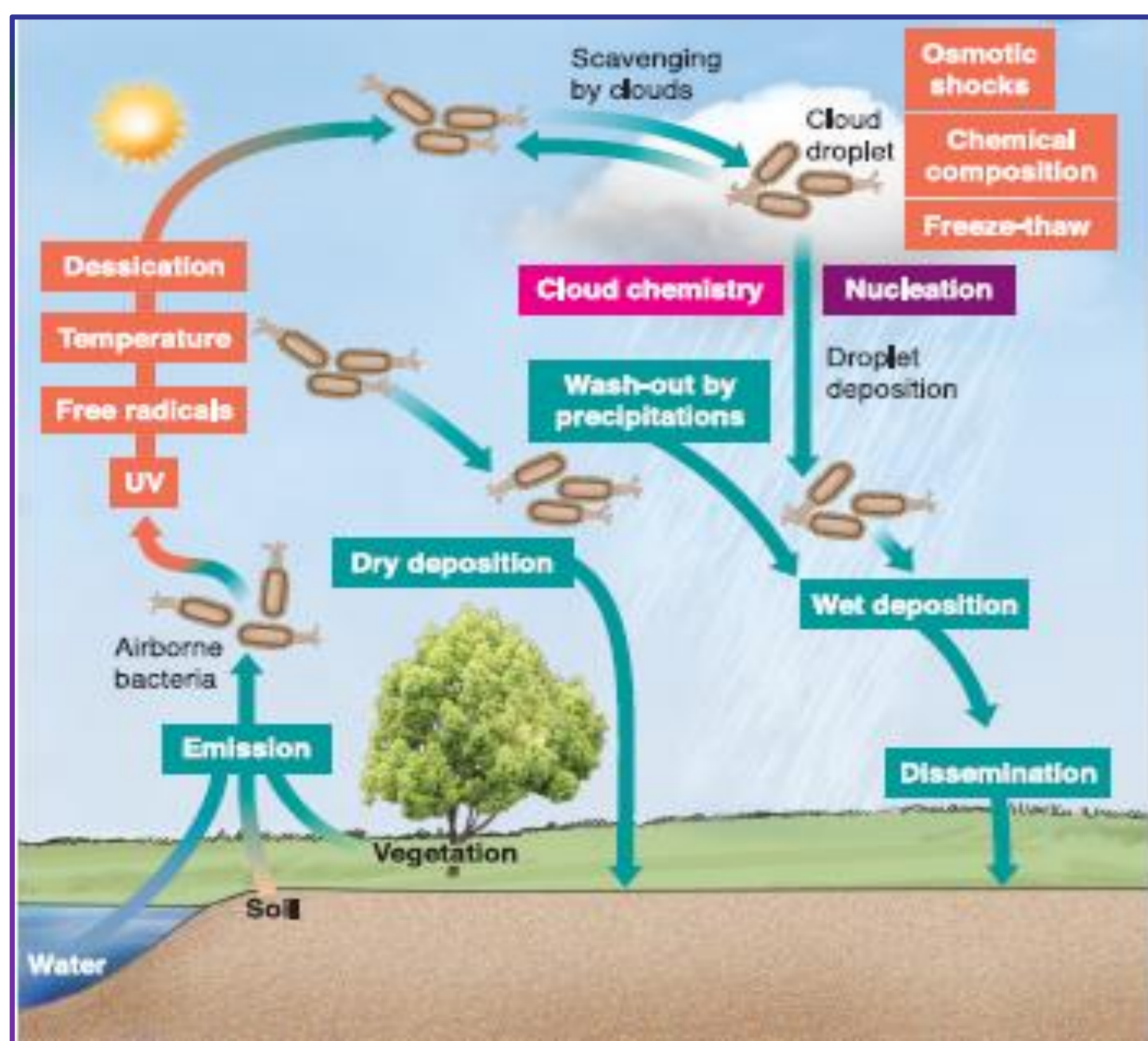


Figure 1. Life cycle of microorganisms in the atmosphere. Picture from Pierre Amato, 2012.

## Why shall we concern ourselves with bioaerosols in the environment?

The potential devastation of bioterrorism or airborne diseases has brought the science of bioaerosols to the forefront of the scientific community.

Historical significant events	More recent events
Irish Potato Famine	<b>Bioterrorism</b> <i>Anthrax attacks</i> in the US during the fall of 2001 killed 5 people and sickened 17.
Bubonic Plague	<b>Epidemics</b> <i>Avian Flu</i> and the transmission of Severe Acute Respiratory Syndrome (SARS).
1918 Influenza outbreak	

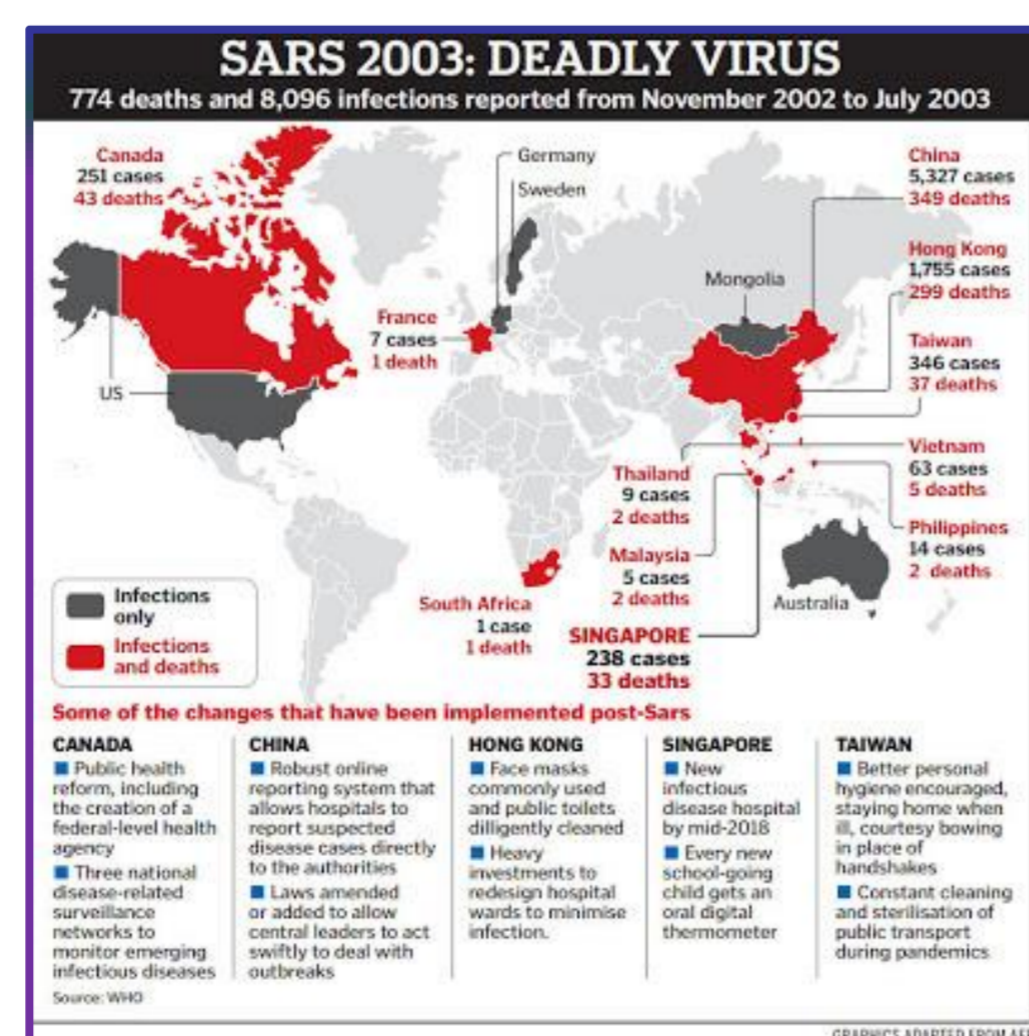


Figure 2: Extent of SARS Pandemic. Picture from World Health Organization, 2003.

## Current challenges

- Early detection, quantification and speciation of bioaerosols



Figure 3. Sampling bioaerosols with different techniques.

- Study the **source of contribution** to bioaerosols: is there difference in the composition of bioaerosols from **urban**, **industrial** and **rural** areas?

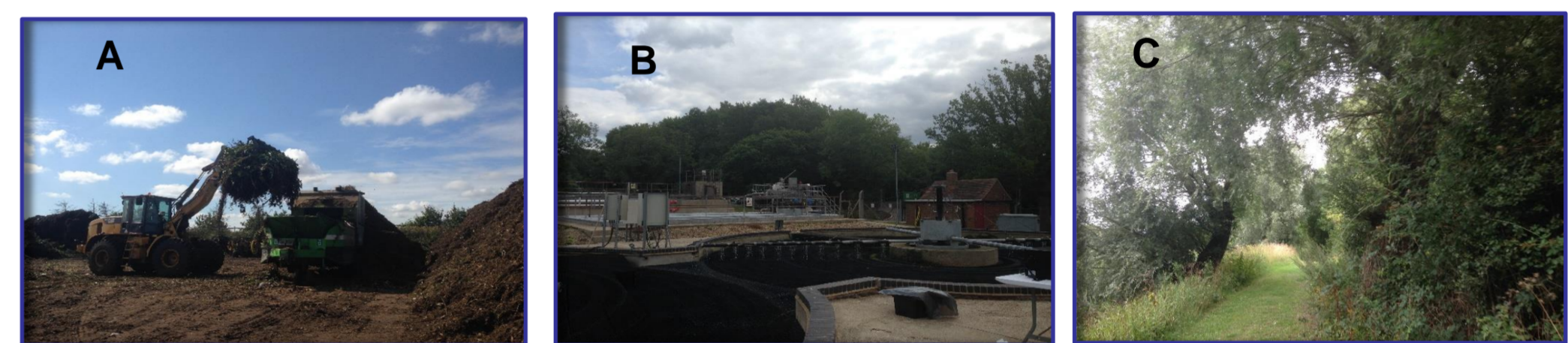


Figure 4. Sampling sites.

A) Compost facility, B) Waste water treatment plant, C) Rural park

- Dispersion and impact of bioaerosols



Figure 5. Dispersion of flu virus.

Picture from Nanosafe 17th November 2015.



Figure 6. Microbial inhalation.

Picture from Nanosafe 23rd November 2015.

## Impact of our research

Impact	Value
Clearer <b>quantification</b> and <b>characterisation</b> mechanisms	When 100,000 persons are exposed to bioaerosols, <b>cost</b> ~ \$26 billion in decontamination and medical treatment
Improved <b>laboratory throughput</b>	Rapid measurement tool for early detection allowing <b>prevention</b> .
Systematic <b>monitoring</b> and <b>analysis</b> of bioaerosols	Better understanding <b>risk of exposure</b> and inform <b>policy</b> .
Determine at what <b>concentration</b> individual constituents of bioaerosols are <b>hazardous</b>	