# ADDRESSING ZAIRE EBOLAVIRUS (EBOV) OUTBREAKS
Qualitative entry and exposure assessment update

Speaker: Gaël Lamielle
FAO Headquarters, Rome
Veterinary Epidemiologist
Emergency Prevention system for transboundary Animal Diseases (EMPRES-AH)
FAO Headquarters, Rome, Italy

On behalf of: Xavier Roche
FAO Headquarters, Rome
Veterinary Epidemiologist
Emergency Prevention system for transboundary Animal Diseases (EMPRES-AH)
FAO Headquarters, Rome, Italy
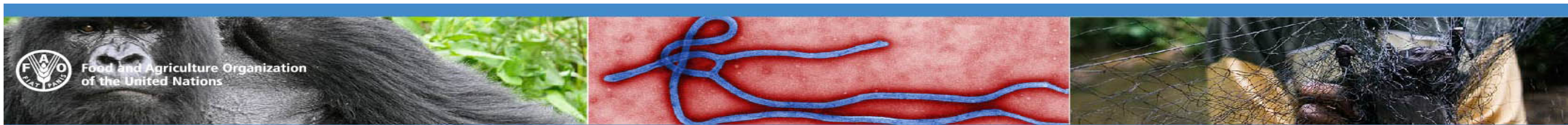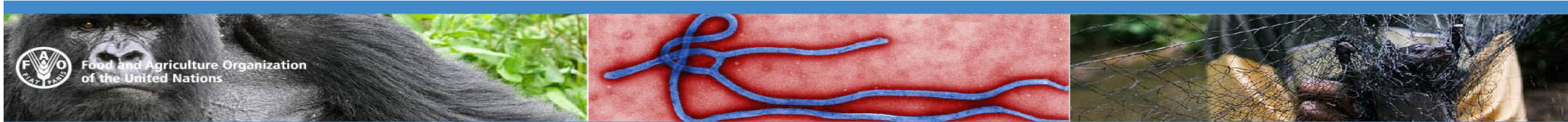
FAO risk assessment update - context

* **Trigger event - May 2018: Ebola outbreak in Équateur District of Democratic Republic of Congo (DRC)**

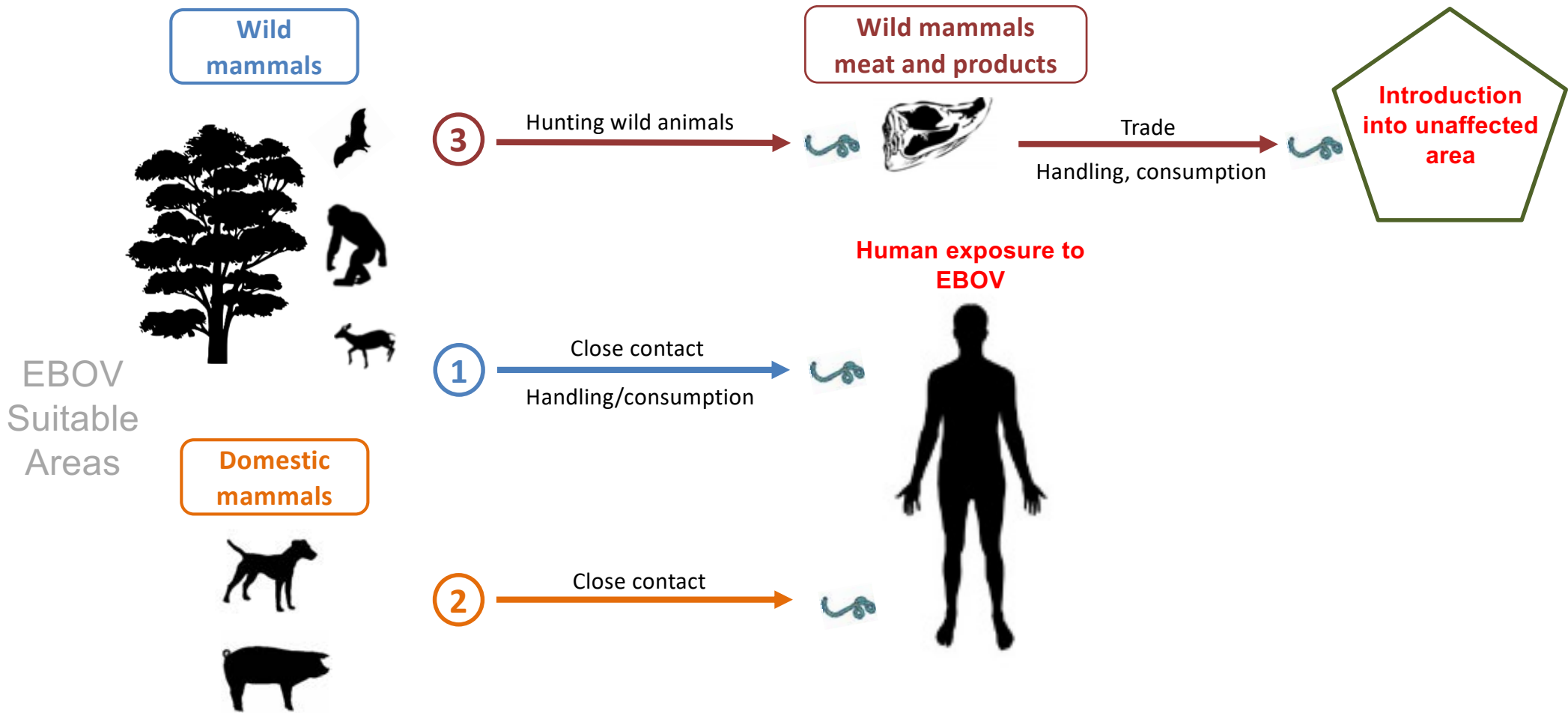- **Existing FAO risk assessment – 2015**

- **Updated based on new information:**
  o Literature review
  o Updates from partner agencies and institutions
  o Expert opinion

- **Published: August 2018**

http://www.fao.org/3/CA0908EN/ca0908en.pdf

3 risk questions addressed

Wild mammals

Wild mammals meat and products

3 Hunting wild animals

Trade

Handling, consumption

Introduction into unaffected area

Human exposure to EBOV

1 Close contact

Handling/consumption

EBOV Suitable Areas

Domestic mammals

2 Close contact
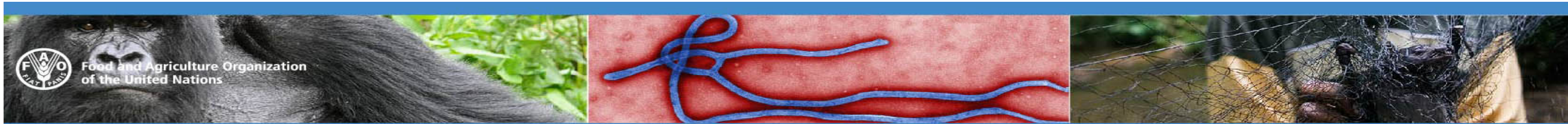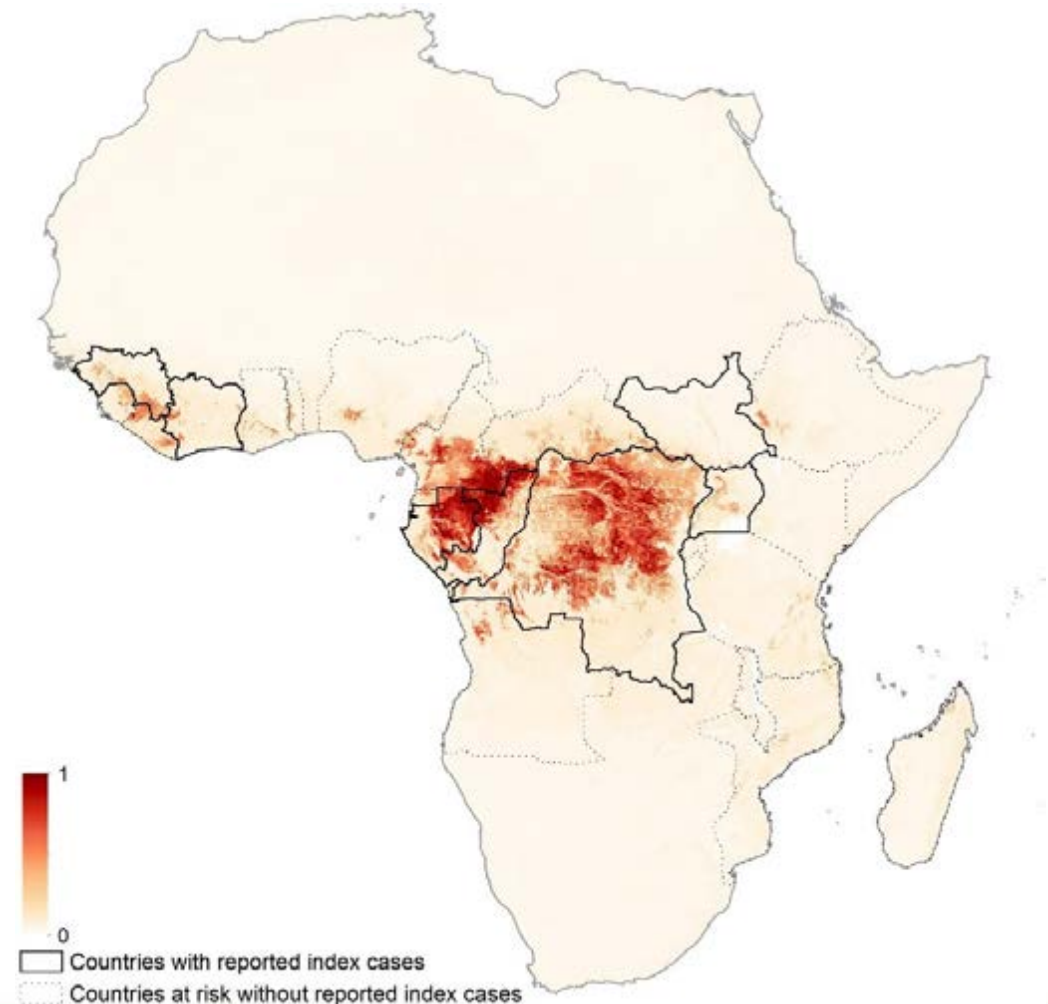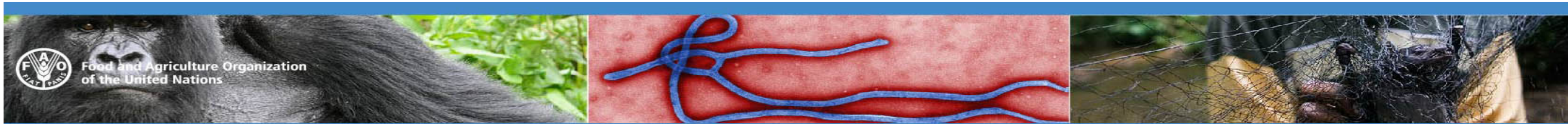
EBOV suitable areas

- **Model takes into account:**
  - Bat species distribution
  - Previous disease occurrence
  - Environmental factors
    - Elevation
    - Mean evapotranspiration rate
    - Enhanced vegetation index
    - Day/night land surface temperature

- **Overlap with dense human population areas**

Pigott *et al.* 2016. Updates to the zoonotic niche map of Ebola virus disease in Africa. https://elifesciences.org/articles/16412

☐ Countries with reported index cases
┈ Countries at risk without reported index cases

Definitions: likelihood and uncertainty
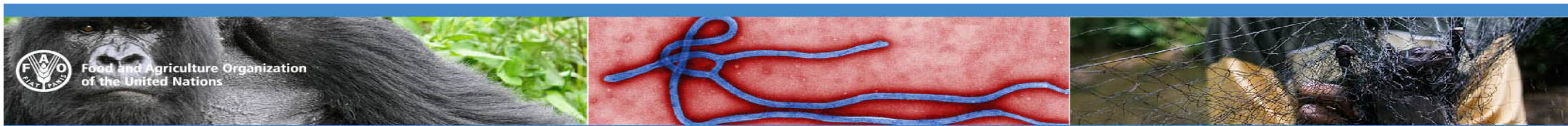
- **Five risk levels:**
  - **High** – highly likely to occur
  - **Moderate** – potentially occurring
  - **Low** – unlikely to occur
  - **Very low** – very unlikely to occur
  - **Negligible** – extremely unlikely to occur
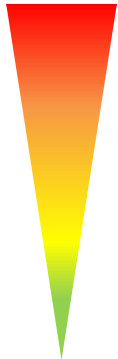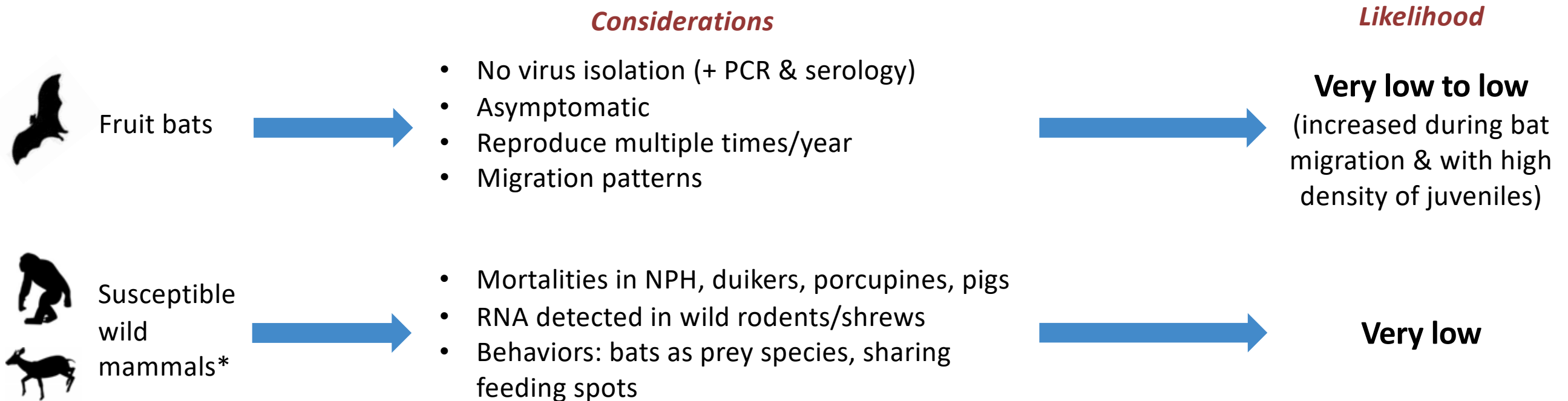
- **High uncertainty for risk assessment**
  - Important knowledge gaps remain on EBOV characteristics and ecology in the wild
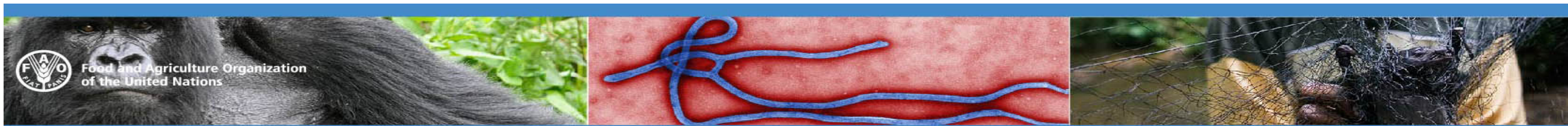
Assessments – Risk Question 1

Question: What likelihood that <u>humans are exposed</u> to EBOV in suitable areas of Africa through <u>close contact, handling or consumption</u> of…

Considerations

Likelihood

Fruit bats →

- No virus isolation (+ PCR & serology)
- Asymptomatic
- Reproduce multiple times/year
- Migration patterns

→ **Very low to low**
(increased during bat migration & with high density of juveniles)

Susceptible wild mammals* →

- Mortalities in NPH, duikers, porcupines, pigs
- RNA detected in wild rodents/shrews
- Behaviors: bats as prey species, sharing feeding spots

→ **Very low**

Main risk factor: close contact with infected wild animal (dead or alive) and consumption of wild meat

***** Non-human primates (NPH), duikers, bush pigs, rodents**   6

Assessments – Risk Question 2

Question: What likelihood that <u>humans are exposed </u>to EBOV in suitable areas of Africa through <u>close contact with domestic mammals</u>, such as…
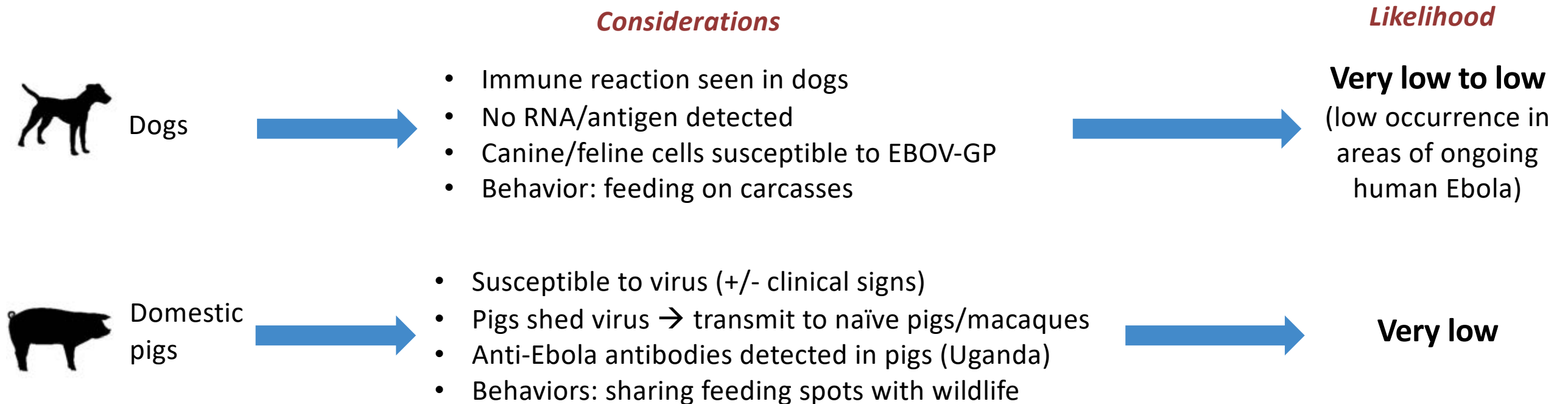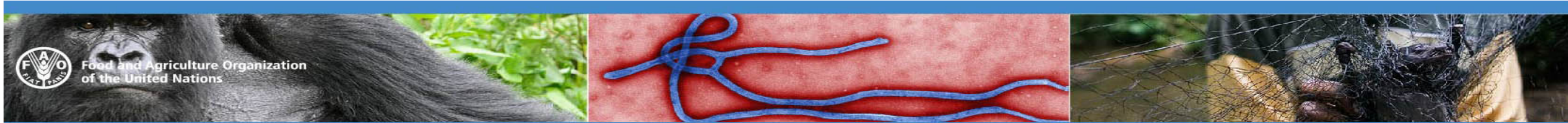
Considerations

Likelihood

Dogs

- Immune reaction seen in dogs
- No RNA/antigen detected
- Canine/feline cells susceptible to EBOV-GP
- Behavior: feeding on carcasses

Very low to low
(low occurrence in areas of ongoing human Ebola)

Domestic pigs

- Susceptible to virus (+/- clinical signs)
- Pigs shed virus → transmit to naïve pigs/macaques
- Anti-Ebola antibodies detected in pigs (Uganda)
- Behaviors: sharing feeding spots with wildlife

Very low

Mechanical transmission of virus from dogs/cats possible? → Needs verification

Assessments – Risk Question 3

Question: What is the likelihood of <u>EBOV spreading from suitable areas of Africa to an unaffected area</u> through <u>trade</u>, <u>handling</u> or <u>consumption</u> of...

|	*Considerations*	*Likelihood*
Meat, products from susceptible wildlife	• Wildmeat hunting is very common • EBOV survival in meat/carcasses not well known → can survive freezing • Informal cross-border movements for wild meat trading purposes • Ebola outbreaks in forested areas are comparatively less likely to expand nationally or regionally	**Very low** • For unaffected areas of affected countries or countries neighbouring affected areas • Decreases with proper processing method applied

Thorough cooking **inactivates EBOV in animal products**
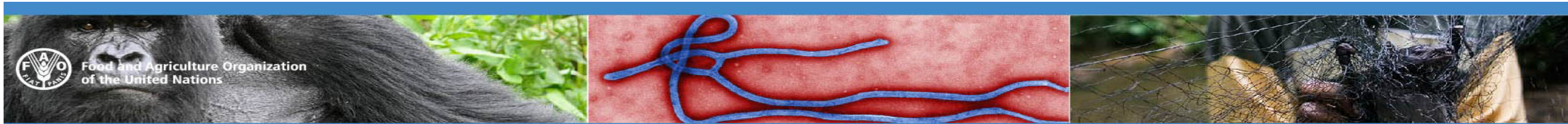
Conclusions

- Ebola **spillover from wildlife to human** populations appears to be a **rare event** compared to other zoonotic diseases

- But **one event** can lead to **tragic consequences**: high case-fatality rate, human-human transmission, discrimination of survivors...

- Communities **awareness** regarding **hunting**, **food hygiene** and **preparation** is critical

- **Many unknowns** remain to this date

Photo: AP Photo/Jerome
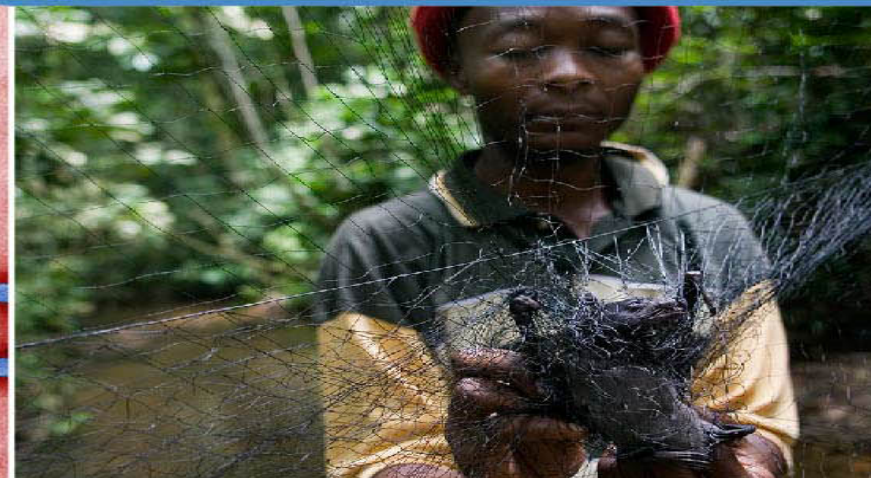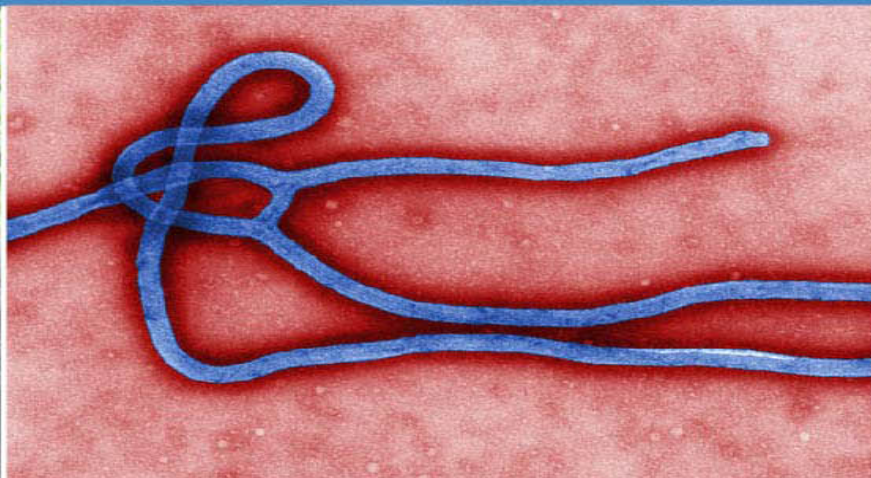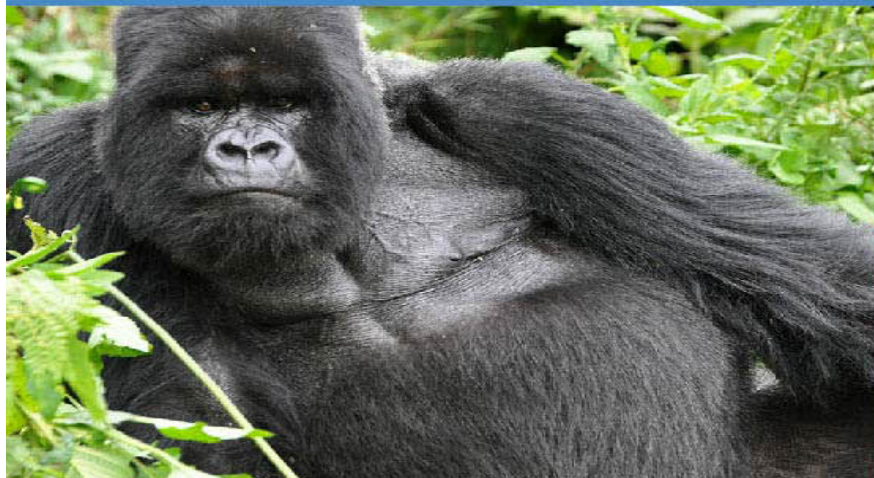
Thank you for your attention

Any questions?

Gaël Lamielle
FAO Headquarters, Rome

Gael.Lamielle@fao.org

Xavier Roche
FAO Headquarters, Rome

Xavier.Roche@fao.org