

# Climate Change Implications for Global Food Safety

Vittorio Fattori PhD

Food Systems and Food Safety Division, FAO, Rome



Changing Food Systems: more complexities in Food Safety...



Thinking about the future of food safety A foresight report

The allo





According to the United Nations Framework Convention on Climate Change (UNFCCC), Climate Change refers to a

'change of climate (global temperatures, precipitations, wind patterns and other measures of climate) that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods'



### Food and Agriculture in relation to Climate Change

- According to a recent IPCC report, if temperatures rise by 1.5 °C above pre-industrial levels this century, 122 million additional people could experience extreme poverty by 2030, mainly due to higher food prices and declining health
- Between 2006 and 2016, 26% of the total damage and loss caused by climate-related disasters in developing countries was in the agriculture sector



- In developing countries, up to 83% of all damage and loss caused by drought, which climate change is expected to intensify, is absorbed by agriculture
- Currently, one-third of the food we produce is lost or wasted. This costs up to USD 2.6 trillion per year, including USD 700 billion in environmental costs and USD 900 billion in social costs
- Climate change is expected to bring additional burdens on water systems, intensifying competition for water, affecting regional water, energy, fisheries and food security, as well as affecting public health





While the impacts of climate change on food security are well known, the implications for food safety receive less attention



### FOODBORNE PATHOGENS AND PARASITES



- Evidence to link increasing temperatures to higher incidences of infections by foodborne pathogens like *Salmonella* spp. and *Campylobacter* spp.
- Water scarcity can have an impact on hygienic conditions in food processing plants
- Flooding leading to increased likelihood of outbreaks of waterborne diseases like cholera





Antimicrobial Resistance – a growing threat



## **ALGAL BLOOMS**



Climate change is enabling various species that form harmful algal blooms (HABs) to expand to new areas, most of which are not prepared to meet the challenges associated with their detection and surveillance

The frequency and duration of certain endemic HABs have increased globally



An overabundance of fertilizer application combined with more frequent and intense precipitation are leading to increased eutrophication in waterbodies, resulting in algal blooms

 Reports on the effects of ocean acidification on HAB toxicity and abundance are not uniform





Warming temperatures widen the seasonal windows for certain HABs, enabling them to persist for longer periods



### **HEAVY METALS**





- Heavy precipitation events, especially in mining areas, can release
  various heavy metals into the surrounding areas, compromising food and
  water quality
- Accelerated permafrost thawing may release historically trapped heavy metals, such as arsenic, into aquatic ecosystems, compromising aquatic life and the safety of freshwater supplies



- Rice a major crop known to take up and bioaccumulate arsenic from the soil or irrigation water
- Arsenic accumulates not only in the plant itself but also in the grain that is consumed



## METHYLMERCURY



The concentration of mercury present in the ocean surfaces has increased by a factor of three or more compared with pre-anthropogenic conditions

- Methylation of mercury is temperature-dependent
- Thawing of permafrost releases mercury into aquatic systems

Deposition of inorganic mercury in lakes and oceans enhanced with increased precipitation

**CO**<sub>2</sub>.

Lowering pH values increases the microbial uptake of mercury in the oceans



## MYCOTOXINS



Mycotoxin contamination in staple crops is a major health concern and barrier to international trade

Altered distribution of toxigenic fungi and the appearance of mycotoxins in crops

- J
- Increases in temperatures may shift the types of mycotoxins produced by any given fungal species, from those that are currently dominant to other related compounds
- Flooding, after heavy precipitation and extreme weather events, affects storage facilities and standing crops, increasing the risks related to mycotoxins





Plants stressed by pest damage are more predisposed to fungal infections



### Food Safety in the face of Climate Change Requires Shared Solutions



**One Health approach** 



#### Greater collaboration among stakeholders



Early warning and surveillance systems



Intelligence gathering and foresight



### Conclusions

#### Safe and nutritious food is the prerequisite for human life and development

• There can be no food security without food safety and climate change threatens both

#### We need to stay vigilant: food safety requires continued commitment

- More attention is needed to raise awareness of climate change implications for food safety
- More efforts are needed to adequately prepare food supply chains and regulatory systems for the various food safety challenges associated with climate change

#### The future of food safety will require proactive and forward-looking approaches rather than relying on reactive measures

- Complementing traditional surveillance systems, foresight will help identify and address emerging food safety issues like those triggered by climate change
- Climate change impacts on food safety is a transdisciplinary issue that needs solutions driven by One Health-based approaches

#### Continued support is necessary: we all need to care







# Thank you