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
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
Best practices and assessing stakeholders’ priorities

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

Tanzania

Assessment workshops: Online survey and FGDs

Kenya: Bomet county

Nandi county

Njombe district

Rungwe district

Brandt et al 2018: Environmental Research Letters

What are the perceptions of the relevant stakeholders in dairy sector?
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
Interstate trade of rice and wheat
(not including Public Distribution System)

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

PRELIMINARY RESULTS
Total cereal water footprint of India...

.... with interstate trade

215 Gm3

68 Gm3

.... if states were self sufficient

191 Gm3

90 Gm3

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

30-40% of all food is wasted

Hunger in India

- 15+% of Indian population is undernourished
- ~190mn 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
- Reaches donor spot
- Serves Needy
- Collects Food
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

70% of Groundwater is used for Agriculture

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

Green and Blue Water Footprints
- Maize
- Sorghum
- Millet
- Rice
- Wheat

- 2005 - 2014
Preliminary Results

Hotspots of Groundwater Depletion and Recharge 2005 - 2014

Aim  Results  Conclusions and Future Work

Green Water Footprint

Blue Water Footprint

ruth.quinn@abdn.ac.uk
Conclusion and Future Work

• 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
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”
ANTIBIOTIC RESISTANCE
Will Kill More People Than Cancer and Diabetes Combined By 2050

How Resistance Develops and Spreads

- Fertilizing with antibiotic resistant manure

80% of antibiotics are given to livestock, mostly to speed their growth and prevent diseases

- Consumption of livestock and grain treated with multi-use antibiotics significantly increases the spread of resistance in bacteria

50%

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

Count of Isolate by Sequence types
Thank you for listening!

Psst, kid! Wanna be part of our Antibiotic Resistance? Just stick this plasmid into yourself, and you’re in!
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$^2$
- Today:
  - 12.5 million tonnes bivalves / year
  - 90% global production

**India**
- A = 52,000 km$^2$
- Today:
  - 0.0126 million tonnes bivalves / year

**Africa**
- A = 340,000 km$^2$
- Today:
  - 0.0025 million tonnes bivalves / year

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

- 88 million tonnes bivalves / year
- 2.65 million tonnes protein / year
- **Feed 130 million people** with bivalves as sole protein source
Improvements in the production process can realise global potential of bivalves

- Faster juvenile growth
- Greater juvenile survivorship
- Improved broodstock quality
- Additional nutrients
- Flavour enhancement

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

Stimulate production

Increase juvenile yield in hatcheries

Enhance quality at point of harvest
- Additional nutrients
- Flavour enhancement

Stimulate demand

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?
Public Expenditure in India

Effect of Additional Government Expenditures on Dietary Diversity Score

<table>
<thead>
<tr>
<th>Public Expenditure Categories</th>
<th>Coef.</th>
<th>Rank</th>
<th>DDS</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural R&amp;D</td>
<td>0.002**</td>
<td>4</td>
<td>0.032**</td>
<td>1</td>
</tr>
<tr>
<td>Food Storage and Warehousing</td>
<td>0.002***</td>
<td>3</td>
<td>0.019***</td>
<td>2</td>
</tr>
<tr>
<td>Irrigation</td>
<td>-0.010***</td>
<td>-1</td>
<td>-0.010***</td>
<td>-1</td>
</tr>
<tr>
<td>Transport</td>
<td>0.009***</td>
<td>2</td>
<td>0.010***</td>
<td>3</td>
</tr>
<tr>
<td>Education</td>
<td>0.010**</td>
<td>1</td>
<td>0.003**</td>
<td>4</td>
</tr>
</tbody>
</table>

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)

US Grain Yields, Historical and Projected
Index averaging corn, wheat, soy, and rice yields, 2017 = 1

Source: Grantham 2018

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

Environmental Policy-Integrated Climate Model (EPIC)

- precipitation
- irrigation
- radiation
- ETP
- infiltration
- crop uptake
- erosion
- runoff
- C,N,P cycling
- percolate
- leaching

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

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

<table>
<thead>
<tr>
<th>Rank</th>
<th>Name</th>
<th>Mean</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Melanesia</td>
<td>- 7.9%</td>
<td>- 5.7%</td>
</tr>
<tr>
<td>2</td>
<td>Western Africa</td>
<td>- 5.5%</td>
<td>- 2.9%</td>
</tr>
<tr>
<td>3</td>
<td>Eastern Africa</td>
<td>- 5.2%</td>
<td>- 2.8%</td>
</tr>
<tr>
<td>4</td>
<td>Caribbean</td>
<td>- 4.6%</td>
<td>- 2.9%</td>
</tr>
<tr>
<td>5</td>
<td>SE Asia</td>
<td>- 4.5%</td>
<td>- 2.0%</td>
</tr>
</tbody>
</table>

*Locations with slopes steeper than 16% excluded