# Interconnections between Biodiversity and Health

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# Global Wildlife Health Programme
# Implementation plan for Europe and Central Asia

## Objectives

1. Strengthen the One Health multisectoral collaboration and capacity for wildlife health management
2. Wildlife health surveillance, monitoring, and management
3. Strengthen the response capacities to wildlife disease outbreaks

- Biodiversity and health interconnected
- Case example: Tick-borne Encephalitis
- Implementation example: Nature4Health

# Biodiversity and health connected

Relationship between host and parasite / pathogen diversity is both scale- and system-dependent.

- Broad geographic scale: more host biodiversity →more parasite / pathogen diversity
- Within ecological communities: body size, immune profile, environmental conditions
- Research capacity becomes limiting due to diversity of ecosystems: we don't yet know what we still don't know

# Biodiversity and health connected

## Biodiversity drives disease emergence

- >70% of emerging infectious diseases spread from animals to humans, more than half from wildlife
- Of emerging viruses, nearly 90% are zoonotic and 2/3 spillover from wildlife
- Some animal groups (e.g., bats) may be hyper-reservoirs, hosting many zoonotic pathogens and possessing ‘protective’ immune adaptations

# Biodiversity and health connected

## Biodiversity loss drives disease emergence

- Pathogens depend on the host competence (ability to transmit), host interactions with each other and response to anthropogenic disturbance
    - Loss of apex predator→more numerous and more connected prey population → more pathogen transmission
    - Loss of low competence host (fewer dead ends for transmission) → more high competent hosts (dilution effect) → more pathogen transmission

# Biodiversity and health connected

## Disease drives biodiversity loss

- Introduction of novel pathogens
- Changing environmental conditions: endemic pathogen causes outbreak: *Pasteurella multilocida* in saiga antelope
- Highly virulent pathogens: HPAI, white-nose fungal syndrome

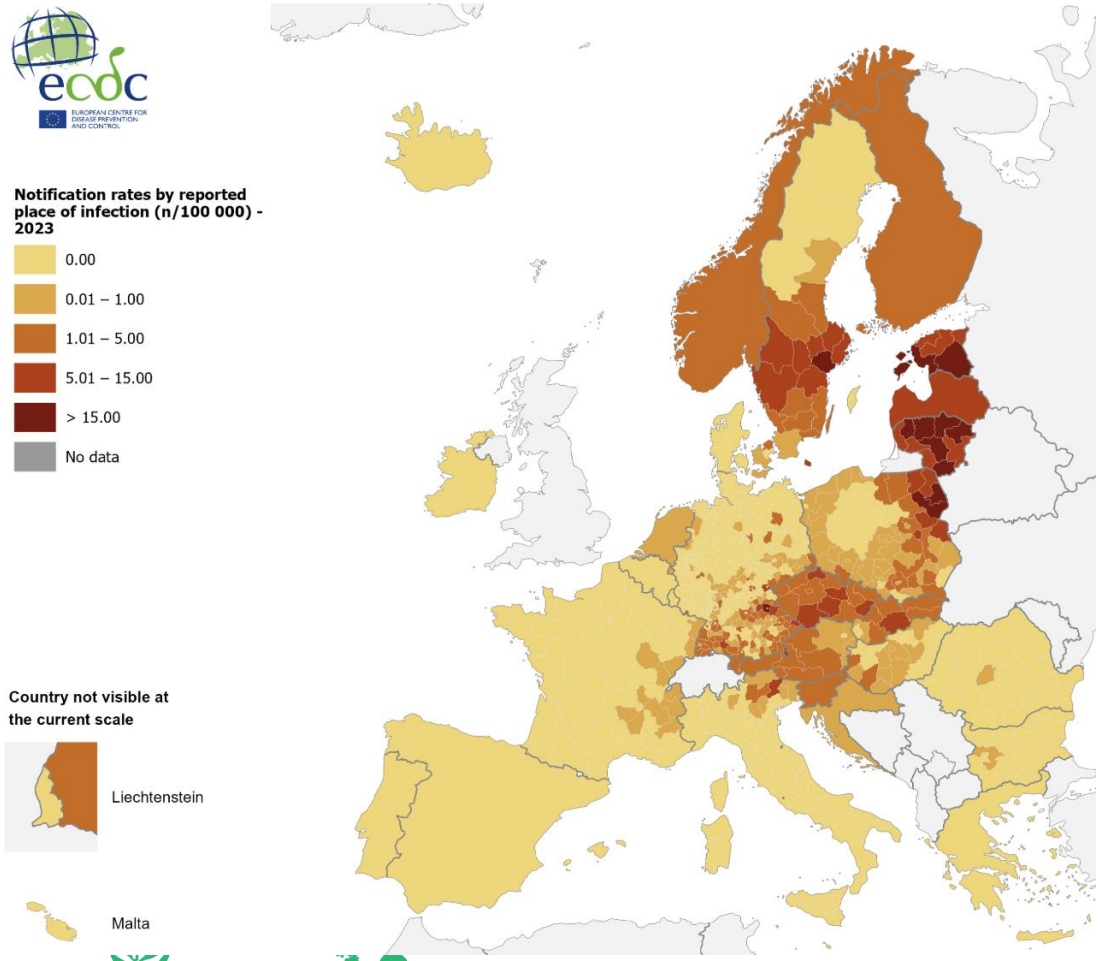
# Biodiversity and health connected

Upstream drivers fuel biodiversity loss by impacting transmission interfaces:

- Land use change→fragments ecosystems
- Agriculture intensity→enables livestock host bridges
- Climate change→alters species distribution and interactions
- Wildlife use→stress and unnatural species mixing

Carlson, C.J., Brookson, C.B., Becker, D.J. et al. Pathogens and planetary change. Nat. Rev. Biodivers. 1, 32–49 (2025). https://doi.org/10.1038/s44358-024-00005-w

# Case example:
# Tick-Borne Encephalitis in Europe




- Transmitted by **Ixodes ricinus**
- No treatment – prevention is key (vaccine, tick avoidance)
- Increasing incidence in Europe & Central Asia

https://www.ecdc.europa.eu/en/publications-data/notification-rates-locally-acquired-cases-reported-2023

# Wildlife biodiversity and disease risk



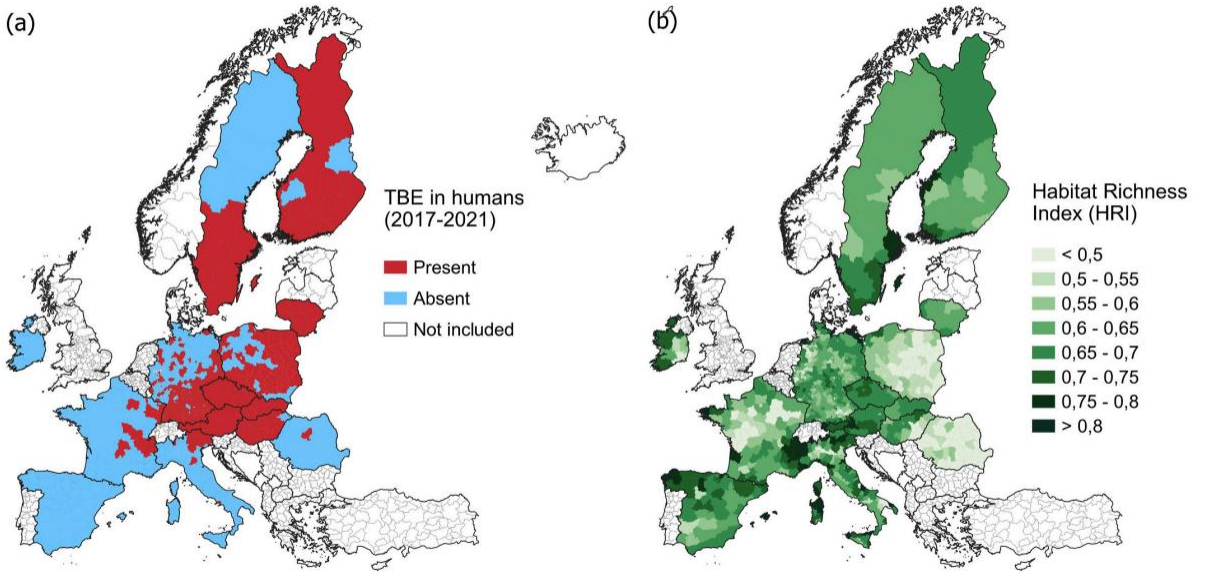



**Fig. 1.** Presence of human TBE cases and values of habitat richness index (HRI) in Europe. Panel (a): presence in red ($n = 381$) and absence in light blue ($n = 498$) of human TBE cases (2017–2021). Panel (b): 95-th percentile value of HRI at regional level. (For interpretation of the references to colour in this figure legend, the

- Small mammals (voles, mice) are key virus reservoirs
- Low species diversity → dominance of competent hosts
- Deer & boar support tick populations (but not virus carriers)
- Predator loss (foxes, raptors) means more rodents

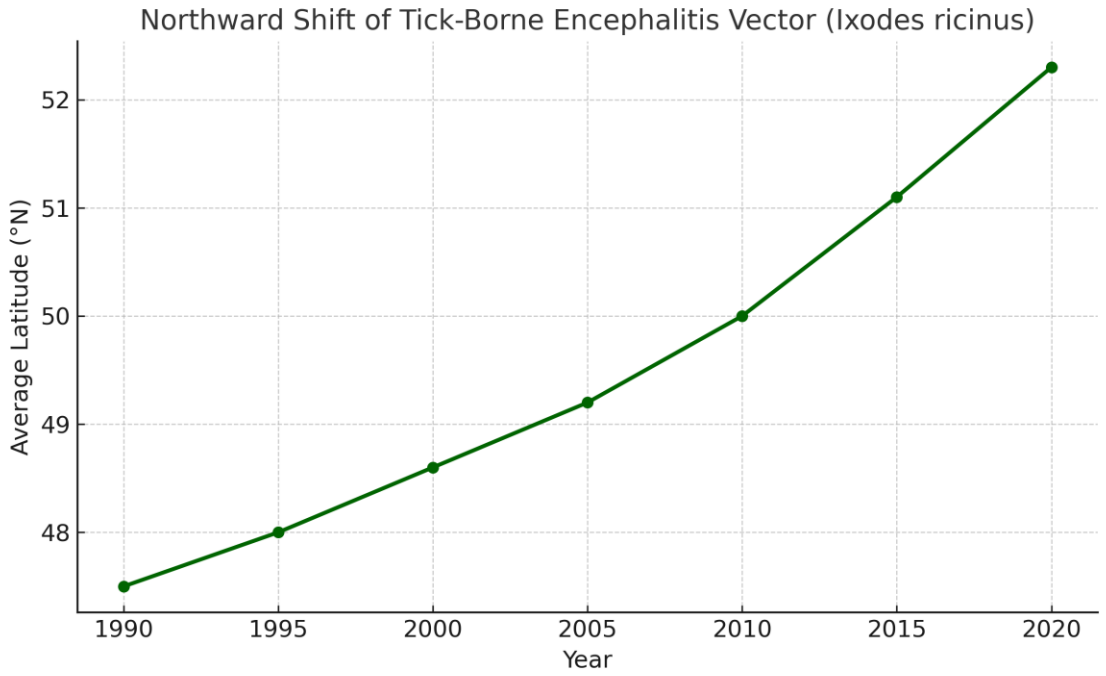
https://openpub.fmach.it/bitstream/10449/83675/1/2024%20OH%20Dagostin.pdf

# Land use change and human exposure

- Land abandonment → reforestation → tick habitat
- Suburbanization & forest recreation increase human exposure
- More foraging, leisure activities, eco-tourism = more tick contact

image: https://www.sciencedirect.com/science/article/pii/S1462901124002053#fig0010

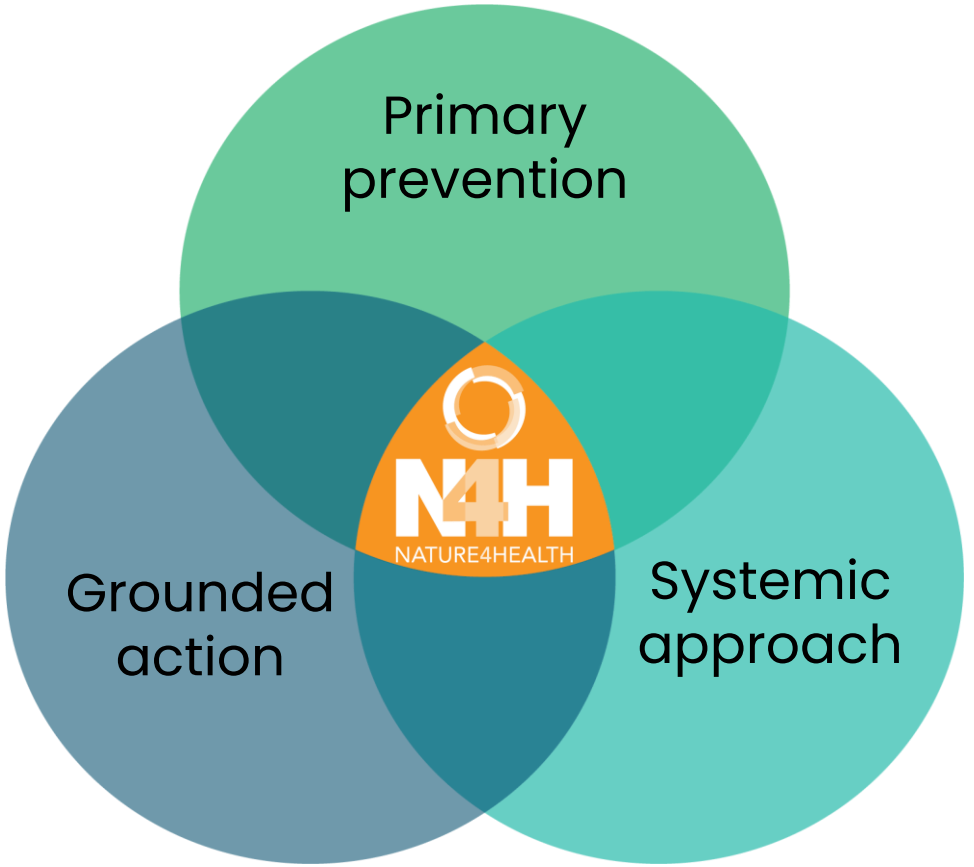
# Climate change effects



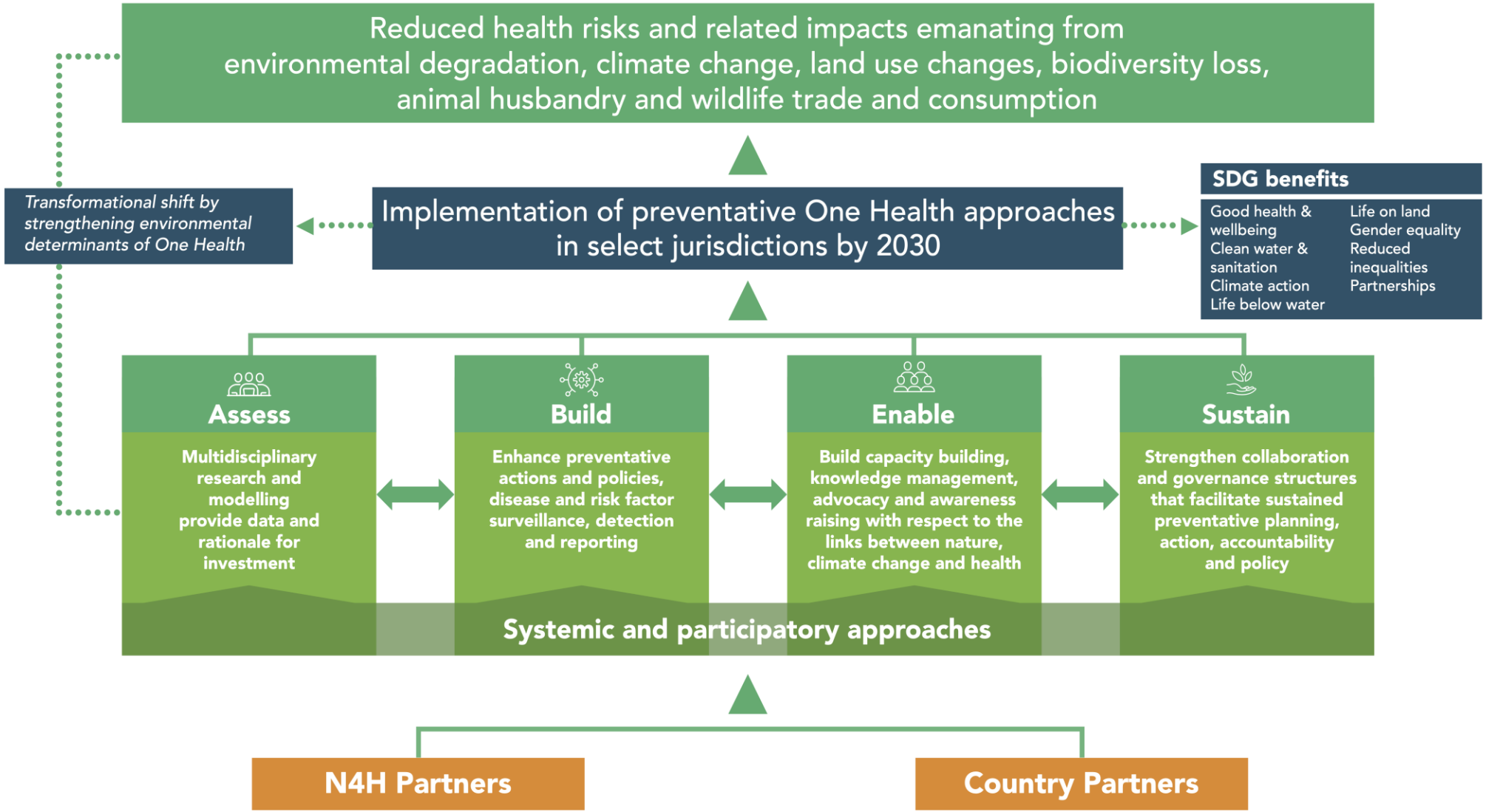

- Warmer winters → increased tick survival
- Longer tick activity seasons: earlier spring, later fall
- Expansion to northern latitudes and higher altitudes

# An implementation example: Nature4Health

- Acts to reduce the risk of zoonotic spillover upstream – primary prevention
- Promotes integration of biodiversity & climate into One Health implementation
- Promotes participatory, systemic approaches to maximize co-benefits and minimize trade-offs



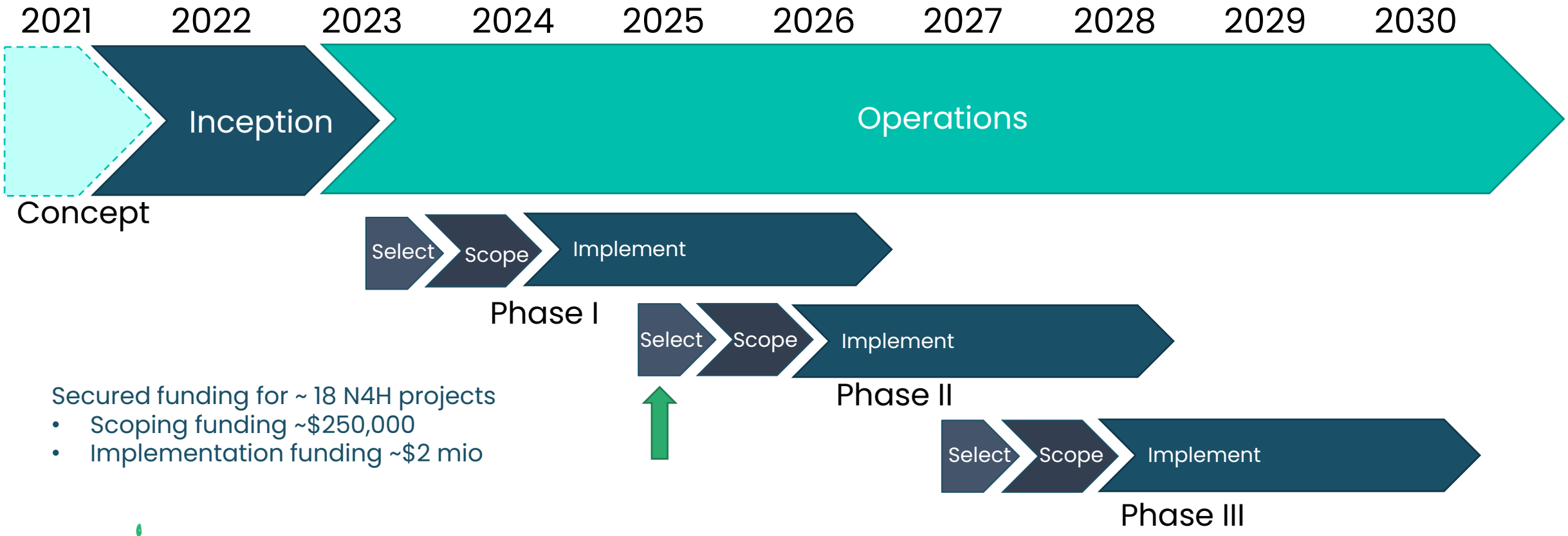

https://nature4health.org/




Limited awareness across nature-health interface ↑ Fragmented institutional landscape ↑ Lack of policy integration ↑ Limited technical capacity and resources ↑ Weak business case

# N4H timeline

Initial contribution of €50 million from Germany
(BMUV / IKI)
for upstream prevention of zoonotic spillover
with pandemic potential




Secured funding for ~ 18 N4H projects
- Scoping funding ~$250,000
- Implementation funding ~$2 mio

# Ecuador

- N4H Ecuador team held five participatory workshops in different strategic cities of Ecuador: Quito, Guayaquil, Cuenca, Puyo and Ambato, and 2 roundtables with indigenous communities: Shuar Shakaim and Kichwa Puyupungo.

Actions:

- Aligning specialized epidemiological surveillance with public policy to institutionalize and operationalize
- Activating an Inter-Institutional Response Committee and strengthening diagnostic capacities through partnerships with public and private laboratories

On-site workshop Puyo - Pastaza Provincial Government - October 8, 2024

On-site workshop Puyo - Shuar Shakaim Community - October 8, 2024

# Ghana

N4H Ghana team conducted a systemic inquiry across four regions of Ghana to understand zoonotic spillover risks and their drivers. The project addresses key areas:

- awareness creation, sensitization and advocacy,
- risk reduction policies and guidelines,
- One Health coordination and information sharing, and
- monitoring, evaluation, learning, and outreach.

# Mongolia

N4H Mongolia responds to the urgent need to enhance One Health coordination mechanisms with better inclusion of the environmental sector, strengthening policies to foster sustainable adapted behaviour towards wildlife and ecosystems.

Actions include:

- Engaging communities into wildlife health monitoring to improve upstream diseases prevention.
- Increasing knowledge of diseases at the environment-human-livestock interface while exploring nature-based solutions adapted to the local context

# Vietnam

N4H Vietnam team highlighted wildlife trade, wildlife farming, transportation and consumption of wildlife as key risks in the Vietnam One Health Plan. Participatory scoping identified key components for implementation:

- Test equitable models to reduce snaring in cooperation with IPLCs and local government.
- Design and test protocols in rescue centers to reduce disease risks and accelerate reintroduction of healthy animals back to the wild.
- Support Vietnam's One Health Partnership to strengthen policy formulation and inter-agency coordination.

# N4H country interventions support achievement of Biodiversity and Health Global Action Plan

Targets 4 , 5 and 9 on Species Management

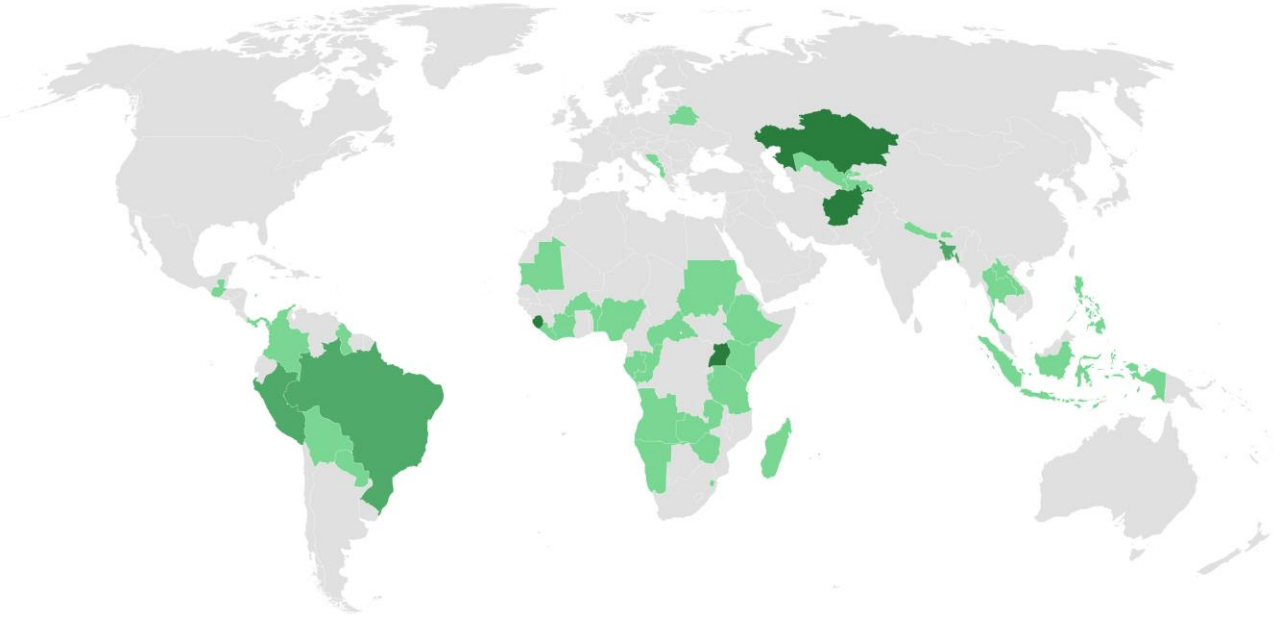
Actions:

4. Strengthen, when possible and in accordance with national capabilities, the capacity to understand and manage human-mediated factors with high potential to drive the transmission of zoonotic diseases, such as unregulated and unsustainable consumption of wild meat.

6. Promote collaborations in line with the One Health approach by reinforcing planning and surveillance of biodiversity, including for wildlife habitats and zoonotic pathogen spillover risk, to better assess and address health and disease risks in order to manage wild species sustainably.

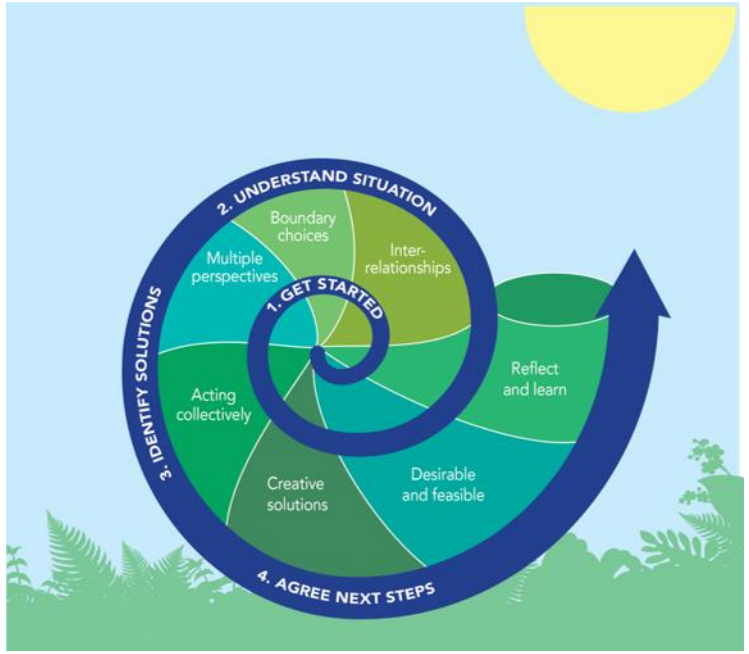
# N4H Phase II Expression of Interest

- Only ODA-eligible countries
- 66 applications received
- 10 applications from Eastern Europe and Central Asia
- Selected countries / regions announced in September



# In the planning stage:
# N4H Systemic Collaborative Learning

- To enhance partnerships among diverse stakeholders and create flexible knowledge-sharing structures that foster evidence-based advocacy and policy action
- Co-developed by experts from systems learning and integrated health implementation
- Envisioned as shared learning process using cohort-based activities, pilot tested over 1 year



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