



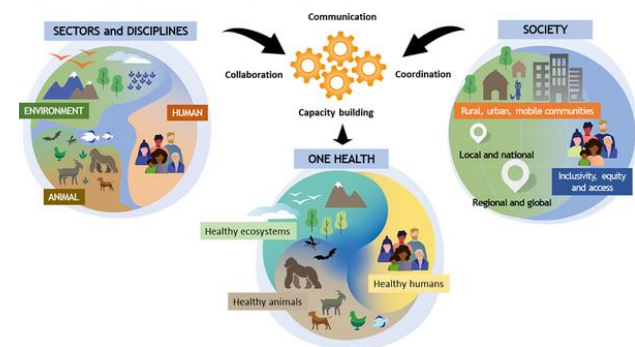
A One Health module: *The History and Evolution*



Association of European Life Science Universities – ICA 07-12-2023

Barry J. McMahon

**UCD School of Agriculture & Food
Science**

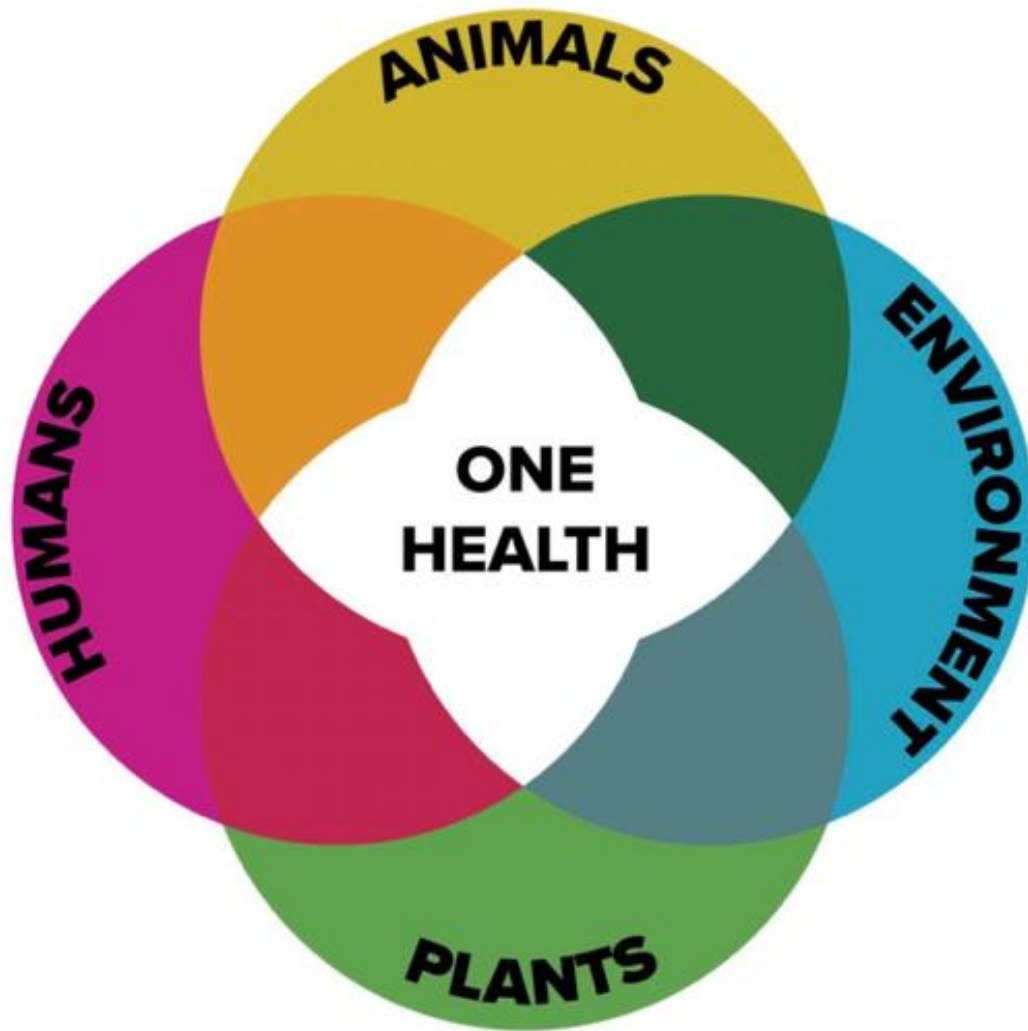




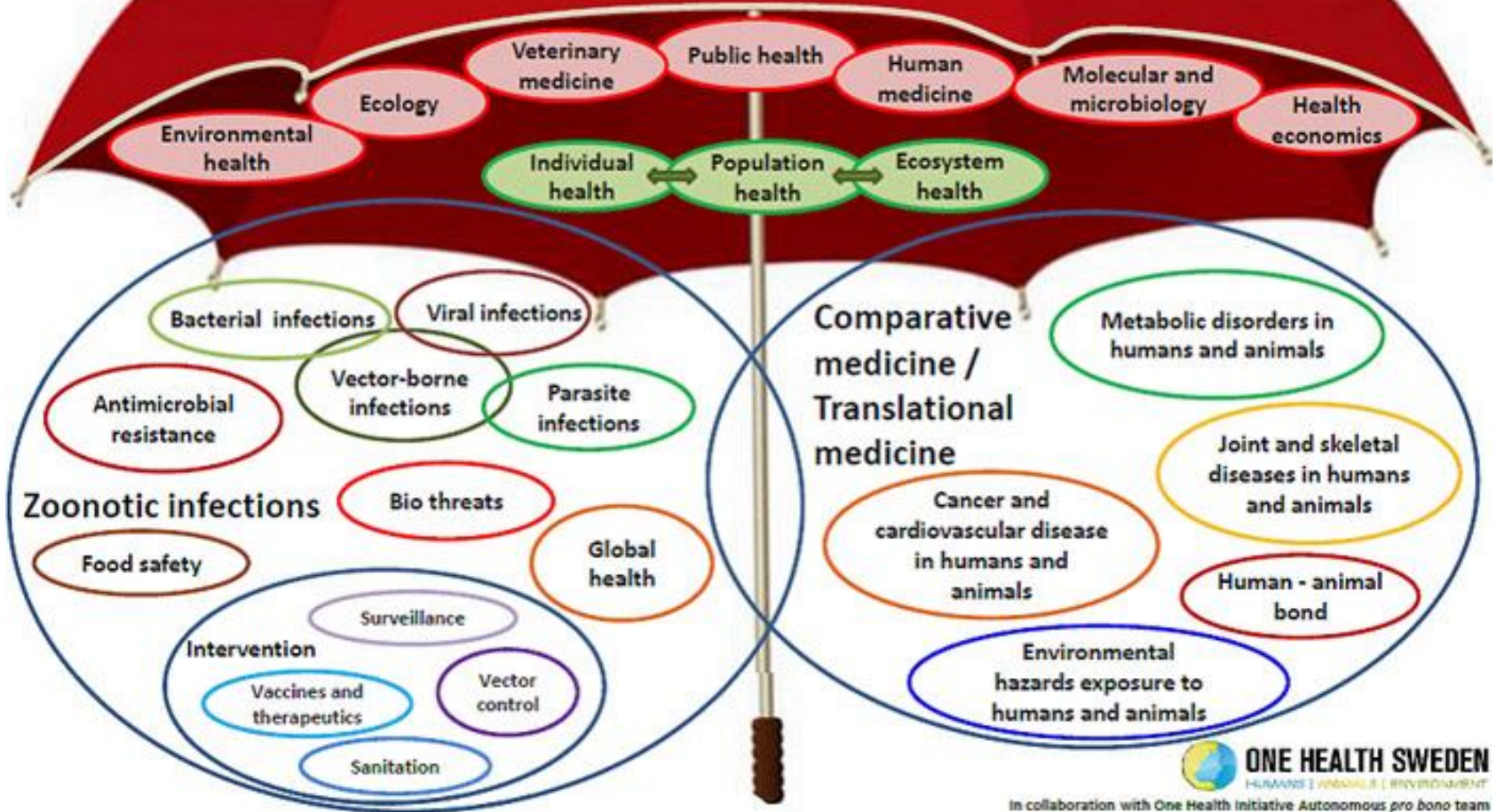


Outline

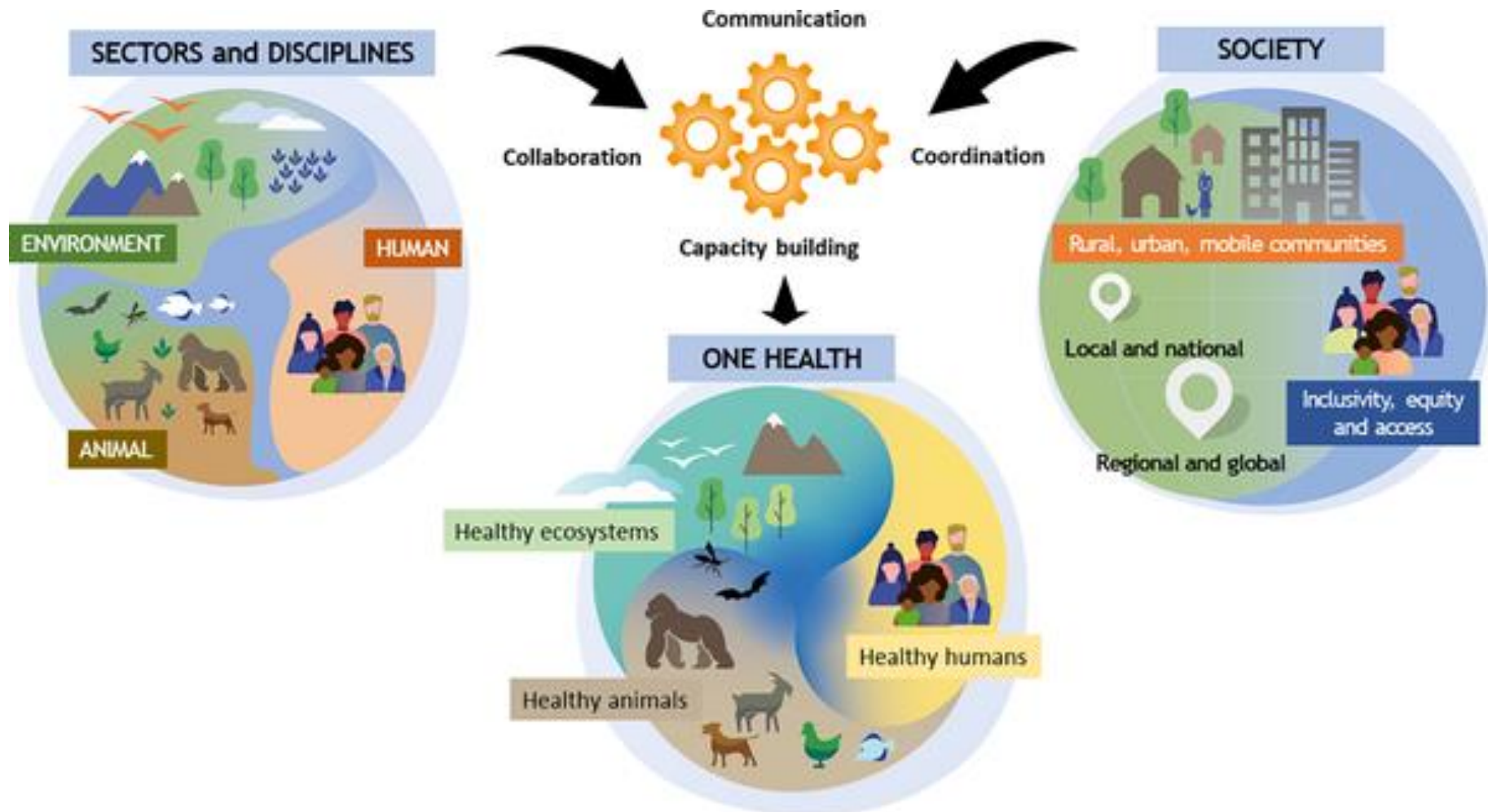
- Brief introduction to One Health
- Origins of the module
- Current outline of module
- Delivery and teaching
- Assessment
- Some linked publications
- Future in education



One Health



One Health is an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals and ecosystems



One Health High-Level Expert Panel (OHHLEP), Adisasmito WB, Almuhairei S, Behravesh CB, Bilivogui P, et al. (2022) One Health: A new definition for a sustainable and healthy future. PLOS Pathogens 18(6): e1010537. <https://doi.org/10.1371/journal.ppat.1010537>
<https://journals.plos.org/plospathogens/article?id=10.1371/journal.ppat.1010537>



Origins of One Health Module

- In 2007: inherited from a Prof. Jeremy Gray: *Epidemiology & Zoonoses - AESC 40020*
- Offered as a core elective to Agri-Environment Science students in the B.Ag.Sc. in UCD in final year of four year degree since 1990's



Origins contd.

- A core module for MSc students in Wildlife Conservation & Management from 2011 (SAFS) and a key theme of the programme:
 - Wildlife Conservation
 - **One Health**: Epidemiology and zoonoses
 - Human wildlife conflict
- Class AES=40%, WCM=40%, misc.=20%
- Centered around a risk assessment of zoonoses

Risk Assessment: Zoonosis



1. History
2. Pathology-description of disease
3. Biology of causal organism(s)
4. Epidemiology
5. Diagnosis
6. Treatment
7. Prevention/control options
8. Risk characterisation



Evolution to One Health

- Name change in 2015: since weight of the movement
- I joined the The Network for Evaluation of One Health-EU COST Action: 2016
- Broadening of content e.g. more biodiversity content, AMR, short description of new zoonoses



Current One Health Learning Objectives

1. To understand the concept of the One Health framework
2. To understand how the One Health framework helps us to appreciate the nature, components and role of epidemiology in disease prevention and control



Current One Health Learning Objectives contd.

3. To appreciate the utility and limitations of different diagnostic and investigative approaches
4. To describe the biology and epidemiology of selected zoonoses in an integrated fashion, with particular reference to Ireland and zoonoses of international importance, perform risk analyses
5. To understand the link between biodiversity and zoonoses emergence

EPIDEMIOLOGY

The costs and benefits of primary prevention of zoonotic pandemics

Aaron S. Bernstein^{1*}, Amy W. Ando^{2,3}, Ted Loch-Temzelides⁴, Mariana M. Vale^{5,6}, Binbin V. Li^{7,8}, Hongying Li⁹, Jonah Busch¹⁰, Colin A. Chapman^{11,12,13,14}, Margaret Kinnaird¹⁵, Katarzyna Nowak^{16†}, Marcia C. Castro¹⁷, Carlos Zambrana-Torrel⁹, Jorge A. Ahumada¹⁰, Lingyun Xiao¹⁸, Patrick Roehrdanz¹⁰, Les Kaufman¹⁹, Lee Hannah¹⁰, Peter Daszak⁹, Stuart L. Pimm^{8*}, Andrew P. Dobson^{20,21*}

The lives lost and economic costs of viral zoonotic pandemics have steadily increased over the past century. Prominent policymakers have promoted plans that argue the best ways to address future pandemic catastrophes should entail, “detecting and containing emerging zoonotic threats.” In other words, we should take actions only after humans get sick. We sharply disagree. Humans have extensive contact with wildlife known to harbor vast numbers of viruses, many of which have not yet spilled into humans. We compute the annualized damages from emerging viral zoonoses. We explore three practical actions to minimize the impact of future pandemics: better surveillance of pathogen spillover and development of global databases of virus genomics and serology, better management of wildlife trade, and substantial reduction of deforestation. We find that these primary pandemic prevention actions cost less than 1/20th the value of lives lost each year to emerging viral zoonoses and have substantial cobenefits.

Failure to prevent pandemics at source is ‘greatest folly’, say scientists

Protecting wildlife to stop viruses jumping to humans would save far more than it costs, analysis shows



Article

Climate change increases cross-species viral transmission risk

<https://doi.org/10.1038/s41586-022-04788-w>

Received: 24 January 2020

Accepted: 21 April 2022

Colin J. Carlson^{1,2,7,50}, Gregory F. Albery^{1,3,7,50}, Cory Merow⁴, Christopher H. Trisos⁵, Casey M. Zipfel¹, Evan A. Eskew^{2,8}, Kevin J. Olival³, Noam Ross³ & Shweta Bansal¹



Outline of the Module

1. One Health Initiative
2. Introduction into Epidemiology
3. Diagnostic Techniques
4. Zoonoses
5. Antimicrobial/Antibiotic resistance*
6. **Case studies of individual zoonoses
i.e. risk assessment**

Understand
the language



Contributors

This have changed throughout the years but currently:

1. Veterinary public health specialist
2. Public Health Doctor
3. Veterinary Epidemiologists
4. Ecologists
5. Food Safety Specialists



Delivery

- Autumn trimester
- Face-to-face
- From 2021-2022: online with a change of assessment to written assignments
- Relatively small groups: 20-30 students
- Brightspace for file/lecture sharing



Assessment method

1. A short quiz during the semester (week 8 of 12) to examine the understanding of the fundamentals of the pathogens-what is it, where it is found and life cycle (20%)
2. End of semester in person exam of 2 hours-**seen exam** (80%)



Assessment method contd.

End of semester exam:

- Questions posted online 3 or 4 weeks from the end of term
- Ten short questions (total = 50): no choice-examines the breath of the course (50%)
- Prepare risk assessment for 2 out 4 listed zoonoses- usually 15 zoonoses covered throughout the course (50%)



Outcome

Desirable outcome is:

1. Knowledge of the language and the detail to describe zoonoses
2. Understanding the externalities (**ecological?**) associated with control of zoonoses: e.g. rabies in Europe, control of rats during plague



Feedback on Module

- Students find the module interesting, different and like the structure with the link to the assessment
- Good students enjoy the complexity
- *Weaker students struggled with details and needed greater direction*
- *Suggestions regarding greater marks for in-semester activities - guidance fluctuates*
- MSc feedback: recognize the continuity with overall theme



Some Module inspired outputs

Received: 9 January 2018 | Revised: 8 May 2018 | Accepted: 27 May 2018

DOI: 10.1111/zph.12489

REVIEW

WILEY

Ecosystem change and zoonoses in the Anthropocene

Barry J. McMahon¹  | Serge Morand² | Jeremy S. Gray³



LETTER TO THE EDITOR

Targets to increase food production: *One Health* implications

Barry J. McMahon, PhD^{1*}, Patrick G. Wall, MVB², Séamus Fanning, PhD² and Alan G. Fahey, PhD¹

¹UCD School of Agriculture & Food Science, University College Dublin, Dublin 4, Ireland; ²UCD Centre for Food Safety, UCD School of Public Health, Physiotherapy & Population Science, University College Dublin, Dublin 4, Ireland

Ecosystem Services 17 (2016) 40–42



Contents lists available at ScienceDirect

Ecosystem Services

journal homepage: www.elsevier.com/locate/ecoser



Soil stewardship as a nexus between Ecosystem Services and One Health

Aidan M. Keith^{a*}, Olaf Schmidt^b, Barry J. McMahon^b

^a Centre for Ecology & Hydrology, Lancaster Environment Centre, Bailrigg, Lancaster LA1 4AP, UK
^b UCD School of Agriculture & Food Science, University College Dublin, Belfield, Dublin 4, Ireland





Module related outputs

Agnew et al. *Irish Veterinary Journal* (2016) e9:13
DOI 10.1186/s13620-016-0072-7

Irish Veterinary Journal

Zoonoses and Public Health

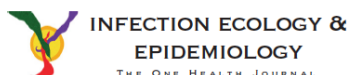
SHORT REPORT

Open Access



Insights into antimicrobial resistance among long distance migratory East Canadian High Arctic light-bellied Brent geese (*Branta bernicla hrota*)

Austin Agnew¹, Juan Wang², Séamus Fanning^{2,3}, Stuart Beahop⁴ and Barry J. McMahon^{1*}



INFECTION ECOLOGY &
EPIDEMIOLOGY
THE ONE HEALTH JOURNAL

LETTER TO THE EDITOR

Targets to increase food production: *One Health* implications

Barry J. McMahon, PhD^{1*}, Patrick G. Wall, MVB², Séamus Fanning, PhD² and Alan G. Fahey, PhD¹

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ORIGINAL ARTICLE

Antimicrobial Resistance in Wildlife: Implications for Public Health

D. Carroll¹, J. Wang², S. Fanning^{2,3} and B. J. McMahon¹

¹UCD School of Agriculture & Food Science, University College Dublin, Dublin, Ireland

²UCD Centre for Food Safety, UCD School of Public Health, Physiotherapy & Population Science, University College Dublin, Dublin, Ireland

³Institute for Global Food Security, School of Biological Sciences, Queen's University Belfast, Belfast, Northern Ireland



NEGLECTED
TROPICAL DISEASES

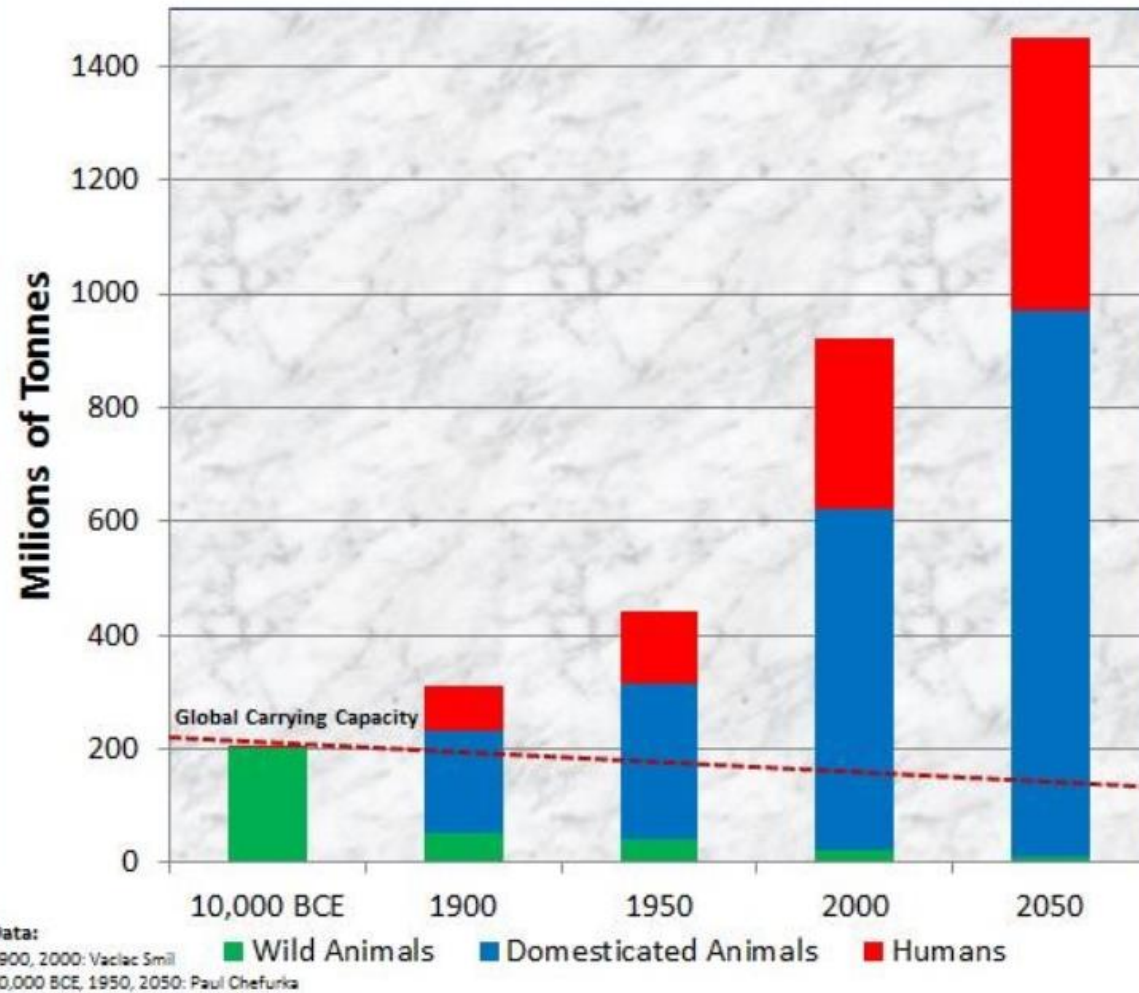
RESEARCH ARTICLE

Emerging Infectious Disease Implications of Invasive Mammalian Species: The Greater White-Toothed Shrew (*Crocidura russula*) Is Associated With a Novel Serovar of Pathogenic *Leptospira* in Ireland

Jarlath E. Nally^{1*}, Zbigniew Arent², Darrell O. Bayles¹, Richard L. Hornsby¹, Colm Gilmore³, Siobhan Regan⁴, Allan D. McDevitt², Jon Yearsley⁵, Séamus Fanning⁶, Barry J. McMahon⁴

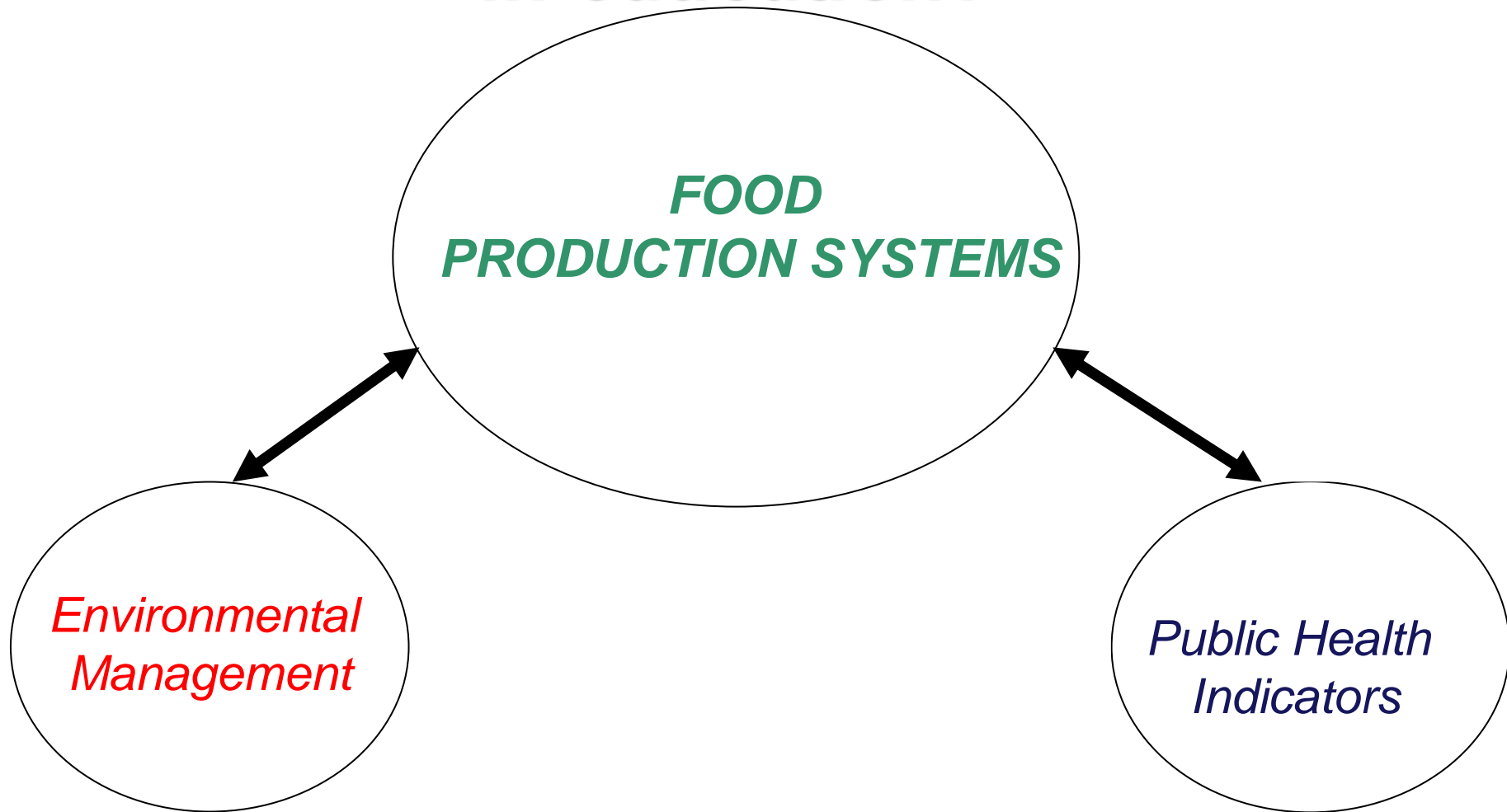


Terrestrial Vertebrate Biomass



Smil (2011)

Future for One Health approach in education?





Questions??

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Twitter: [@barryjmcMahon](https://twitter.com/barryjmcMahon)

