

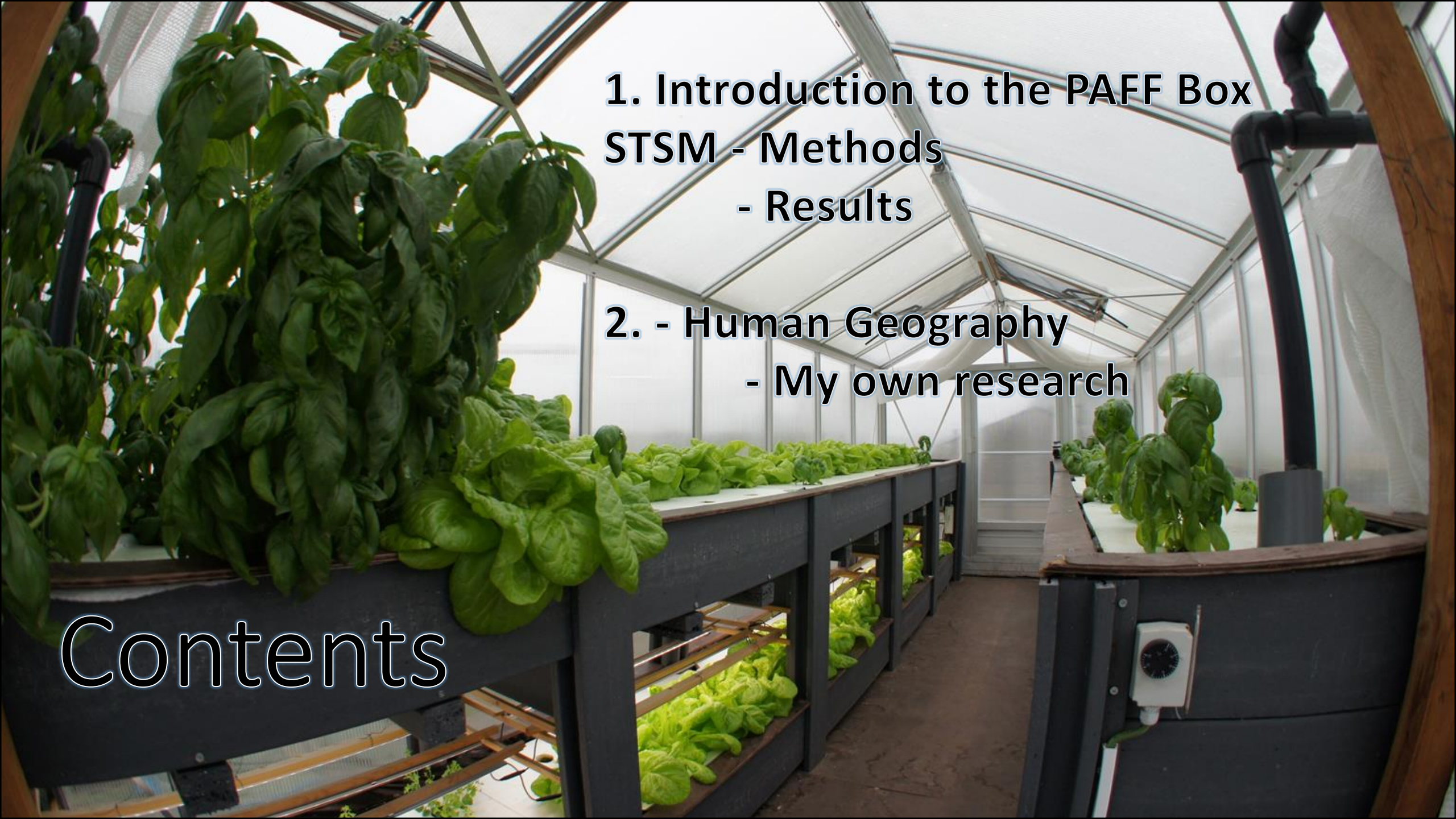
Plant production capacity and nutrient
mass balance in the PAFF Box, an urban
aquaponics module: Preliminary findings
(And its place in human geography research.)

James Gott

Geography and Environment
University of Southampton, UK

Prof. Haïssam Jijakli
Boris Delaïde

Gembloux Agro Bio Tech
University of Liège, Belgium

A hydroponic greenhouse with rows of basil plants in black troughs. The plants are lush green and growing in a white nutrient solution. The greenhouse has a white plastic covering and a metal frame. The floor is made of concrete. The lighting is bright, suggesting a sunny day.

**1. Introduction to the PAFF Box
STSM - Methods
- Results**

**2. - Human Geography
- My own research**

Contents

The PAFF Box

System temperature aim: 25°C

Fish:

Nile Tilapia (*Oreochromis niloticus*)

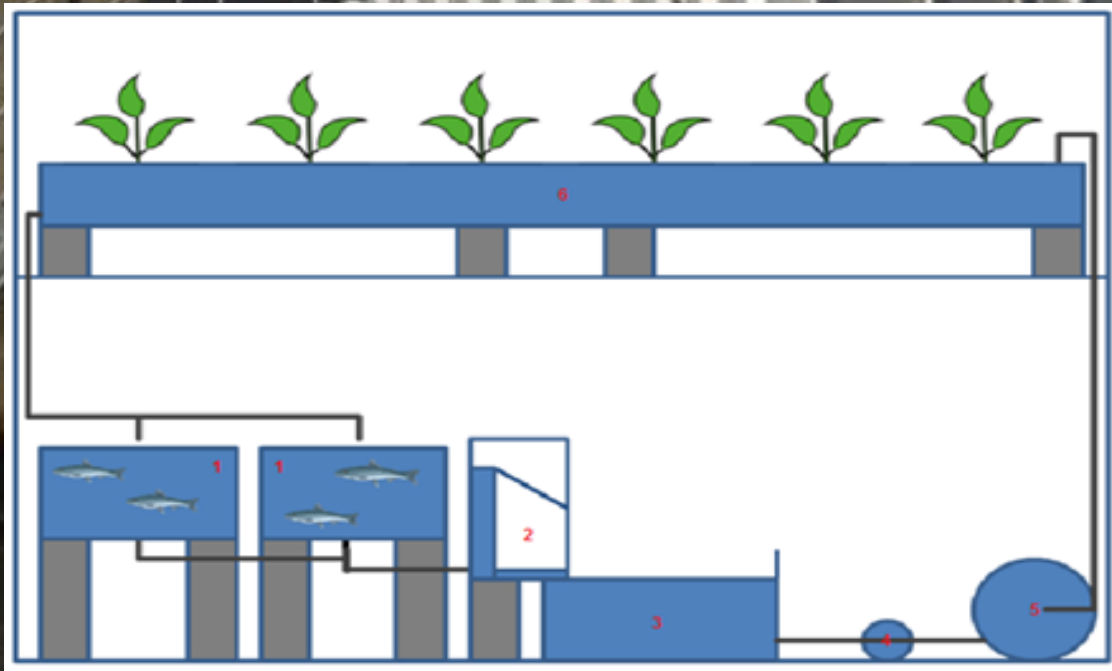
Plants:

Basil (*Ocimum basilicum* var. 'Grand Vert')

Lettuce (*Lactuca sativa* var. 'GBP')

System details:

1. Fish tanks: 2 x 0.380 m³
2. Sieve gravity filter
3. Biofilter: SHARK BEAD microbead filter
4. Deep Water Growbeds:
2 x 0.275 m³ 65 plants per bed
2 x 0.345 m³; 83 plants per bed
(31 pt/m²)
5. Occupies 71.21m³
6. Total water volume of 2.673m³.





STSM: aims and objectives

Describe:

- 1) Plant and fish production capacity
- 2) Water and energy consumption over one season production
- 3) Analyse all macro- and micronutrient budgets

Additional aims:

- 4) Experience running aquaponic systems
- 5) Ethnographic data collection

Methods:

	<u>daily</u>	<u>2x week</u>	<u>1x week</u>	<u>1 x per 2 weeks</u>	<u>1 x per cycle</u>
Solution	pH	TAN	PO4		
	Conductivity	NO2	S		
	DO	NO3	Alkalinity		
	T°C		Mg, Ca, K, Ca, Mn, Zn, B, Mo, Cl, Na, Fe		
Plants	Sanitary state			Size stem	Wet and dry mass (all plant, leaf, root)
Fish	Mass feed				Nutrient content
	Fish number				mass fish
Fresh water	input				

Cultivation Plan 1.

Seedlings:

Sown into Rockwool

Watered with tap water

Enter PAFF box after 15 days



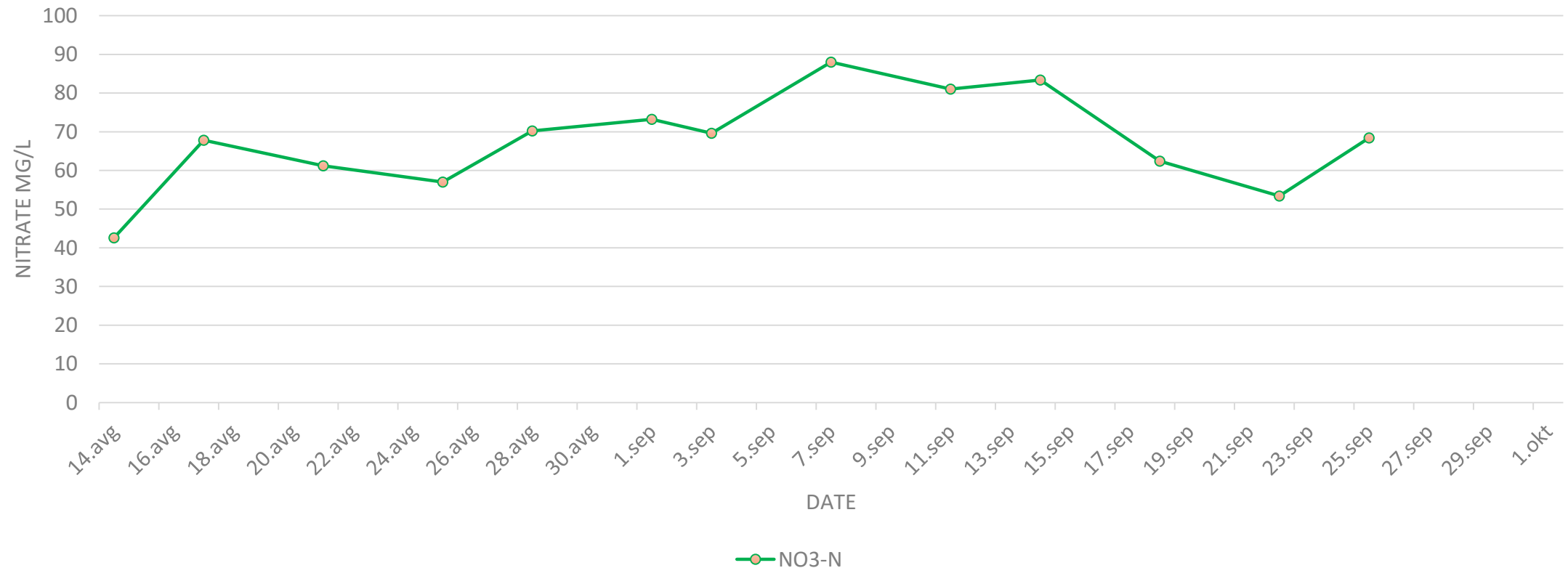


Cultivation Plan 2

Results

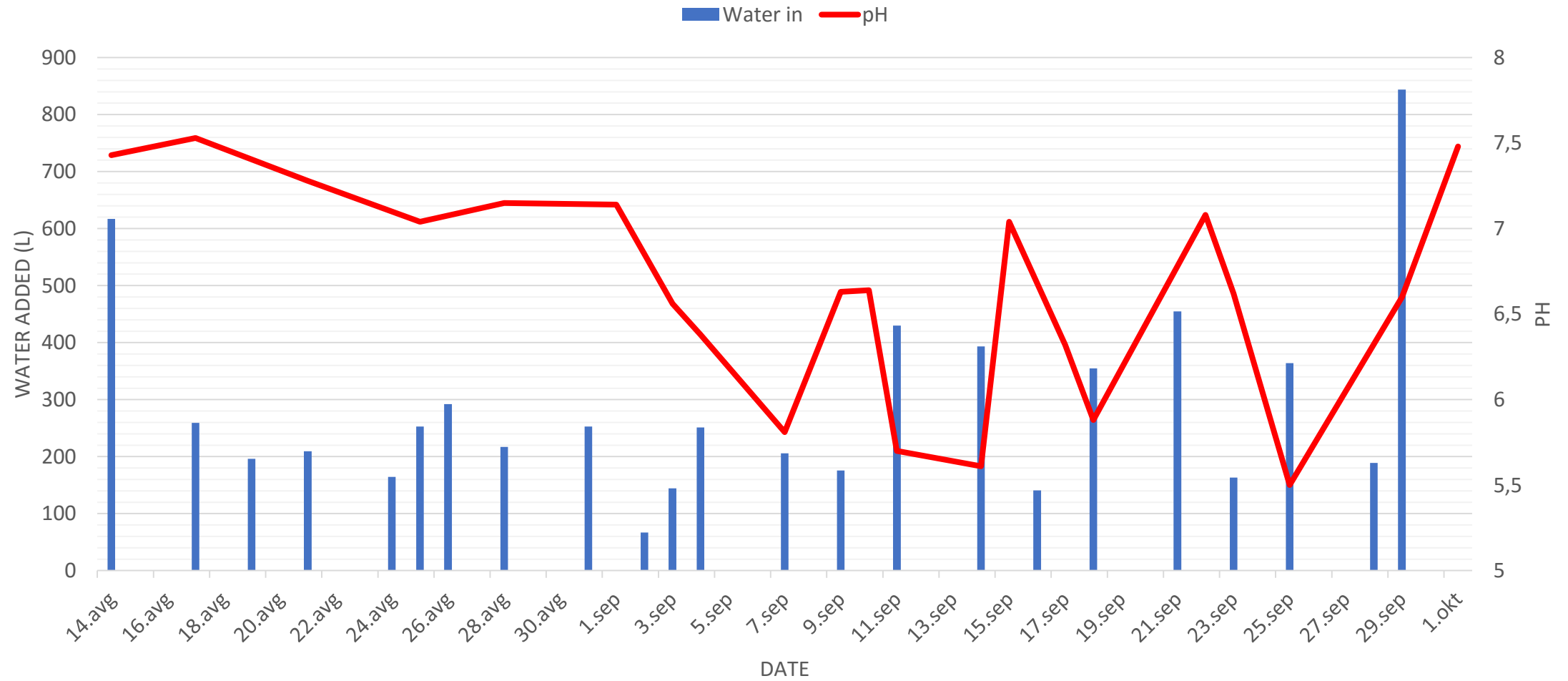
	pH	Alkalinity	TAN=NH3-N	NO2-N	NO3-N
Mean	6.64	25.00	0.75	0.06	67.55
SD	0.64	21.02	0.70	0.03	12.57
Observation (N)	21.00	13.00	13.00	13.00	13.00
min	5.50	5.00	0.30	0.02	42.60
max	7.53	80.00	2.25	0.12	88.00

NO3-N concentration and Water added over time

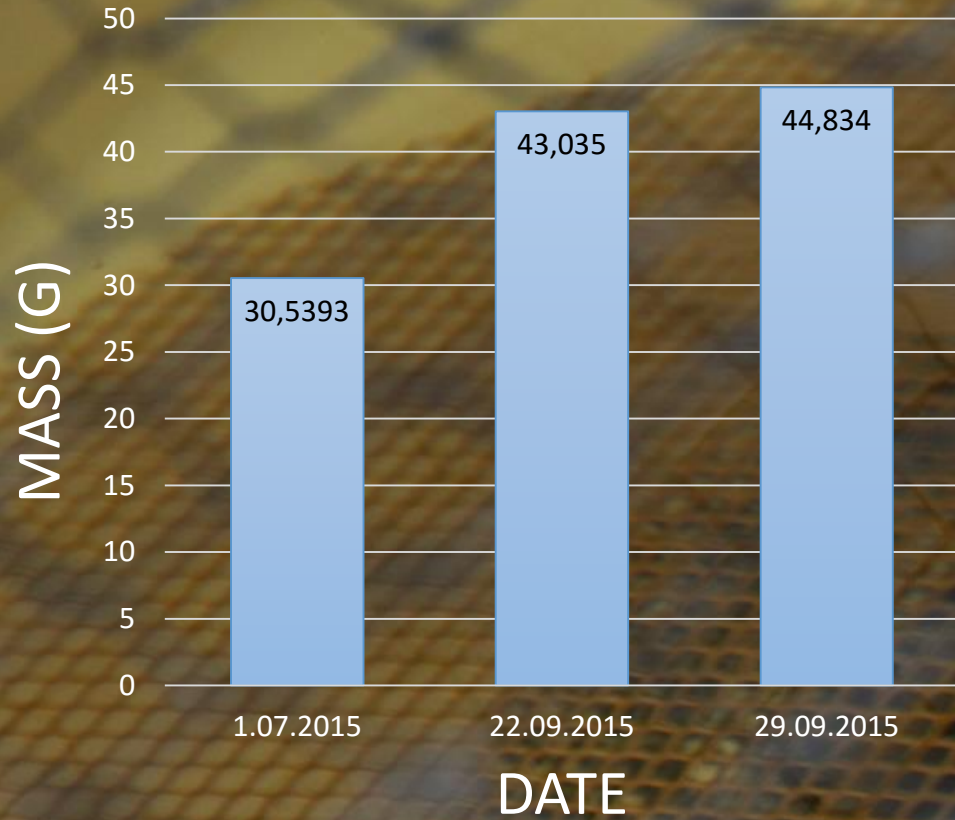


Results

pH and water added over time



Fish production



Total feed (kg)	25.4
Total days	91
mortality (%/d)	5
FCR:	3.28
SGR (%/d):	0.47
GR (g/d):	0.90

Plant Yields

Basil	Shoot fresh w. (g)	Shoot dry w. (g)	Ratio leave/stem (g)	Roots dry weight (g)	Ratio roots/shoot (g)	yields (kg/m ²)
Observation (N)	32	5	11	5	5	32
Mean	183.24	16.14	1.55	2.57	0.16	5.68
SD	81.40	9.06	0.10	1.58	0.03	2.52
min	61.93	9.01	1.32	1.06	0.11	1.92
max	386.68	27.80	1.66	4.43	0.18	11.99

Lettuce	Shoot fresh w. (g)	Shoot dry w. (g)	Ratio leave/stem (g)	Roots dry weight (g)	Ratio roots/shoot (g)	yields (kg/m ²)
Observation (N)	66	16	N/A	16	16	66
Mean	173.23	9.35	N/A	0.90	0.10	5.37
SD	81.61	2.34	N/A	0.18	0.02	2.53
min	45.84	5.38	N/A	0.66	0.08	1.42
max	317.74	13.34	N/A	1.29	0.13	9.85



Marx: 'members of society appropriate the materials of nature through their labour, in the process transforming the environment and simultaneously their own (human) nature.'

Human Geography and aquaponics?

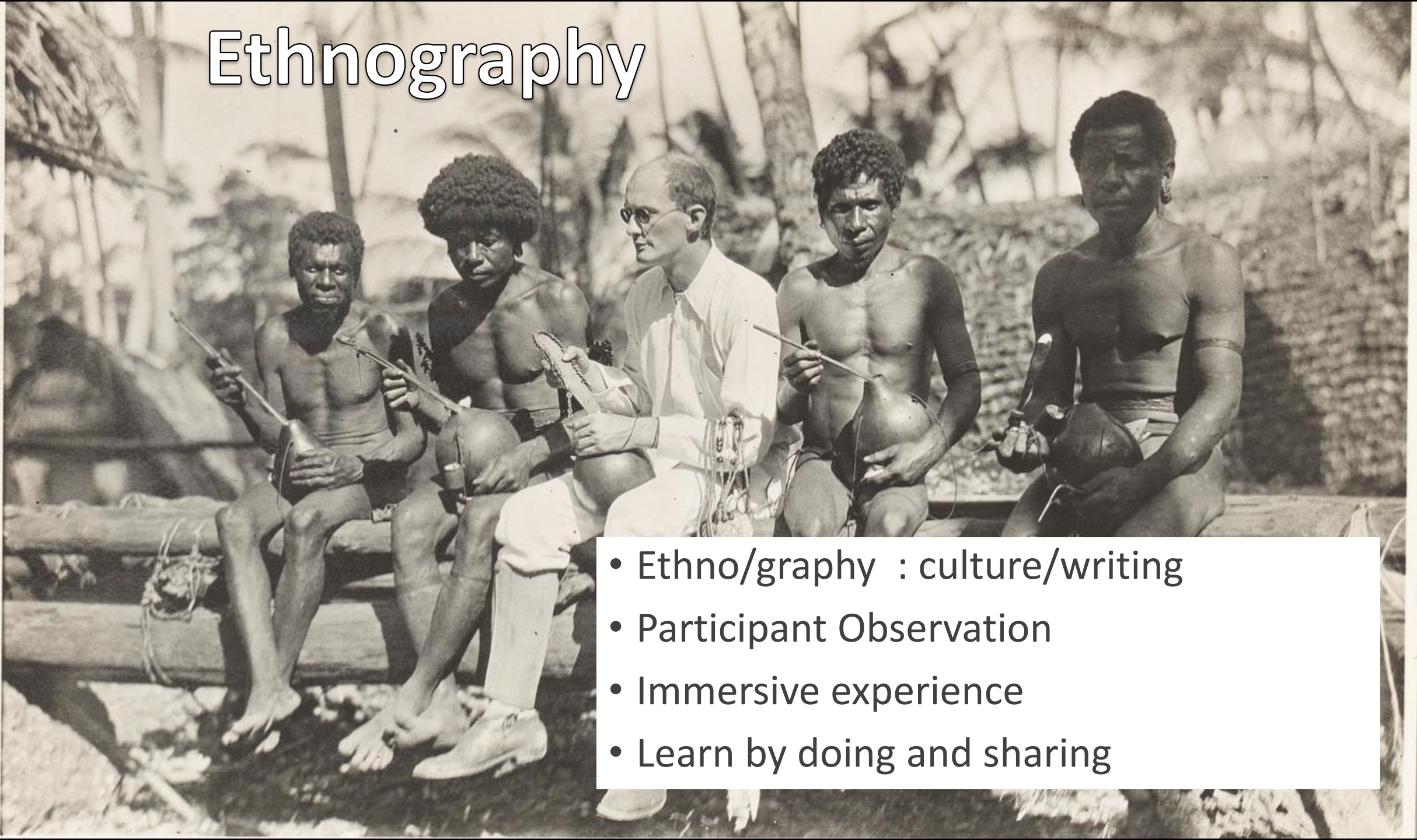
- Belton and Bush (2014)

47 geographic journals articles take up aquaculture

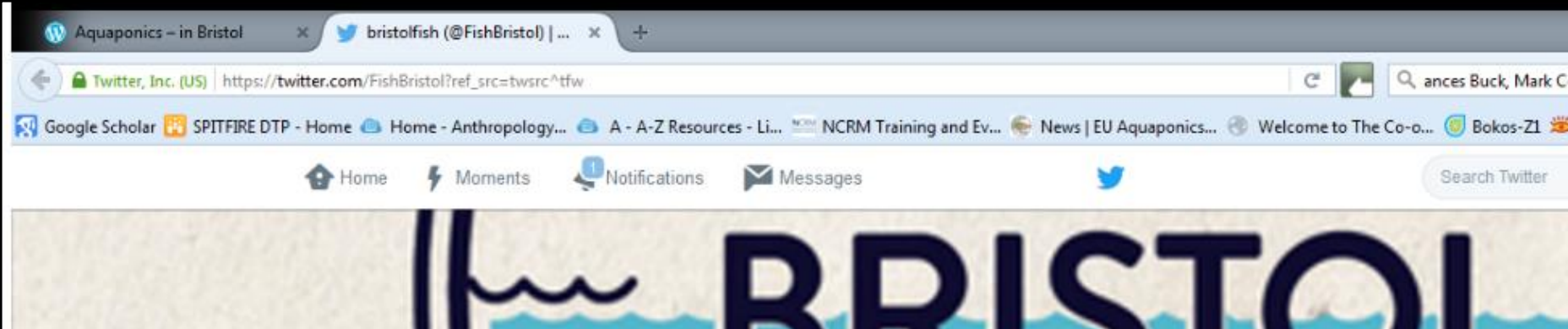
Key findings

- 1) Uneven focus on export species/supply chains destined for Northern markets.
- 2) 'Everyday practices' of aquaculture missing.
- 3) 'Alternative food markets' require attention.

Ethnography



- Ethno/graphy : culture/writing
- Participant Observation
- Immersive experience
- Learn by doing and sharing



References



- BELTON, B. & BUSH, S. R. 2014. Beyond net deficits: new priorities for an aquacultural geography. *The Geographical Journal*, 180, 3-14.
- FOSTER, J. B. 1999. *Marx's ecology : materialism and nature*, New York, Monthly Review Press.
- MALINOWSKI, B. 1922. *Argonauts of the western Pacific : an account of native enterprise and adventure in the Archipelagoes of Melanesian New Guinea*, [S.l.], Routledge.