In-field tool based on mobile phone App to enable precision nutrient management

Name: Adrian Mallory

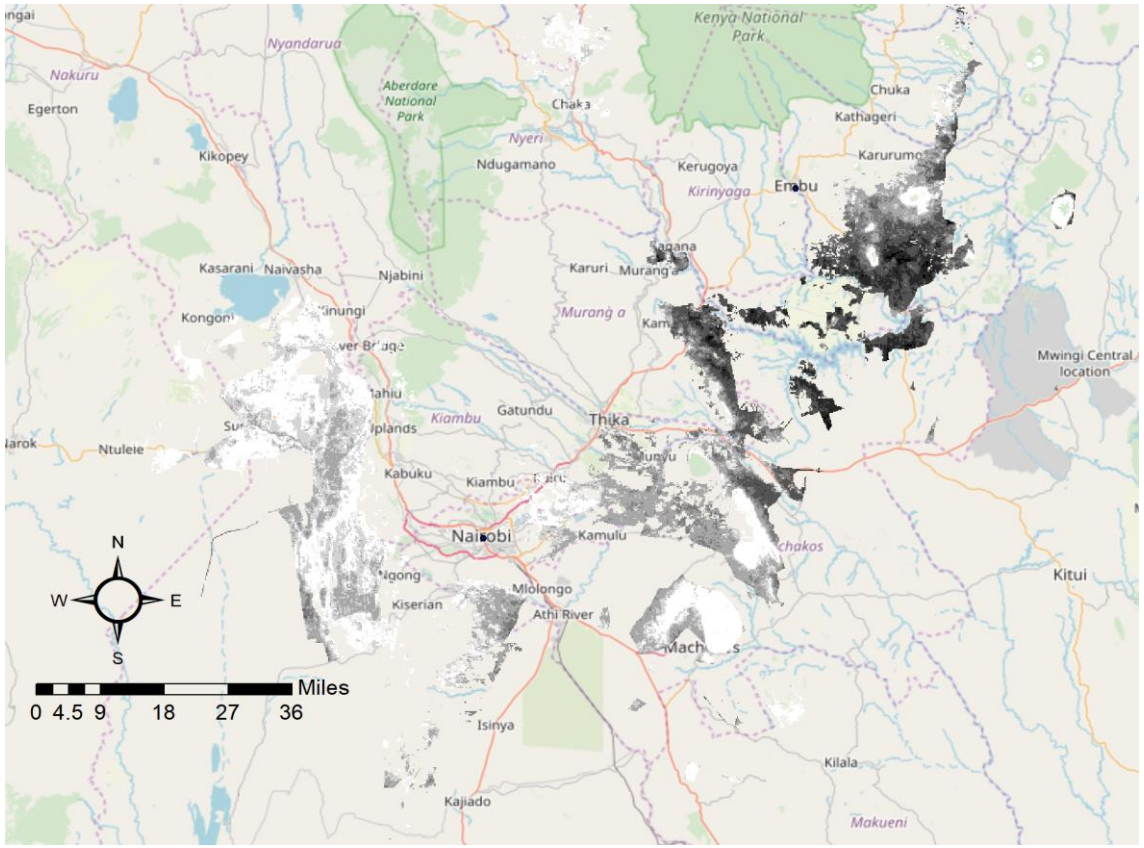
Affiliation: Cranfield University

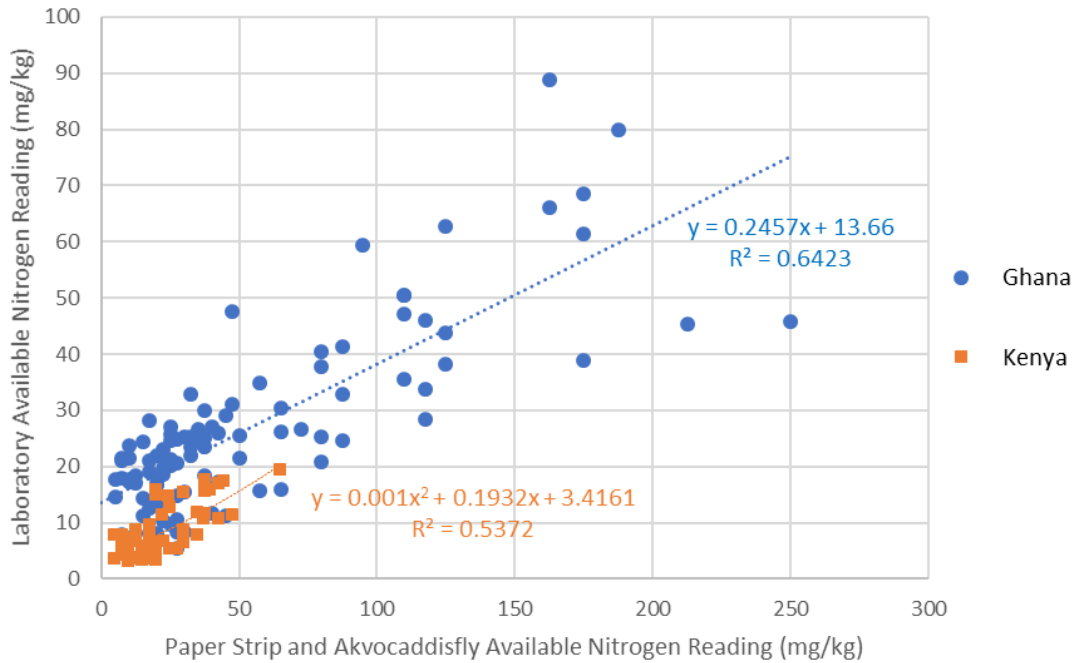
Email address: a.mallory@cranfield.ac.uk

1. To assess the use of micro paper analytical device (µPAD) in determining nutrient variability in HWDF

2. To evaluate the use of geospatial technology to determine suitable landbank to receive application of HWDF

3. To assess how the µPAD fits with existing decision processes and information sources used by farmers


Nyandarua
Kenya National Park
Nakuru
Egerton
Aberdare National Park
Chaka
Nyeri
Chuka
Kathageri
Kikopey
Ndugamano
Kerugoya
Karurumo
Kirinyaga
Embu
Kasarani
Naivasha
Njabini
Karuri
Murang'a
Kongoni
Mwingi Central location
Kiambu
Gatundu
Thika
Ntuleie
Kabuku
Kiambu
Nairobi
Kamulu
Kitui
Kiserian
Mlolongo
Athi River
Machakos
Isinya
Kilala
Kajiado
Makueni
N
W
E
S
Miles
0 4.5 9 18 27 36


Laboratory Available Nitrogen Reading (mg/kg)
Paper Strip and Akvocaddisfly Available Nitrogen Reading (mg/kg)
y = 0.2457x + 13.66
R² = 0.6423
y = 0.001x² + 0.1932x + 3.4161
R² = 0.5372
Ghana
Kenya
0
10
20
30
40
50
60
70
80
90
100
0
50
100
150
200
250
300


SAVUL

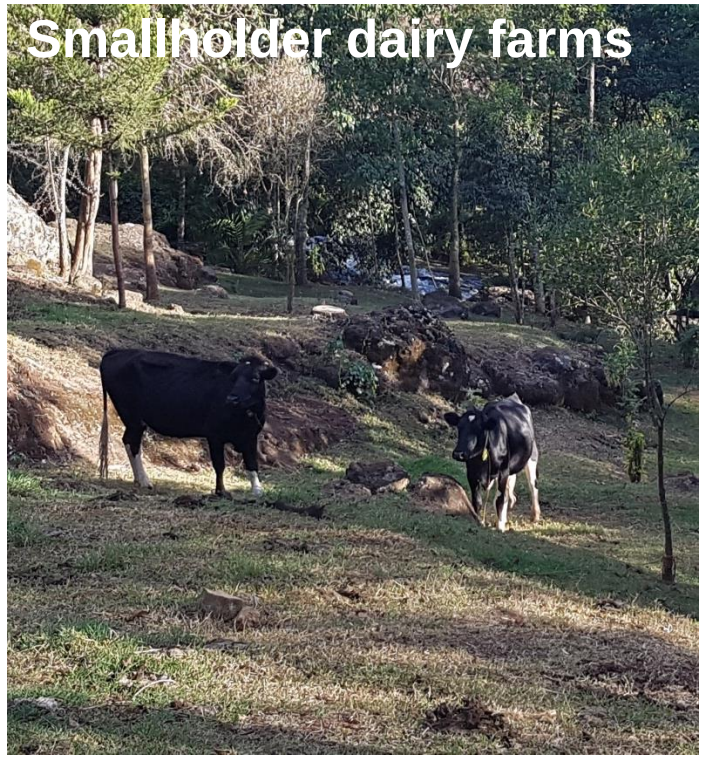
Flash Presentation

Name: Gabriel Yesuf

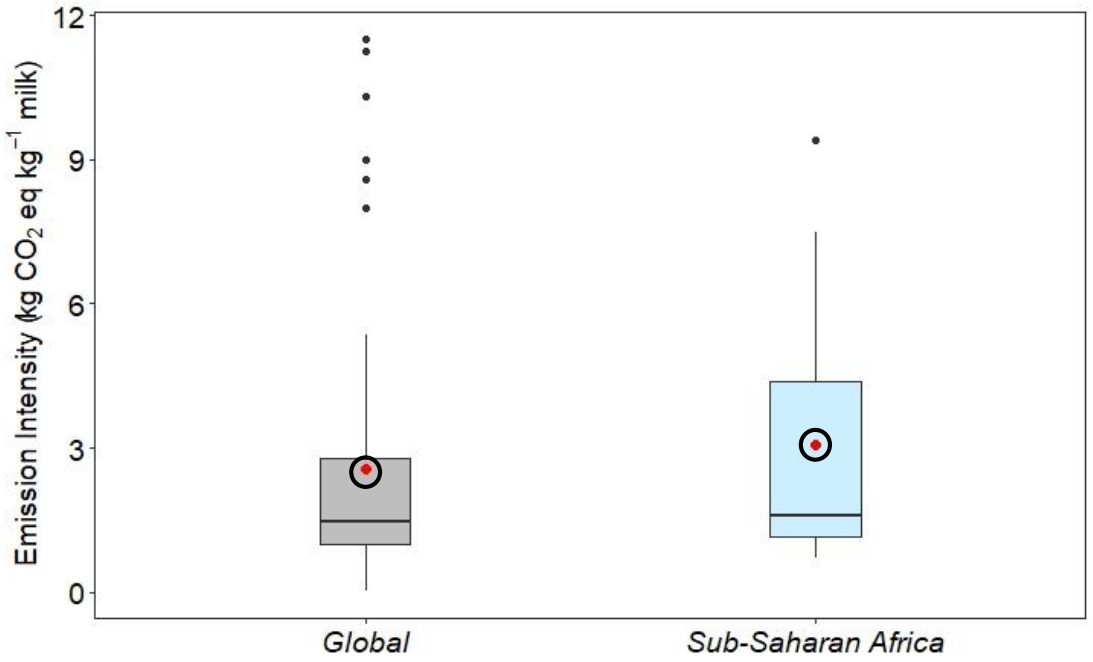
Affiliation: Lancaster Environment Centre, Lancaster University

Email address: g.yesuf@lancaster.ac.uk

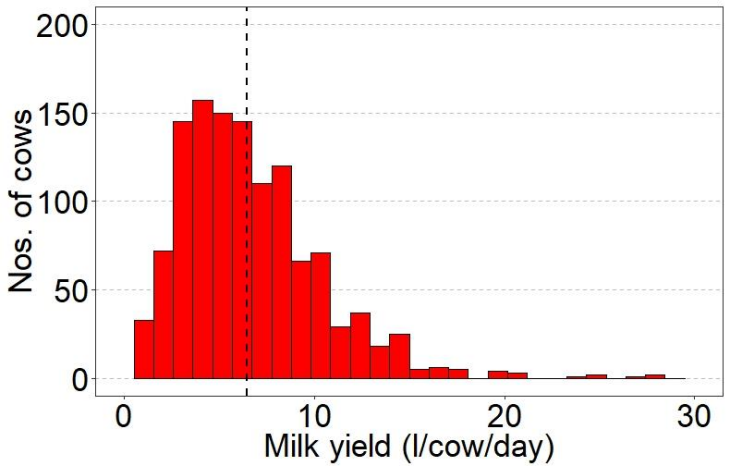
Background



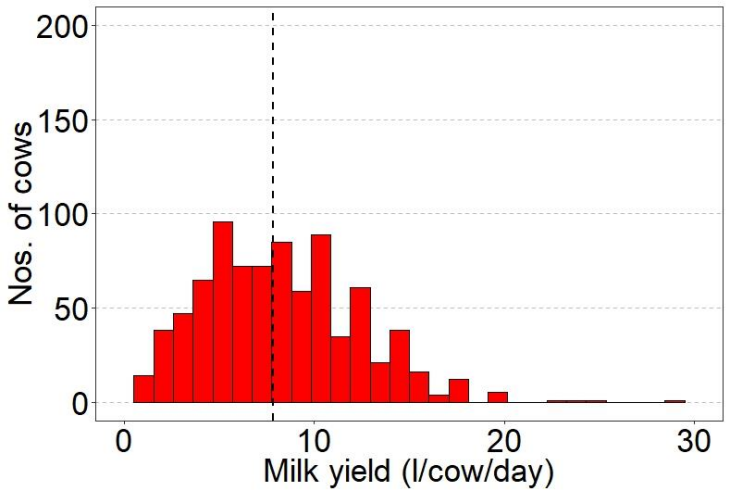
- Contribute ~ 80% of local milk production in Kenya and Tanzania.
- Often characterized as low input-low output systems



Kenya (Households: 1050)



Tanzania (Households: 1199)



Best practices and assessing stakeholders' priorities

Feed intensification strategies	Intensification levels: proportions are relative to the total DMI of the baseline	
	medium	high
Improved forage quality (**Fo**)	+25 % Napier grass -25 % pasture grass	+50 % Napier grass -50 % pasture grass
Feed conservation & increased grain content (**Fe**)	+25 % maize silage -25 % maize stover	+50 % maize silage -50 % maize stover
Dairy concentrates supplementation (**Co**)	+3 kg day^{-1} dairy meal	+6 kg day^{-1} dairy meal

Feed intensification scenarios: combinations of strategies at medium & high intensification

Fo+Fe
Fo+Fe
Fo+Co
Fo+Co
Fo+Fe+Co
Fo+Fe+Co
Fe+Co
Fe+Co

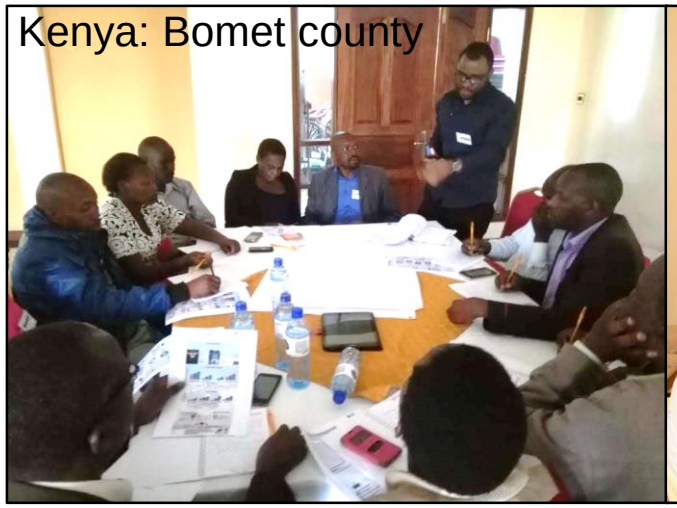
Brandt et al 2018: Environmental Research Letters

Scenario with highest potential for reduced greenhouse gas emissions and forest disturbance.

What are the perceptions of the relevant stakeholders in dairy sector?

Assessment workshops: Online survey and FGDs

Kenya: Bomet county



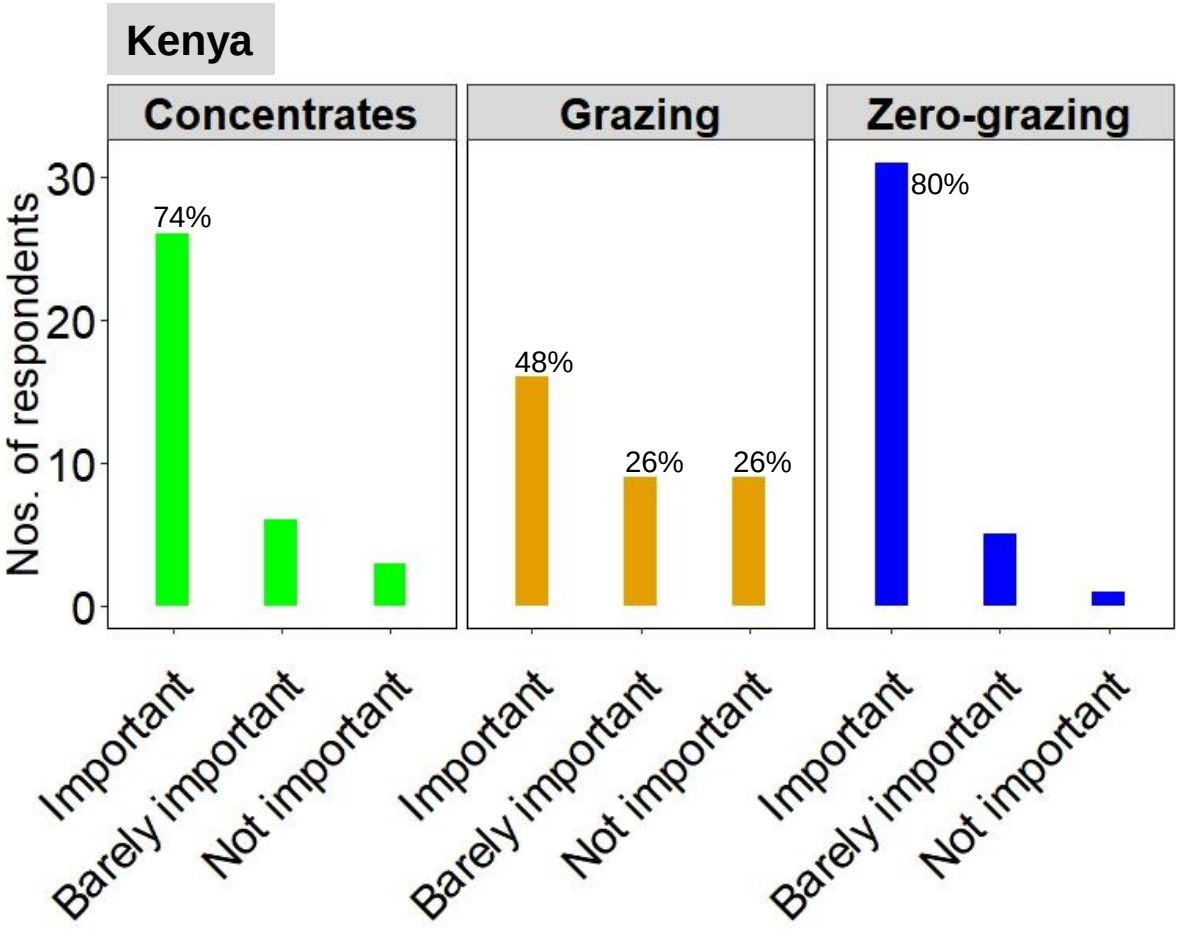
Nandi county

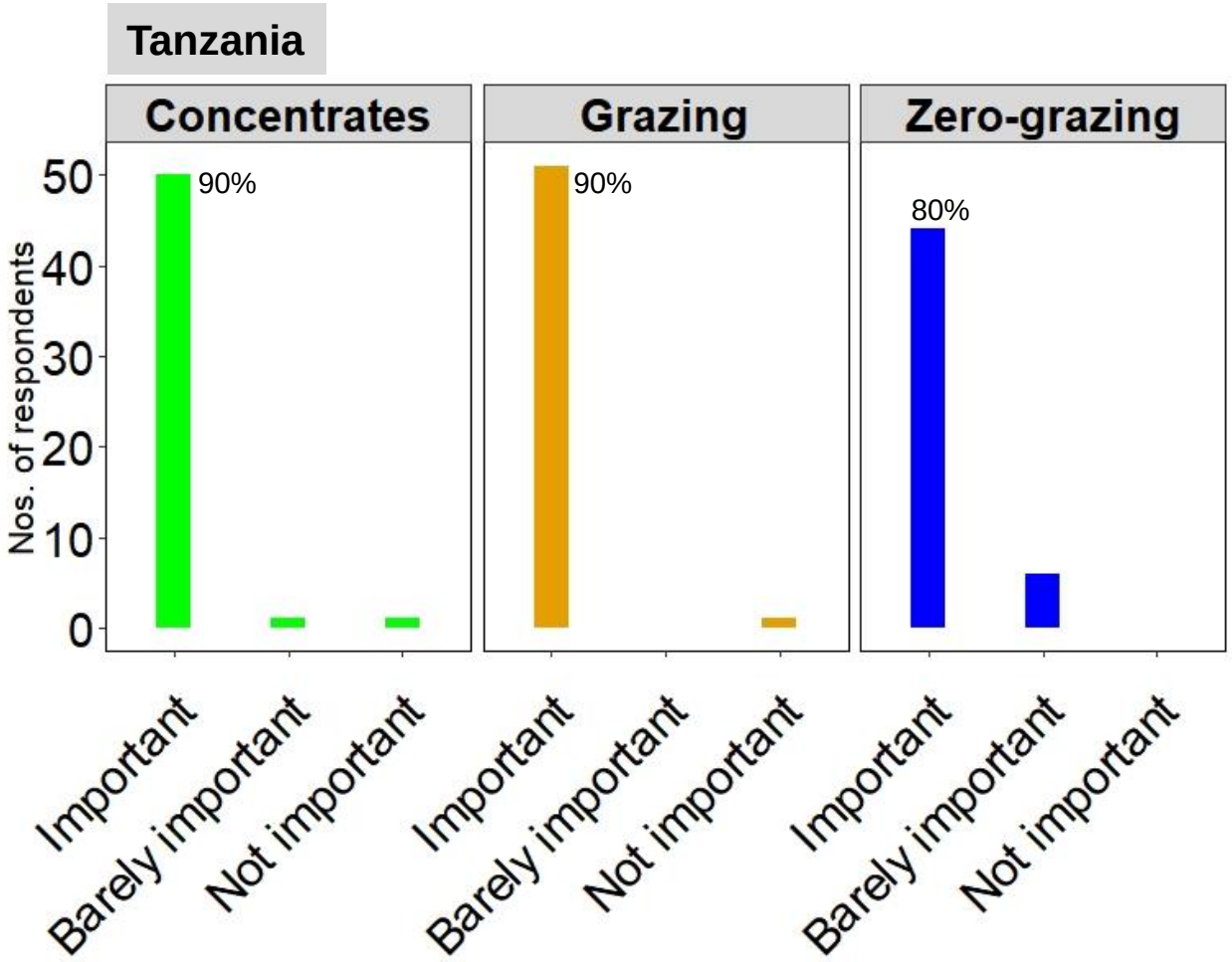
Tanzania

Njombe district

Rungwe district

Results





✓ Next step: Optimise livestock production model…

Trading water:

quantifying inter-state trade of cereals in India

Francesca Harris

London School of Hygiene & Tropical Medicine

Francesca.Harris@lshtm.ac.uk

@LSHTM_sustainhealth

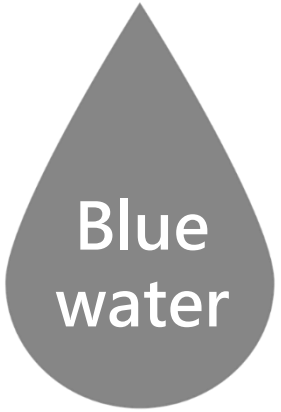
Method

- **Cereal supply and demand balances** for each state (Govt. production data, National Sample Survey) – centered on the years 2011-12

- **Assign water footprints** to cereal production; developed through the Cool Farm Tool Water (Kayatz et al., 2019)
- **Approximate direction of trade flows using a linear program model** (based on distance, state GDP and other measures)

→ **Calculate the flows of water** between states based on cereal trade

Volume of rainwater evaporated or incorporated into product



Volume of surface or groundwater evaporated or incorporated into product

Interstate trade of rice and wheat

(not including Public Distribution System)

Million Tonnes/year

Blue water – Km3/year

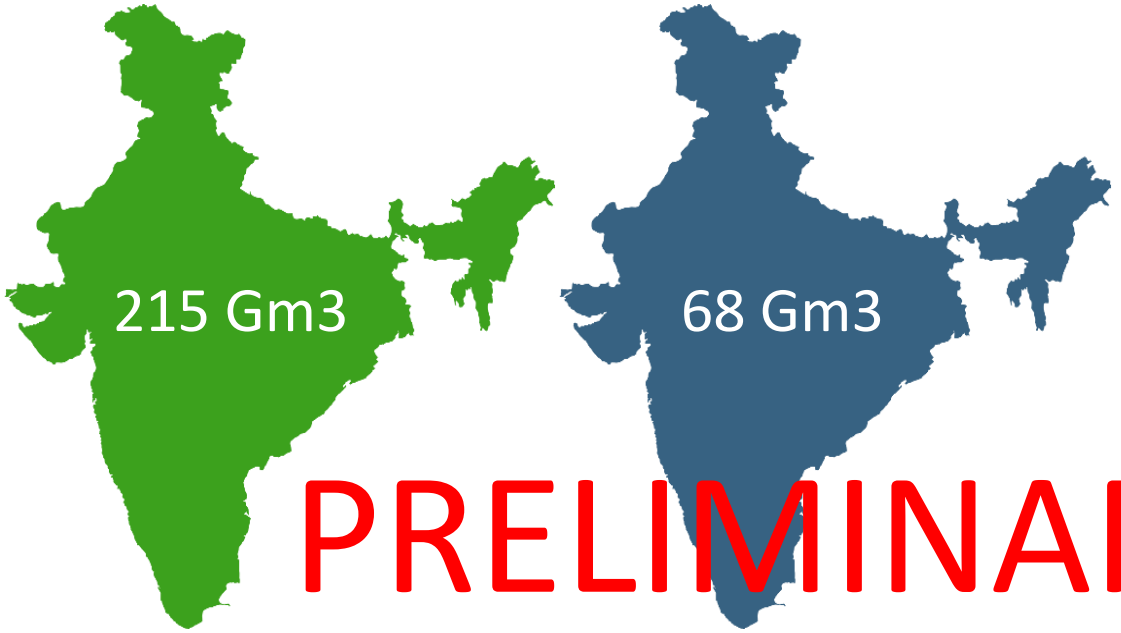
PRELIMINARY RESULTS

Regions

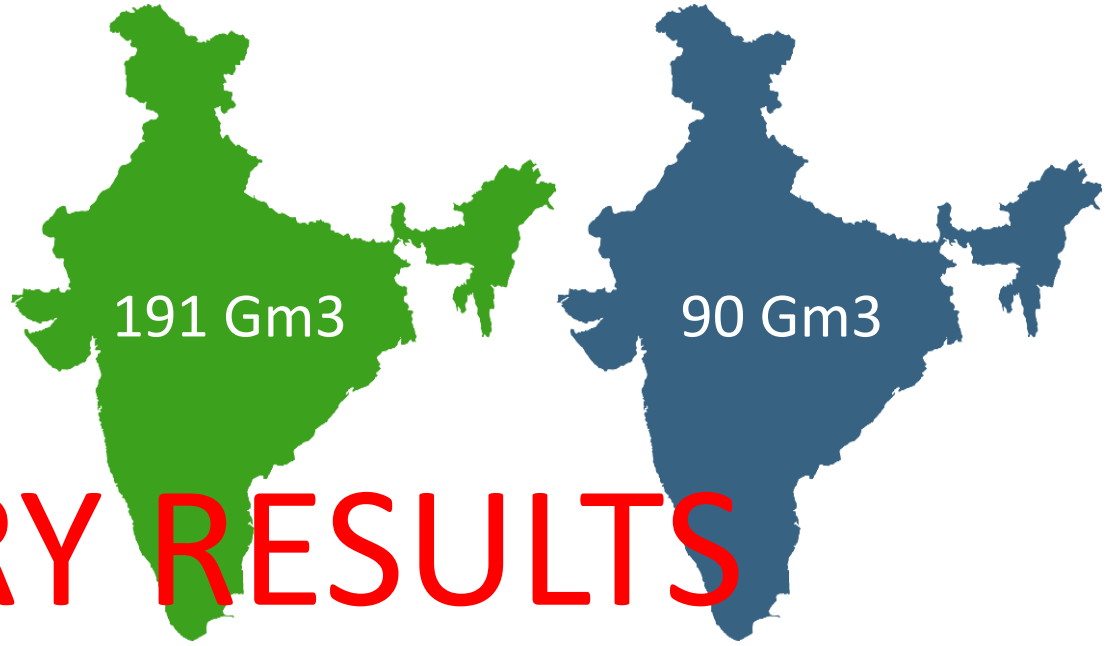
- North
- Northeast
- East
- South
- Western
- Central

Total cereal water footprint of India…

…. with interstate trade



… if states were self sufficient



PRELIMINARY RESULTS

Trade does not affect total water use, but results **25%** less blue water used

Addressing Food Waste with Bio-Packaging.

Name: Dr Julien Lepine

Affiliation: University of Cambridge, Centre for Sustainable Road Freight

Email address: jl974@cam.ac.uk, julien.lepine3@gmail.com

In developing countries, up to 50% of food is wasted during transport

Roads

Vehicles

Protective packaging


BOTNIA
BOTNIA


PAPER

In Fact, There is Enough Food to Feed Everyone in The World

30-40%

of all food is wasted

This can be used to help

Hunger in India

15+%	of Indian population is undernourished
~190 mn	Indians go hungry everyday
20+%	of Indian children under the age of 5 years are underweight
3,000	children deaths/day from poor diet related illness
1 out of 4	malnourished children lives in India

HUNGER SPOTS- Demand- Where food is needed

Orphanages

Government Hospitals

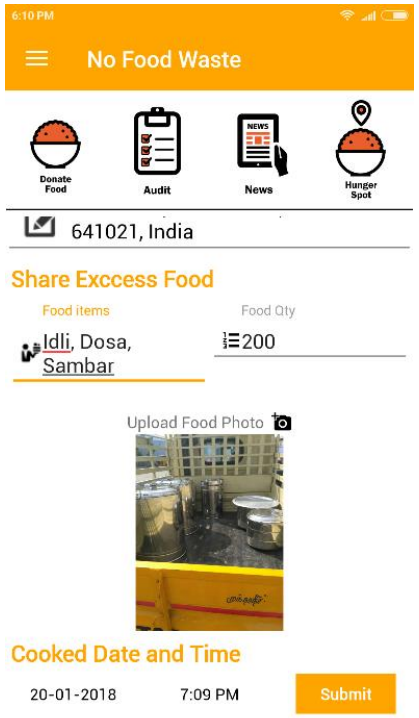
Dump yards/Rag Pickers

Slums

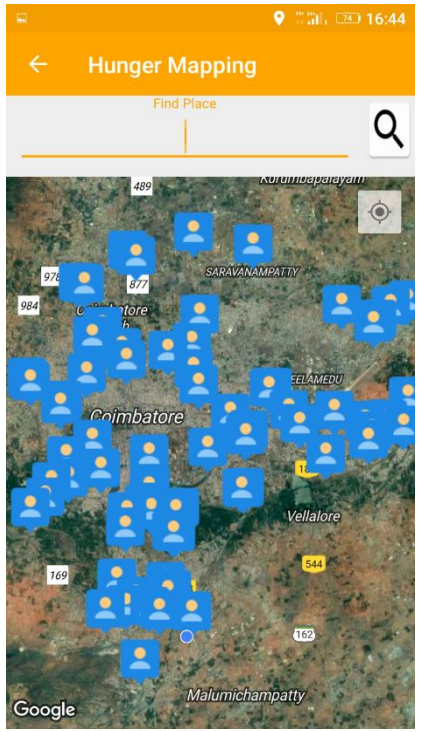
Homeless

BPL Areas

FOOD RECOVERY THRU APPLICATION



Donor shares food details



Food availability notification

Local chapter/ network accepts request

Organize pick up

Serves Needy

Collects Food

Reaches donor spot

SOCIAL IMPACT

- No. of cities covered – **12**
- No. of meals recovered – **2.5 Million**
- Economical Impact– **70 Million**
- Environmental Impact of saving about 745 tons of food waste from reaching landfills there by saving carbon emissions
- Hunger Mapping 650+ communities and locations served directly
- 3000 meals served daily by spending just Rs.1500 i.e. 20 GBP on Logistics

Feed People not landfills !

My Details

agp@nofoodwaste.org

Padmanaban Gopalan, Founder – No Food Waste India

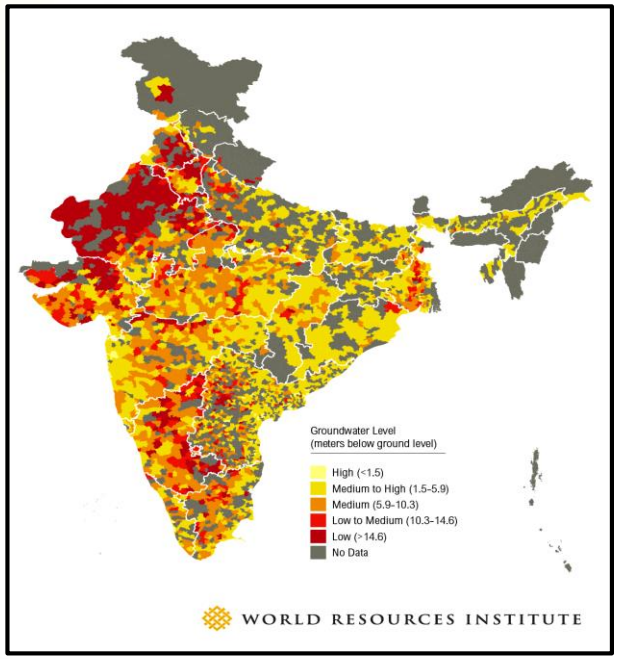
Linking resource productivity with environmental impact in India

Ruth Quinn

ruth.quinn@abdn.ac.uk

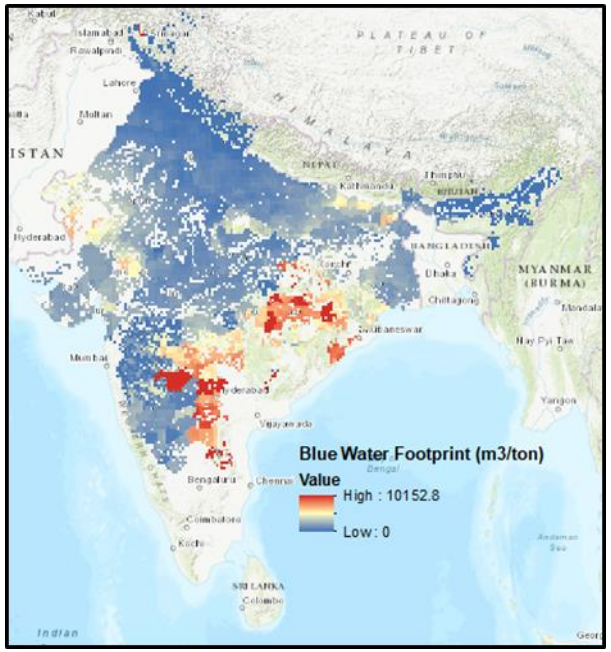
Based at UCL

The Problem



Depth to Groundwater

70% of Groundwater is used for Agriculture



Blue Waterfoot Print of Rabi Maize.

Green and Blue Water Footprints

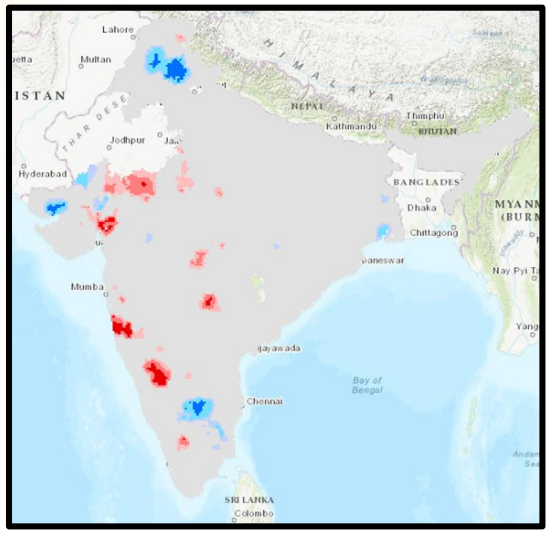
- Maize
- Sorghum
- Millet
- Rice
- Wheat

- 2005 - 2014

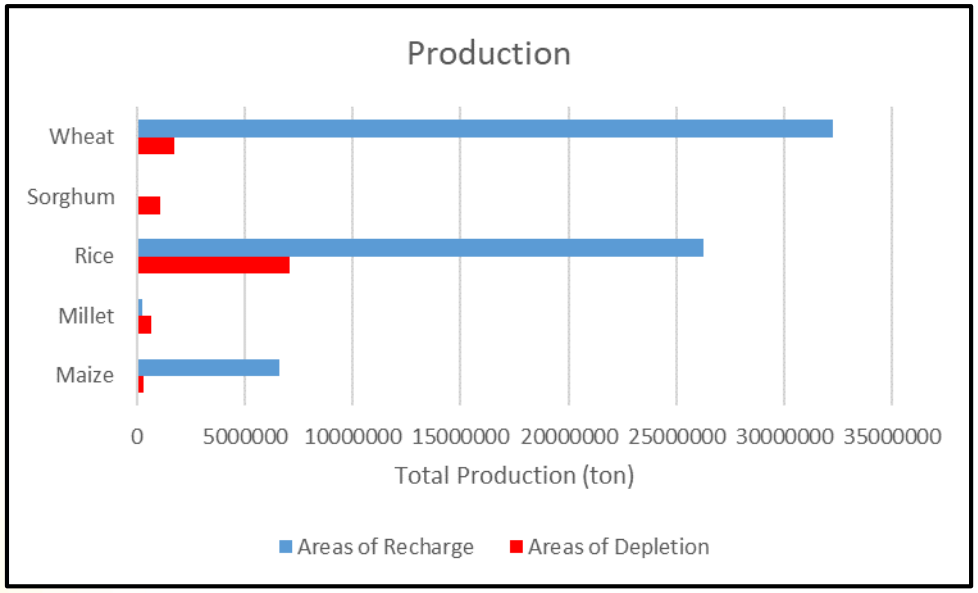
Aim: Determine the relationship between agricultural water footprints and groundwater levels throughout India

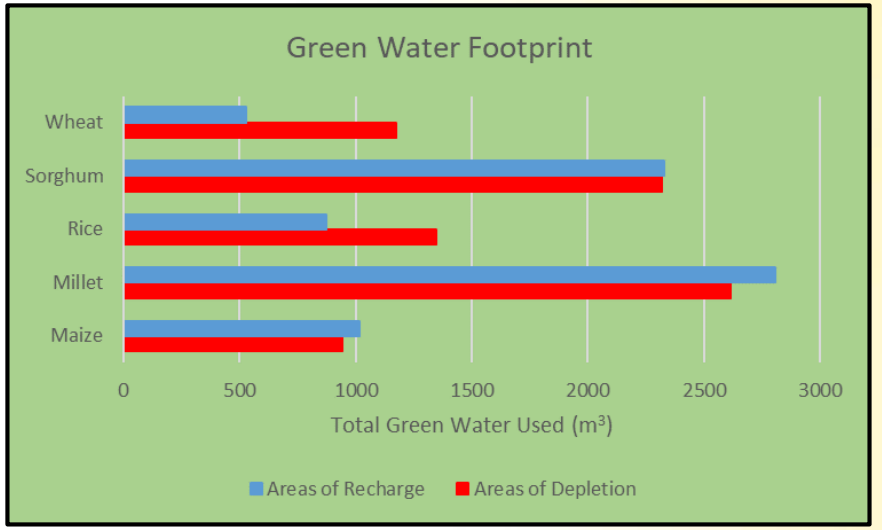
ruth.quinn@abdn.ac.uk

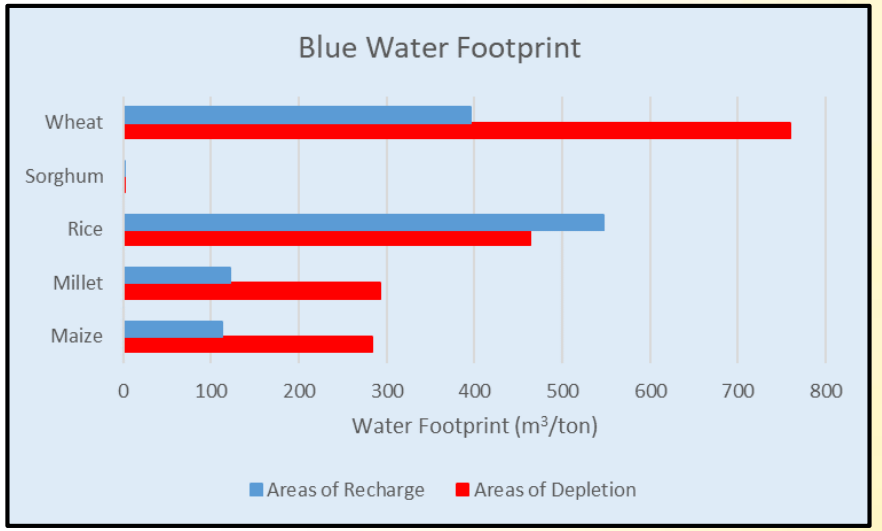
Preliminary Results



Hotspots of Groundwater Depletion and Recharge 2005 - 2014







ruth.quinn@abdn.ac.uk

Conclusion and Future Wor

- Green water footprint is similar in both groundwater depletion and recharge areas.

- Blue water footprint is higher in areas of groundwater depletion.

Future Work

Droughts

Flooding

Nutrition

Purchasing Patterns

ruth.quinn@abdn.ac.uk

Flash Presentation

Name: Ruth Quinn

Affiliation: University of Aberdeen (Based at UCL)

Email address: ruth.quinn@abdn.ac.uk

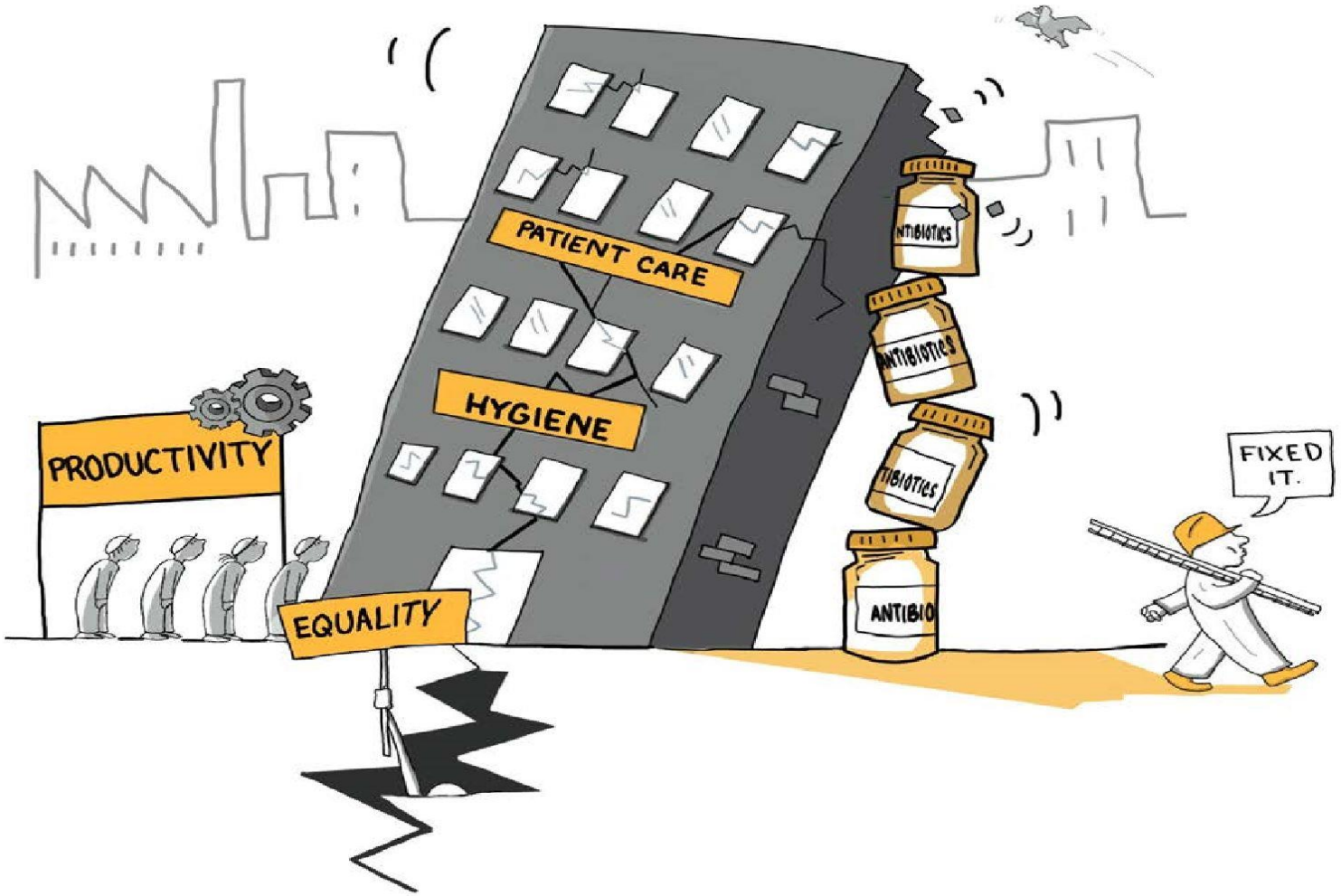
Flash Presentation: Genomic Analysis of Antimicrobial Resistance Salmonella *spp* from Nigeria

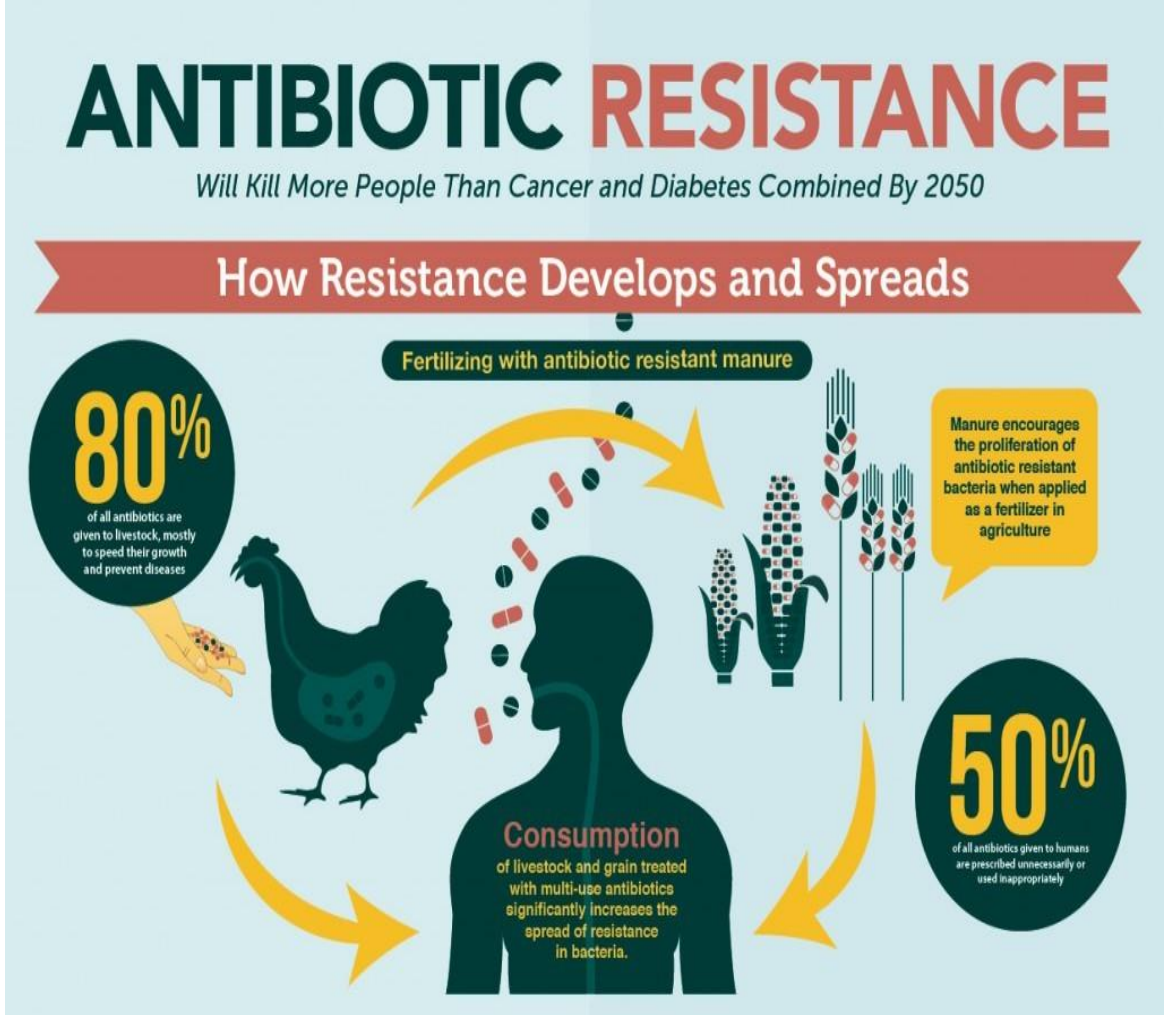
Name: Chioma Achi

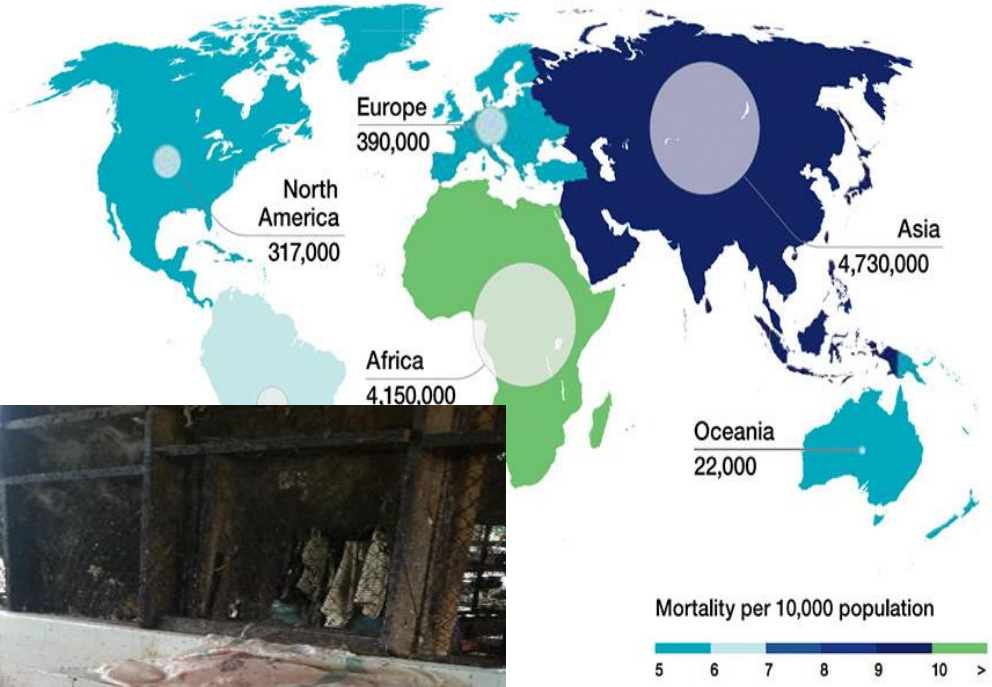
Affiliation: University of Cambridge

Email address: cra37@cam.ac.uk

Antibiotics as a “Quick Fix”



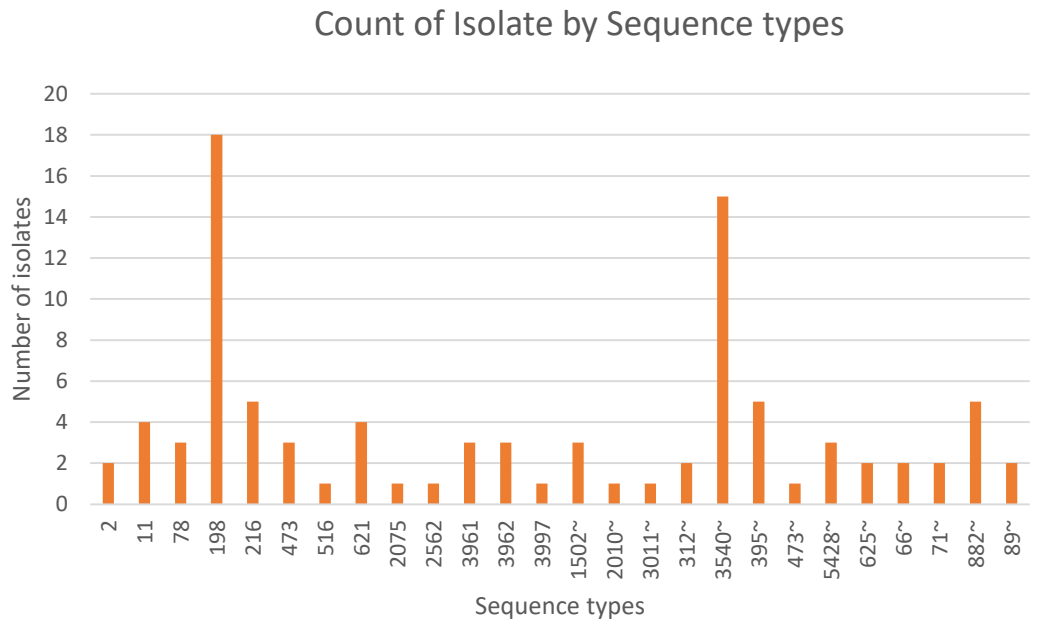




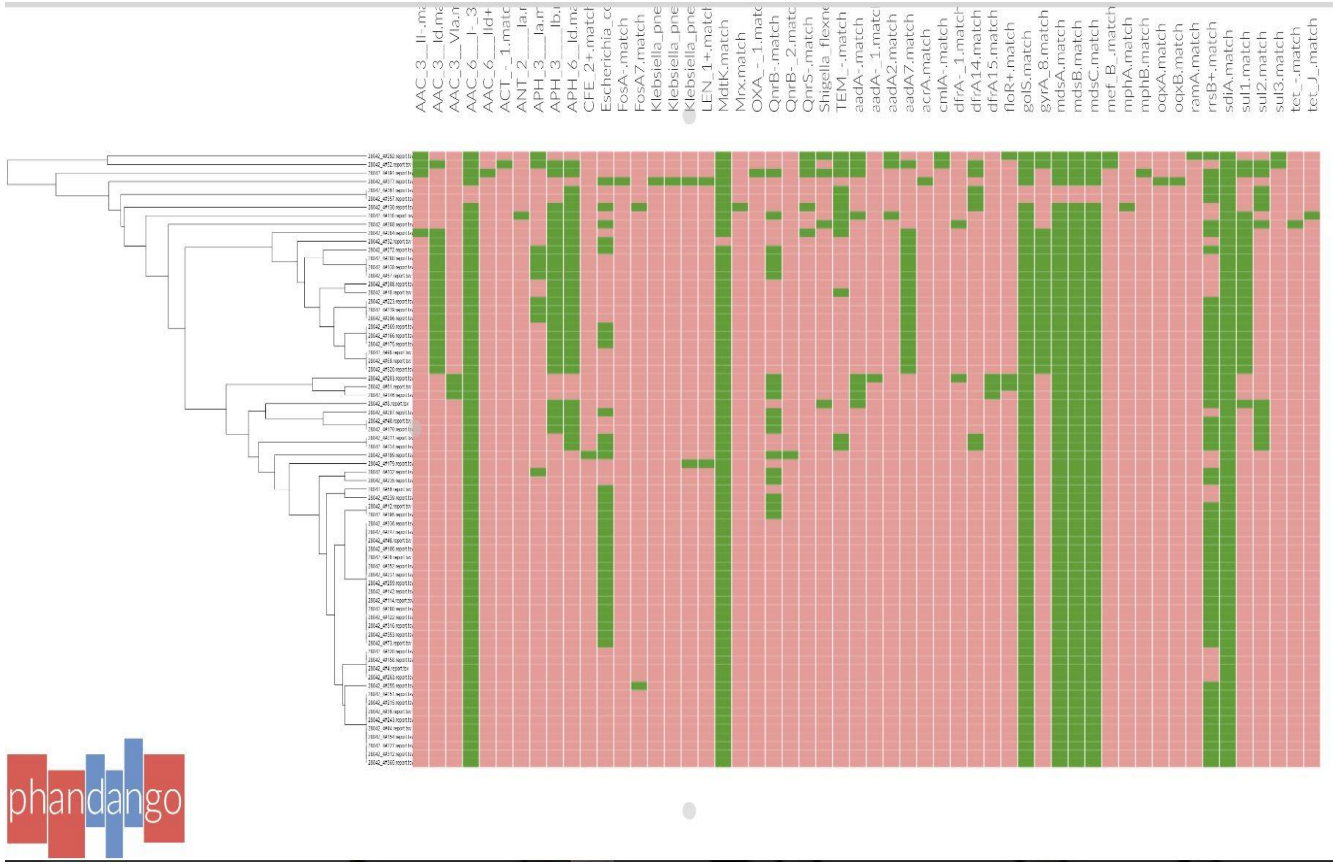
For example: Zoonotic *Salmonella* Species

Population Structure and AMR genes

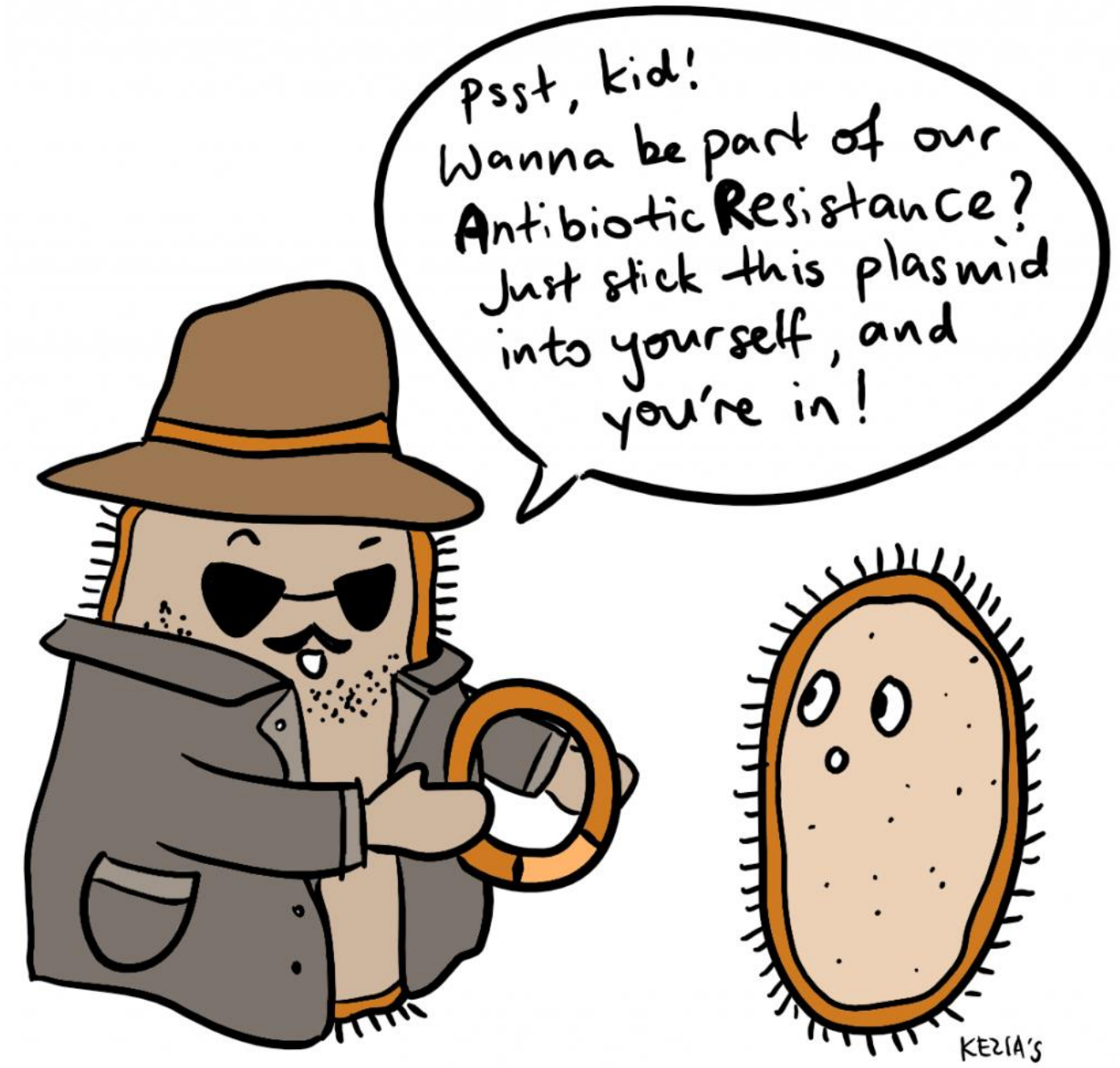
- 13 known Sequence Types (ST)
- 13 Novel STs



- Multi-drug Resistant Salmonella spp with diverse resistant genes



Thank you for listening!



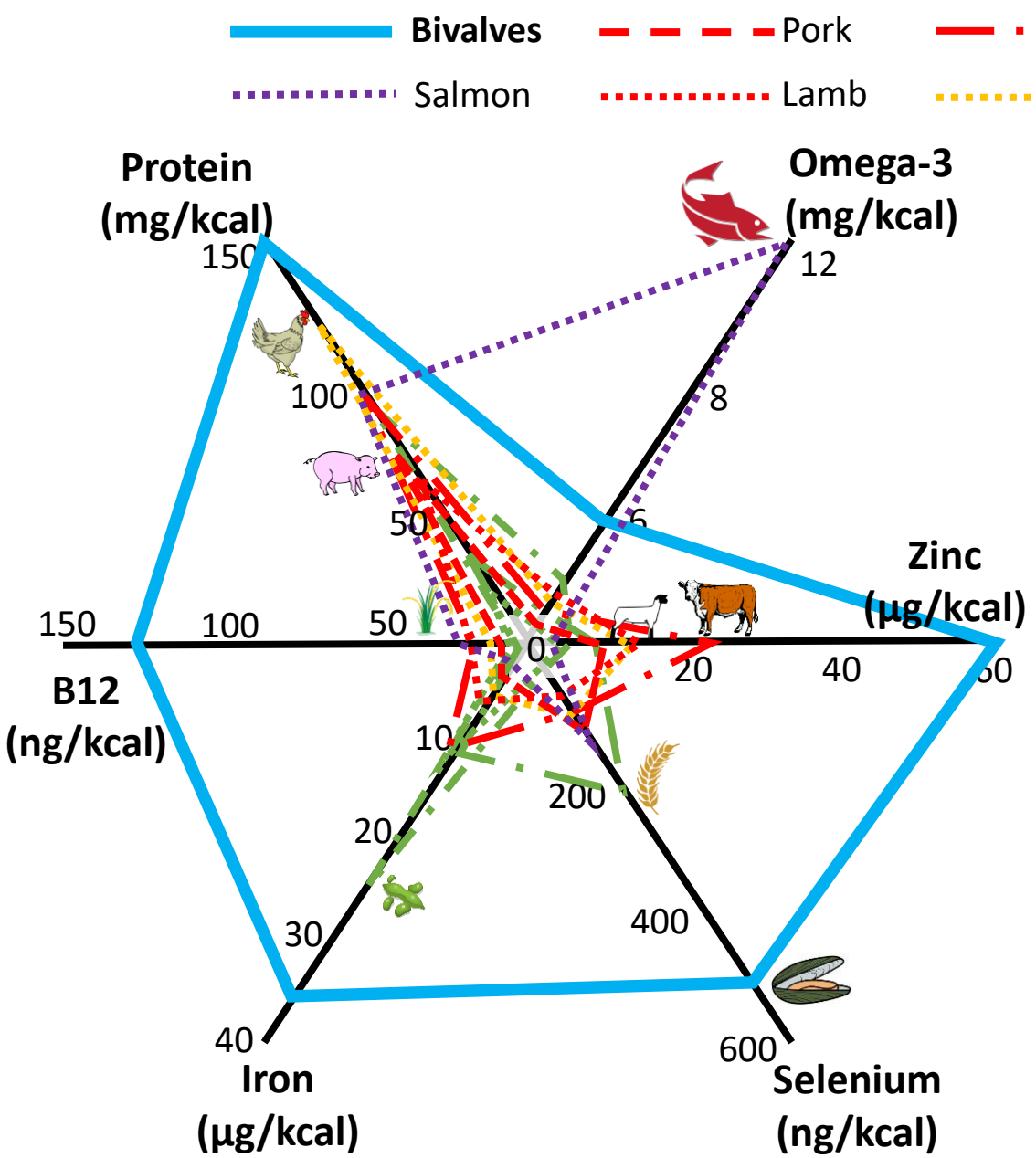
Flash Presentation

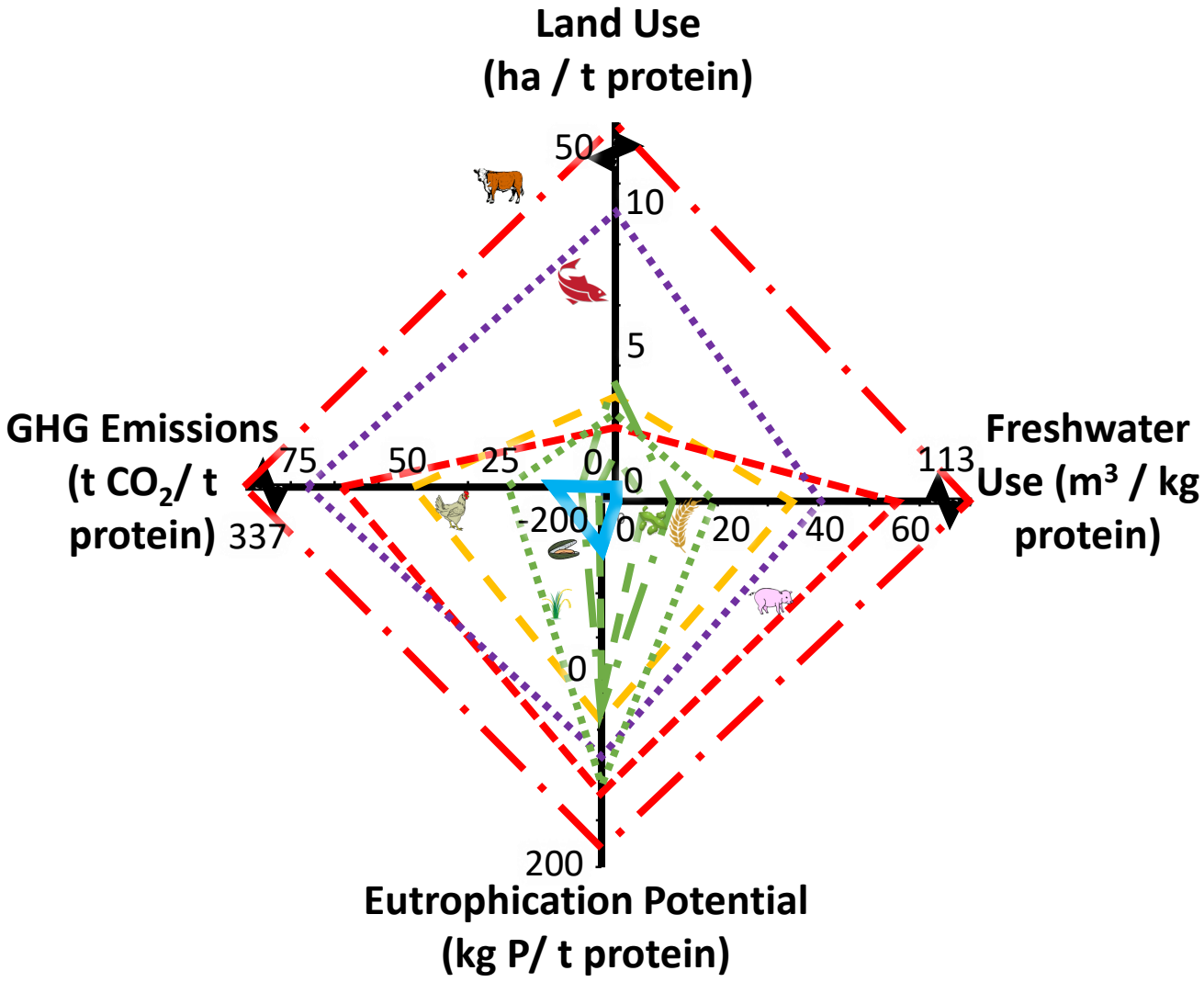
Name: David Willer

Affiliation: Department of Zoology, University of Cambridge

Email address: dw460@cam.ac.uk

Bivalve shellfish are nutrient rich and sustainable compared to alternatives





The global potential for increased bivalve production - India and Africa

China

A = 4800 km^2

<u>Today:</u>

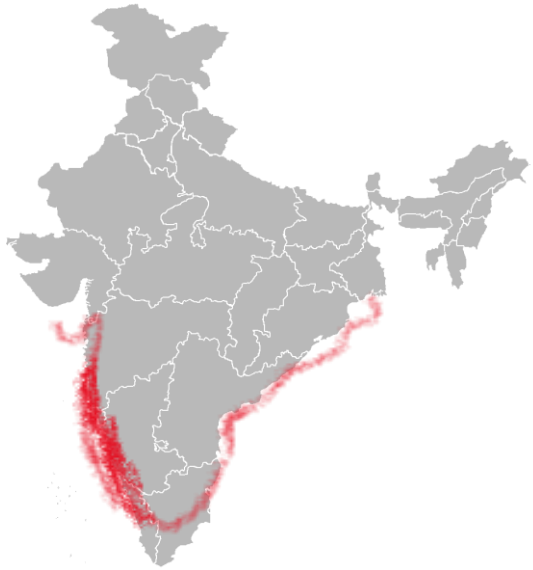
- 12.5 million tonnes bivalves / year
- 90% global production

India

A = 52,000 km^2

<u>Today:</u>

- 0.0126 million tonnes bivalves / year



<u>Potential:</u>

- 13 million tonnes bivalves / year
- 390,000 tonnes protein / year
- **Feed 19 million people** with bivalves as sole protein source

Africa

A = 340,000 km^2

<u>Today:</u>

- 0.0025 million tonnes bivalves / year

<u>Potential:</u>

- 88 million tonnes bivalves / year
- 2.65 million tonnes protein / year
- **Feed 130 million people** with bivalves as sole protein source

A = Area of coast with high bivalve productivity potential

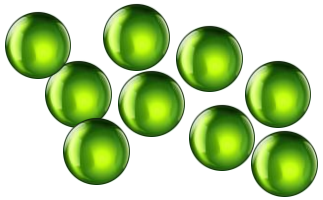
Potential = Potential production if use **just 10%** of available productive coast

Improvements in the production process can realise global potential of bivalves

Stimulate production

Microencapsulated Diet

- Cost effective
- Contains *Schizochytrium* algae grown on food waste



Stimulate demand

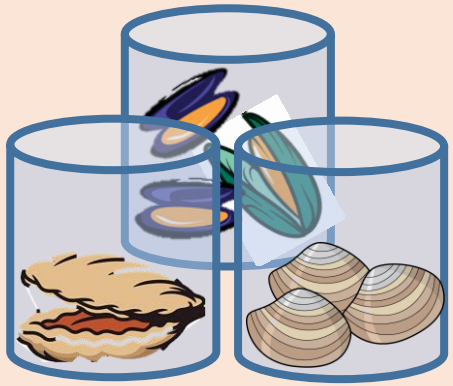
Increase juvenile yield in hatcheries

- Faster juvenile growth
- Greater juvenile survivorship
- Improved broodstock quality

Enhance quality at point of harvest

- Additional nutrients
- Flavour enhancement

Hatchery

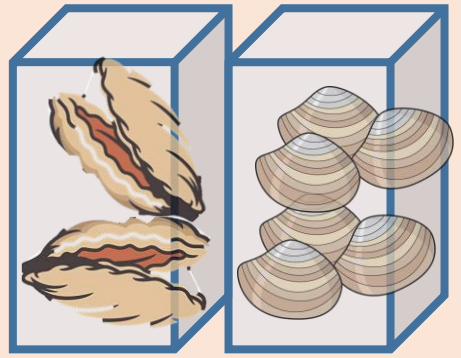


Juvenile rearing ~6 months

Sea: reefs / cages / ropes

Grow to adult size 1-2 years

Harvest



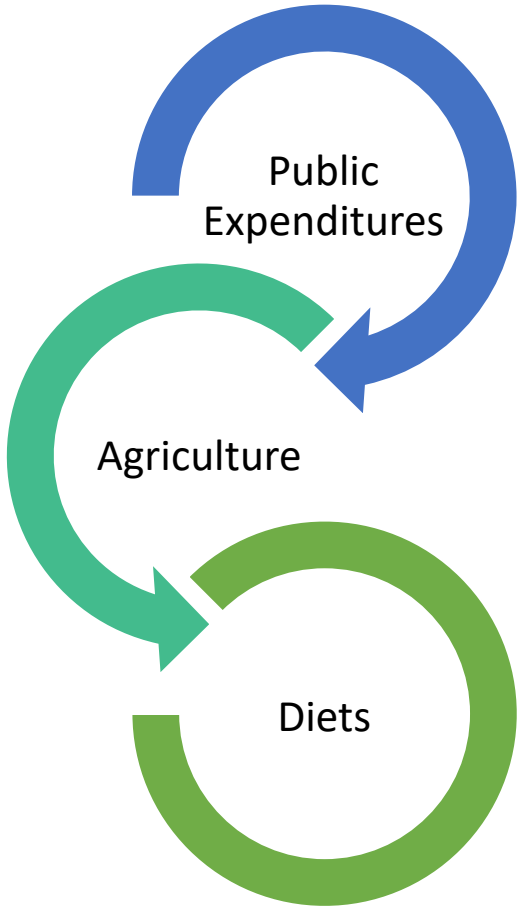
Held in filtration tanks 2 days

Flash Presentation

Name: Dr. Mehroosh Tak

Affiliation: University of Edinburgh

Email address: mehroosh@gmail.com

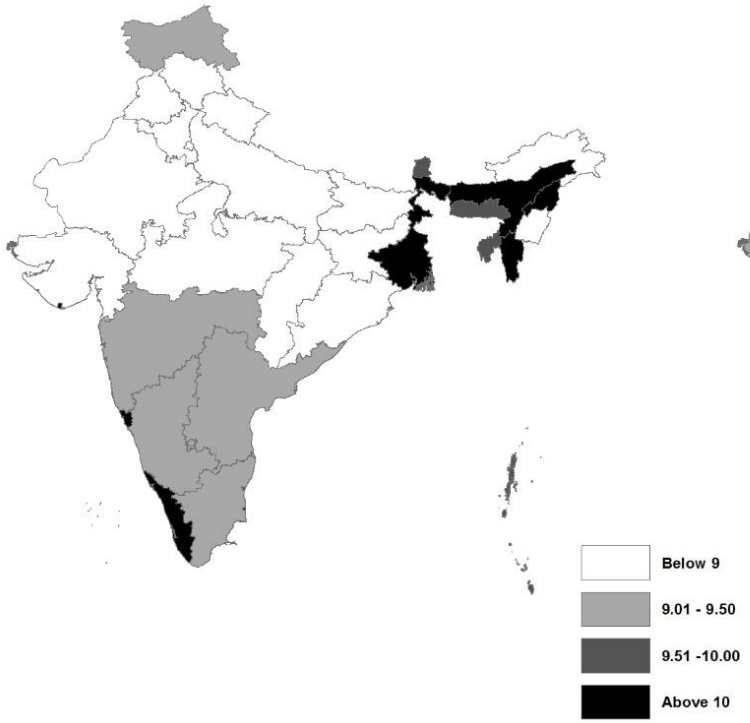


How nutrition-sensitive are the public expenditures in agriculture and rural infrastructures?

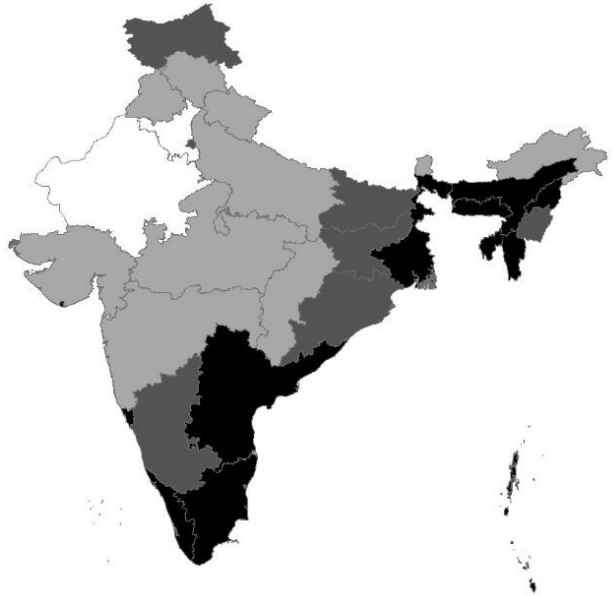
What is the association between public expenditures and rural diets in India?

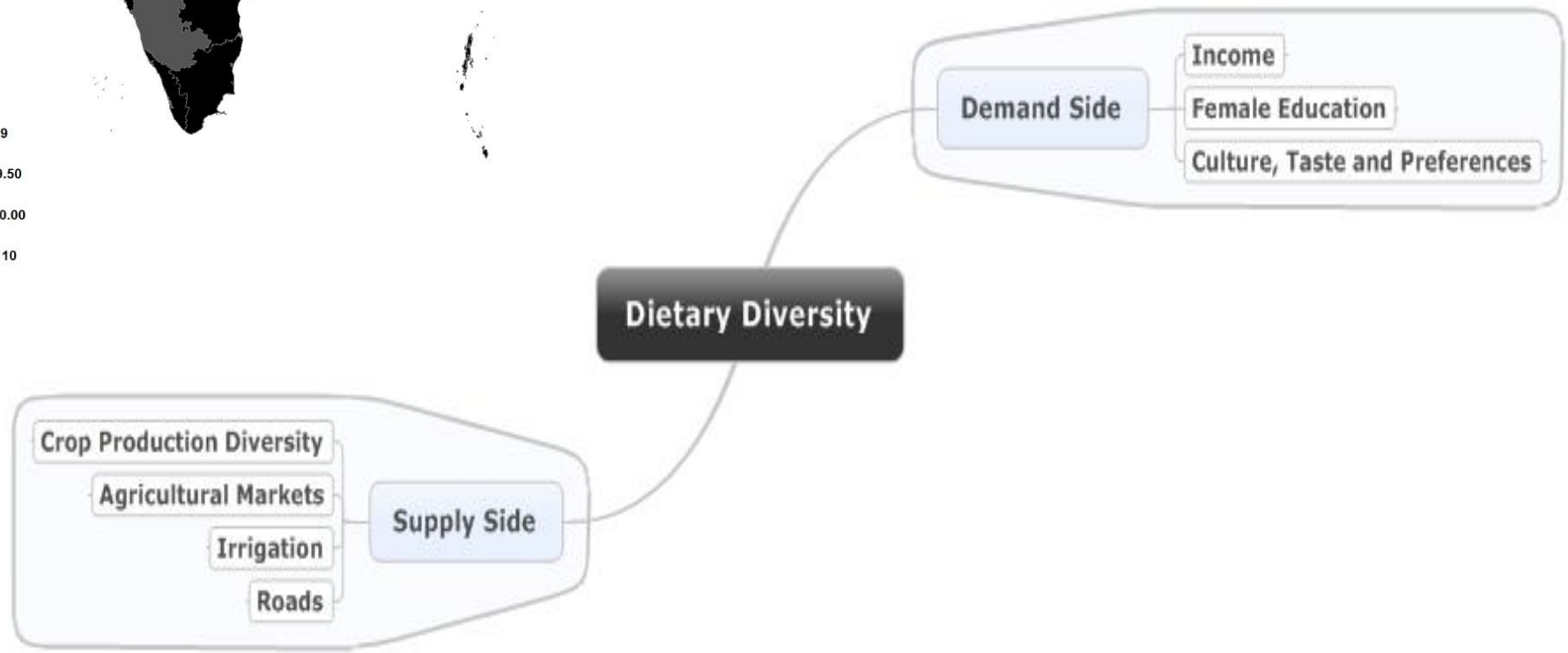
Dietary Diversity in Rural India

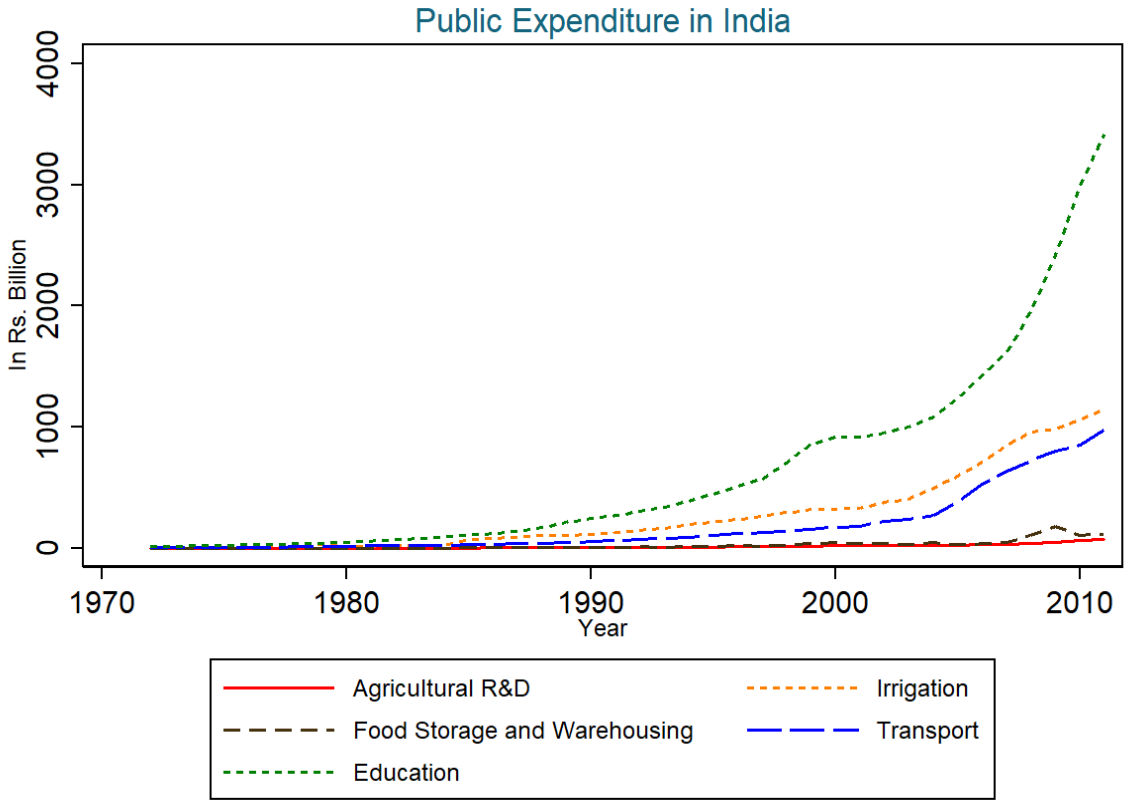
1993-94



2011-12







Effect of Additional Government Expenditures on Dietary Diversity Score

	Elasticities		Marginal Impact of Spending Rs 100 Per Capita at 2011 Prices	
Public Expenditure Categories	Coef.	Rank	DDS	Rank
Agricultural R&D	0.002**	4	0.032**	1
Food Storage and Warehousing	0.002***	3	0.019***	2
Irrigation	-0.010***	-1	-0.010***	-1
Transport	0.009***	2	0.010***	3
Education	0.010**	1	0.003**	4

Note: 1. Statistical significance denoted at * p<0.05, ** p<0.01, *** p<0.001

Flash Presentation

Name: Tony Carr

Affiliation: University College London, Institute for Sustainable Resources

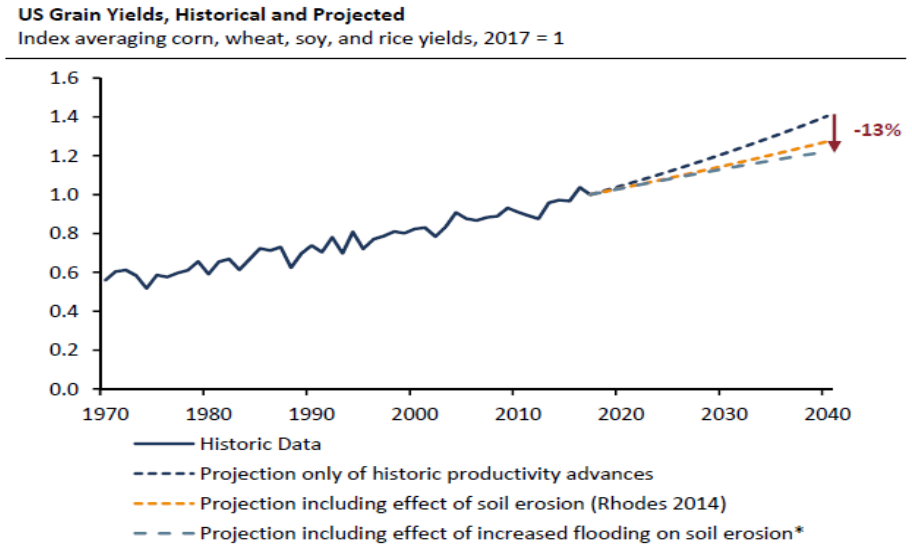
Email address: tony.carr.16@ucl.ac.uk

Global loss of soil and decline in agricultural productivity due to water erosion

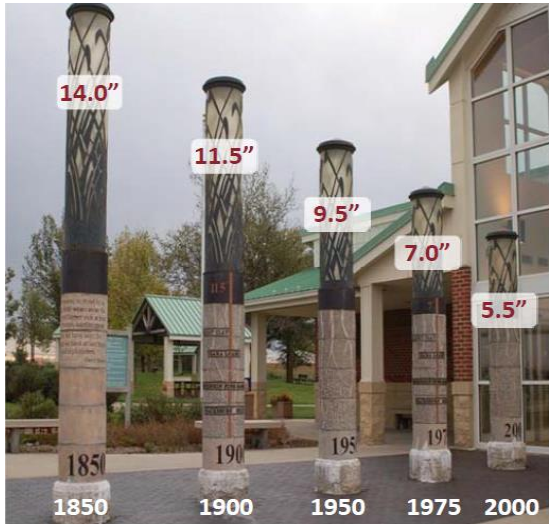
Soil loss due to water erosion (Source: *Africa Soil Atlas)*

Sediment Drainage from Betsiboka River, Madagascar. (Source: NASA)

Gully formation in the Debre Mewi watershed, Ethiopia. (Source: Zegeye 2009)



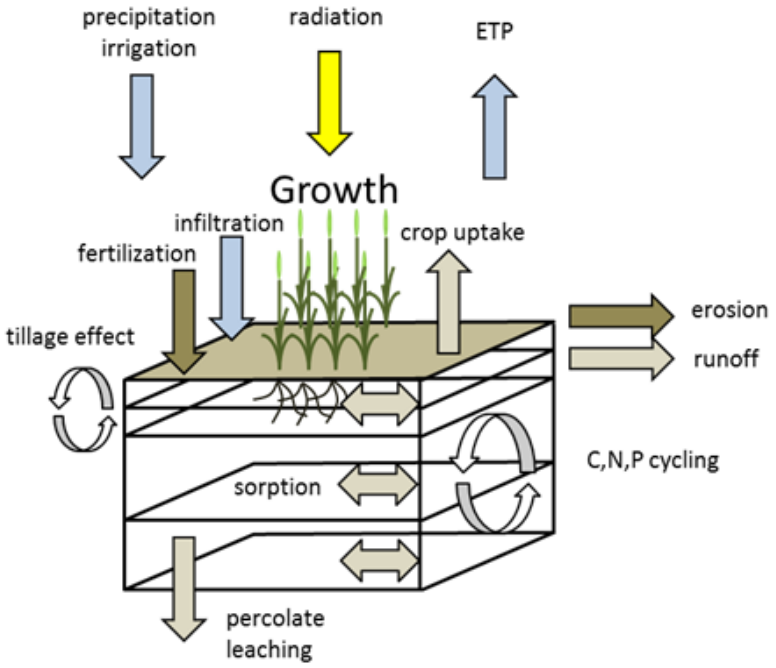
Source: Grantham 2018



Soil depth in Iowa has halved since intensive cultivation began. (Source: Grantham 2018)

Research Methods

Environmental Policy-Integrated Climate Model (EPIC)



basic components of EPIC model to simulate the growth and development of crops (Source: Sharpley & Williams 1990).

Global Input Data:

- Daily weather
- Soil properties
- Topography
- Nitrogen and Phosphorus Fertilizer
- Crop Calendar
- Field management scenarios

Global Resolution:

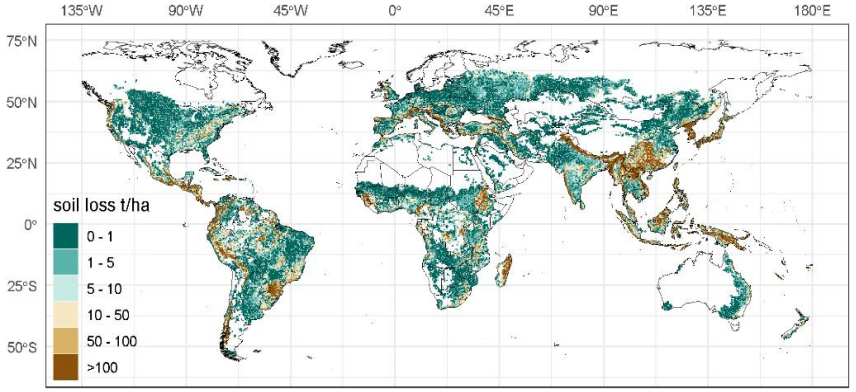
- 5’ to 30’ (~10 – 50 km at equator)

Evaluation Data:

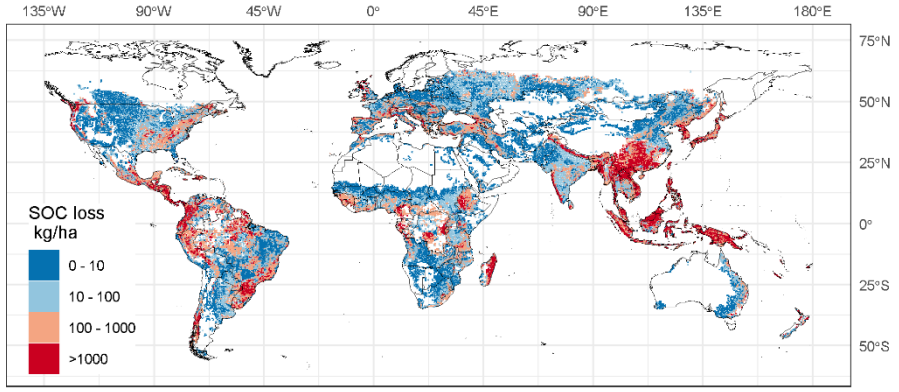
- National crop yields (source: FAO)
- Reported erosion rates (n=563)

Results and Outlook

Water Erosion



Loss of soil organic carbon



Regions most affected by Maize yield decline due to water erosion*:

Rank	Name	Mean	Median
1	Melanesia	- 7.9%	- 5.7%
2	Western Africa	- 5.5%	- 2.9%
3	Eastern Africa	- 5.2%	- 2.8%
4	Caribbean	- 4.6%	- 2.9%
5	SE Asia	- 4.5%	- 2.0%

*Locations with slopes steeper than 16% excluded

Reduction in Maize Yields due to water erosion