

BSc Honours Environmental Sciences (One Health)

Victor Wepener

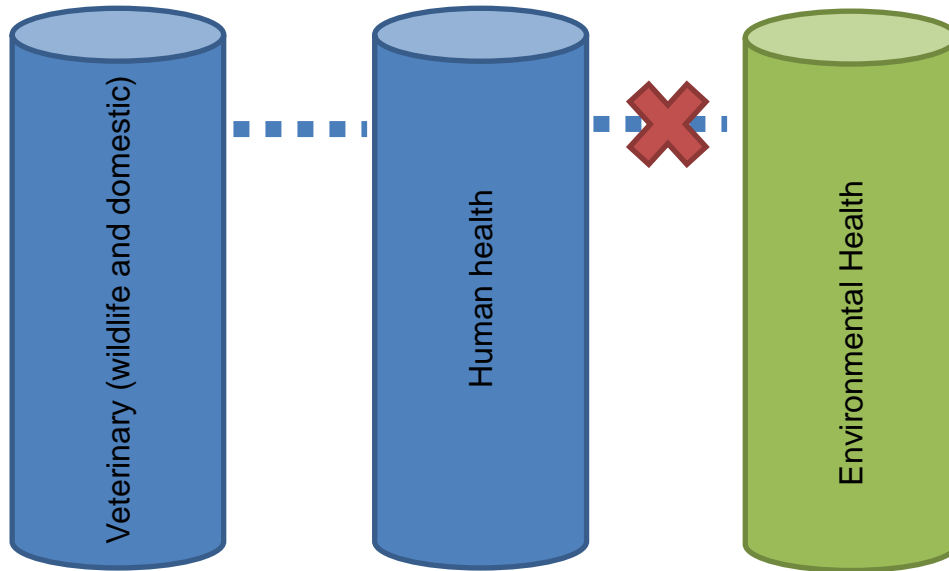


One Health

- One Health is defined as “a collaborative, multi-sectoral, and transdisciplinary approach working at the local, regional, national, and global levels with the goal of achieving optimal health outcomes recognizing the interconnection between people, animals, plants, and their shared environment”.
- The areas of work in which a One Health approach is particularly relevant include food safety, the control of zoonoses (diseases that can spread between animals and humans), environmental pollution where e.g. the trophic transfer of pollutants from the environment into humans can lead to health risks; and combatting antibiotic resistance.

One Health

- Internationally – veterinary sciences = human health.



- Limited (to none) environmental.

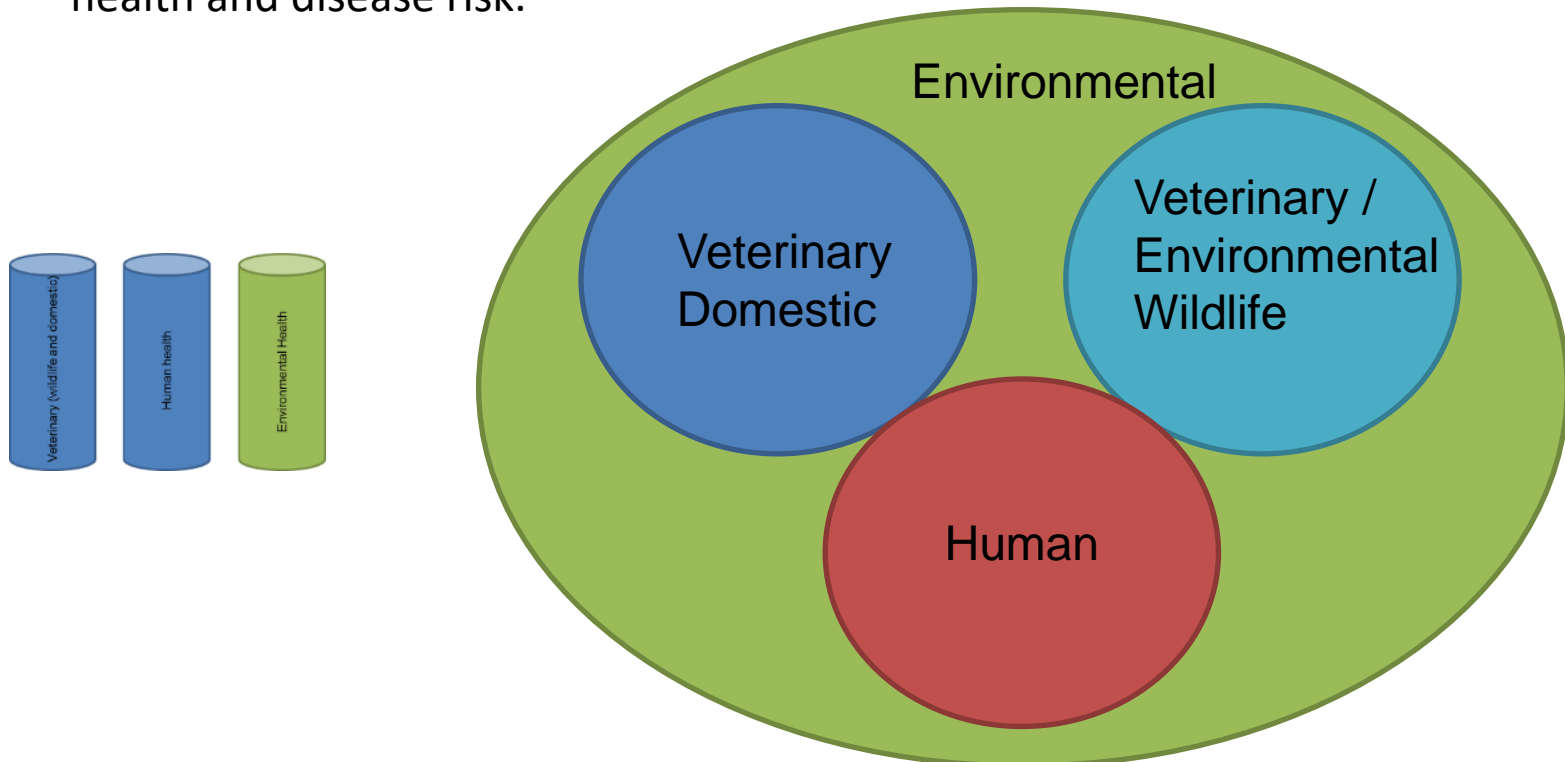
One Health

Why the “Environmental” focus?

- The most recent **Global Biodiversity Outlook** warned that mankind is at a cross road due to an unprecedented loss in biodiversity. This has had a profound influence on most nations not being able to meet the Sustainable Development Goals set for 2020.
- The report highlights how the **COVID-19 pandemic** has forced us to think about the importance of the relationship between people and nature, and how in turn the human well-being and survival can be compromised due to continued biodiversity loss and the degradation of ecosystems.
- Highlights the role that **One Health** can play in this regard
- WHO Director-General Tedros Adhanom Ghebreyesus (17 February 2021)
“It is clear, however, that One Health must be about **more than zoonoses**”, Tedros spelled out. “We cannot protect human health without considering the impact of human activities that disrupt ecosystems, encroach on habitats, and further drive climate change”.

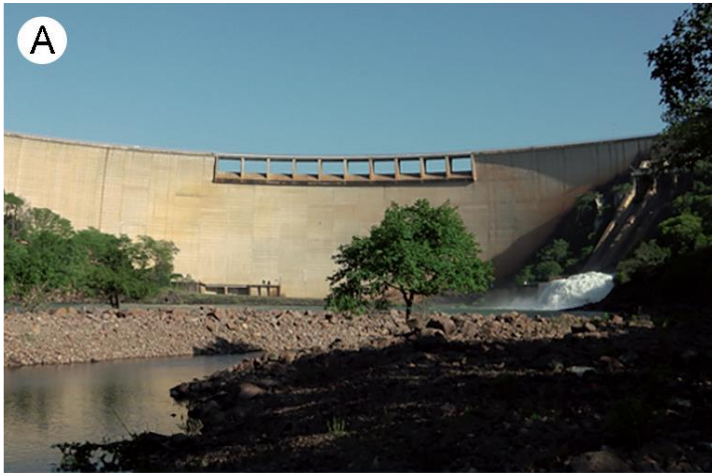
One Health @ NWU

- The unique skills set at NWU allows us to focus the curriculum on a biodiversity-inclusive One Health transition.
- This will involve managing ecosystems, including agricultural and urban ecosystems, as well as the use of wildlife, through an integrated approach, to promote healthy ecosystems and healthy people.
- This transition recognizes the full range of linkages between biodiversity and all aspects of human health, and addresses the common drivers of biodiversity loss, health and disease risk.



Conserving Freshwater Biodiversity in an African Subtropical Wetland: South Africa's Lower Phongolo River and Floodplain

*Aline Angelina Acosta, Edward Netherlands, Francois Retief,
Lizaan de Necker, Louis du Preez, Marliese Truter,
Reece Alberts, Ruan Gerber, Victor Wepener,
Wynand Malherbe and Nico J. Smit*



How healthy are the resources on the Phongolo floodplain?

Why would it not be?



Why would it not be?



Why would it not be?



Concentrations and human health risk assessment of DDT and its metabolites in free-range and commercial chicken products from KwaZulu-Natal, South Africa

L. A. Thompson, Y. Ikenaka, Y. B. Yohannes, J. J. van Vuren, V. Wepener, N. J. Smit, W. S. Darwish, S. M. M. Nakayama, H. Mizukawa & M. Ishizuka

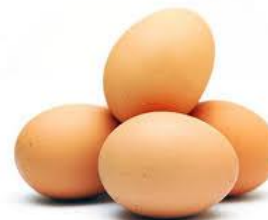
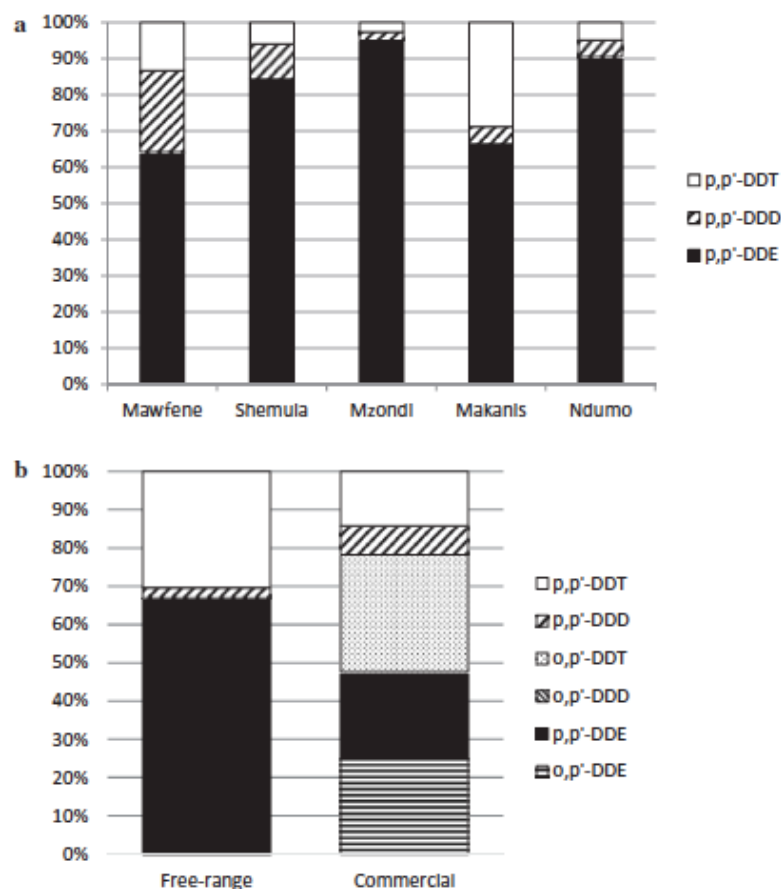


Figure 2. Relative abundance of individual DDT components in free-range chickens from KwaZulu-Natal: (a) Chicken meat samples; (b) Chicken egg contents.

Concentrations and human health risk assessment of DDT and its metabolites in free-range and commercial chicken products from KwaZulu-Natal, South Africa

L. A. Thompson^a, Y. Ikenaka^{a,b}, Y. B. Yohannes^{a,c}, J. J. van Vuren^{b,d}, V. Wepener^b, N. J. Smit^b, W. S. Darwish^{a,e}, S. M. M. Nakayama^a, H. Mizukawa^f and M. Ishizuka^a

Percentile	25th	50th	75th	95th
Chicken meat				
p,p'-DDE	0.8	3.5	5.9	23.6
p,p'-DDD	0.1	0.1	0.5	3.4
p,p'-DDT	0.1	0.1	1.2	6.5
ΣDDTs	0.9	3.6	10.5	34.9
Chicken egg contents				
Free range				
o,p'-DDE	0.001	0.001	0.04	0.3
p,p'-DDE	163.1	927.3	2529	5509
o,p'-DDD	0.0	0.2	0.3	1.5
o,p'-DDT	0.2	0.5	1.1	3.0
p,p'-DDD	6.4	39.4	60.2	257.4
p,p'-DDT	31.2	260.9	446.8	3381
ΣDDTs	178.7	1298.0	4013	8423
Commercially produced				
o,p'-DDE	0.001	0.001	0.1	0.2
p,p'-DDE	0.01	0.03	0.1	0.3
o,p'-DDD	0.001	0.001	0.001	0.001
o,p'-DDT	0.001	0.001	0.001	0.1
p,p'-DDD	0.002	0.02	0.03	0.1
p,p'-DDT	0.001	0.05	0.1	0.1
ΣDDTs	0.1	0.2	0.3	0.5



^a A value >1 indicates a potential health risk.



Artisanal Fisheries in the Ndumo Area of the Lower Phongolo River Floodplain, South Africa

How many times per week do you usually eat fish?

1 x per week	2 x per week	3 x per week	4 x per week	5 x per week	6 x per week	7 x per week
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Among those who consumed fish, which included the vast majority of the participant group (**88.9%**),

- fish was eaten an average of **1-2** times a week.
- On days when fish was eaten, participants ate fish an average of **1.4** times per day (SD = 0.59).



How do Phongolo people utilize fish?

Why do you eat fish (tick all that apply)?

1	2	3	4	5	6
I can catch it for free	It is cheap / affordable	I like the way it tastes	It is easily available	It is healthy	Can easily/quickly prepare a dish with fish

- **57% of participants said they did so as fish is healthy,**
- 41.1% because they like the way fish tastes,
- 21.9% said they preferred it as it was fairly cheap and affordable,
- 15.5% said it was easily available,
- 10.6% said they ate fish as it was quick and easy to prepare,
- 9.4% of participants indicated that they ate fish as they could catch it for free.



How healthy are the fish?

Science of the Total Environment 685 (2019) 1116–1126



Contents lists available at ScienceDirect

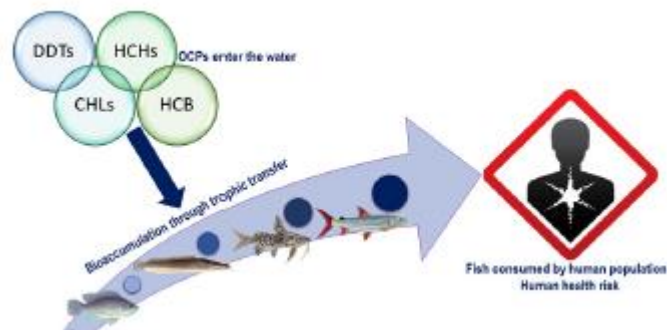
Science of the Total Environment

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



Bioaccumulation of persistent organic pollutants and their trophic transfer through the food web: Human health risks to the rural communities reliant on fish from South Africa's largest floodplain

C.M. Volschenk^a, R. Gerber^{b,*}, M.T. Mkhonto^a, Y. Ikenaka^{b,c}, Y.B. Yohannes^{c,d}, S. Nakayama^c, M. Ishizuka^c, J.H.J. van Vuren^{a,b}, V. Wepener^{b,c}, N.J. Smit^b



DDTs
Lindane (γ -HCH)

Malaria vector control and wildlife

The Journal of
**Veterinary
Medical
Science**



NOTE

Toxicology

Dichlorodiphenyltrichloroethane (DDT) levels in rat livers collected from a malaria vector control region

Kodai MOTOHIRA¹⁾, Yoshinori IKENAKA^{1,2)}, Yared Beyene YOHANNES¹⁾, Shouta M. M. NAKAYAMA¹⁾, Victor WEPENER^{1,2)}, Nico J. SMIT²⁾, Johan H. J. VAN VUREN²⁾, Ana Catarina SOUSA^{1,3)}, Alex Ajeh ENUNEKU⁴⁾, Emmanuel Temiotan OGBOMIDA⁵⁾ and Mayumi ISHIZUKA^{1)*}

Chemosphere 264 (2021) 128368



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Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Chemosphere

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



Levels of DDTs and other organochlorine pesticides in healthy wild Nile crocodiles (*Crocodylus niloticus*) from a flagship conservation area

Ruan Gerber ^{a,*}, Hindrik Bouwman ^b, Danny Govender ^{c,d}, Mayumi Ishizuka ^e, Yoshinori Ikenaka ^{a,e}, Yared B. Yohannes ^{e,f}, Nico J. Smit ^a, Victor Wepener ^{a,e}




Malaria vector control and human health

Environmental Science and Pollution Research (2019) 26:17774–17786
<https://doi.org/10.1007/s11356-019-05046-9>

RESEARCH ARTICLE



Dietary exposure and risk assessment of organochlorine pesticide residues in rural communities living within catchment areas of iSimangaliso World Heritage Site, South Africa

Archibold Buah-Kwofie¹  • Marc S. Humphries¹ • Letitia Pillay¹

Commentary

Environmental Health Perspectives

085005-1

A Section 508–conformant HTML version of this article is available at <https://doi.org/10.1289/EHP1774>.

Endocrine Disruptors and Health Effects in Africa: A Call for Action

Maria S. Bornman,^{1,2} Natalie H. Aneck-Hahn,^{1,2,3} Christiaan de Jager,^{1,2} Gesina M. Wagenaar,⁴ Hindrik Bouwman,⁵ Irene E.J. Barnhoorn,⁶ Sean M. Patrick,^{1,2} Laura N. Vandenberg,⁷ Andreas Kortenkamp,⁸ Bruce Blumberg,⁹ Sarah Kimmins,^{10,11} Bernard Jegou,^{12,13} Jacques Auger,¹⁴ Joseph DiGangi,¹⁵ and Jerrold J. Heindel¹⁶

How do we manage sustainability?

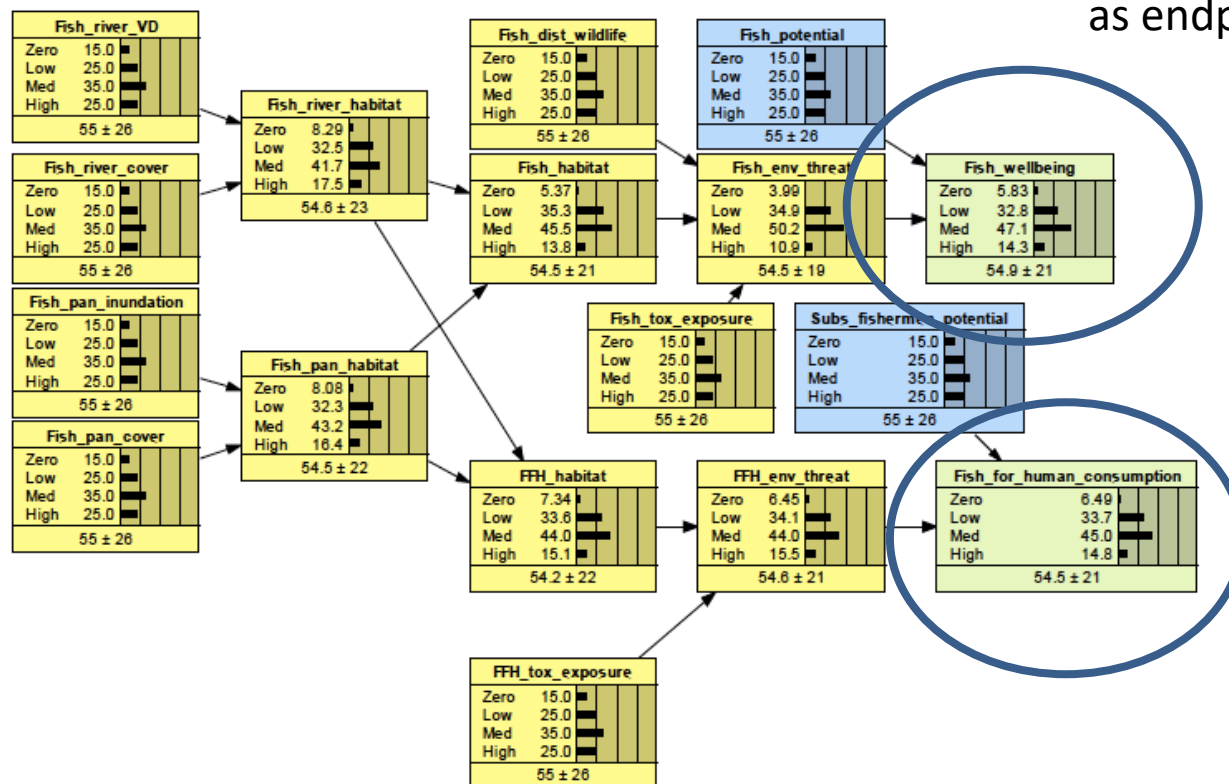
Risk Analysis, Vol. 41, No. 10, 2021

DOI: 10.1111/risa.13689

Regional Scale Risk to the Ecological Sustainability and Ecosystem Services of an African Floodplain System

Gordon O'Brien ^{1,*} Nico J Smit ² and Victor Wepener ²

Ecosystem services as endpoints



One Health programme structure

- Traditionally at Masters level (internationally, Africa and in SA)
- BSc Honours (Environmental Sciences)
- Target group
 - increase the Honours numbers from other disciplines
- Structure – 128 credit:
 - Research module (32 credits)
 - 6 modules (16 credit)
 - Introduction to One Health (ITOH611)
 - Introduction to Environmental Management (OMBO611)
 - Zoonoses (OMWW617)
 - Transdisciplinary Health Promotion (THPE621)
 - Advanced Ecotoxicology (OMSE625)
 - Genome analysis and bioinformatics (OMSB629)