Resource Governance: A Case for Phosphorus

Interdisciplinary Circular Economy Conference 2020

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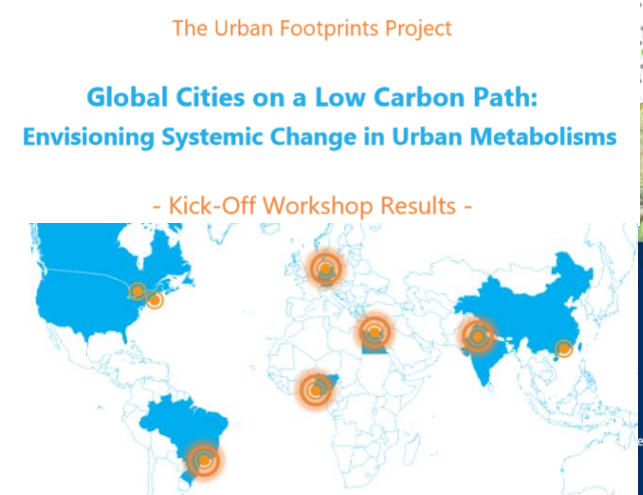
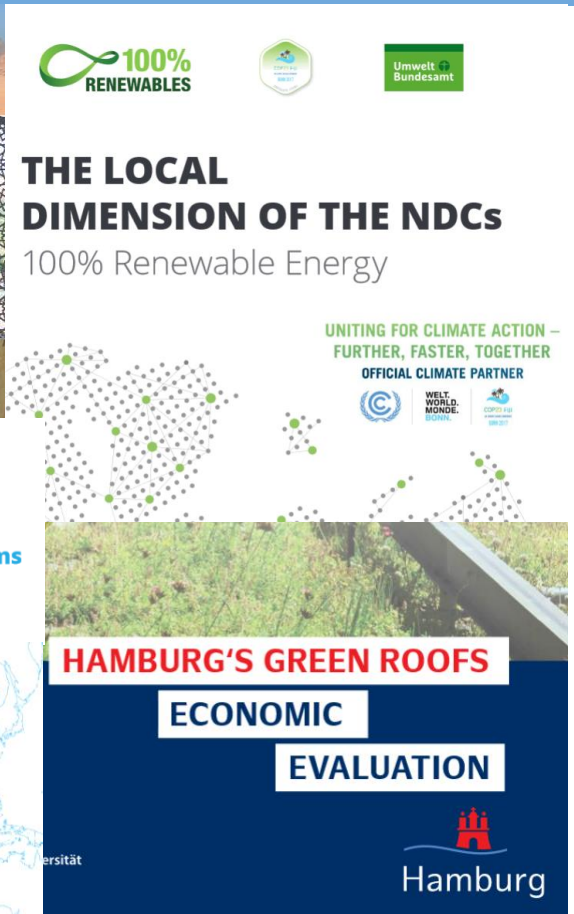
Personal Background





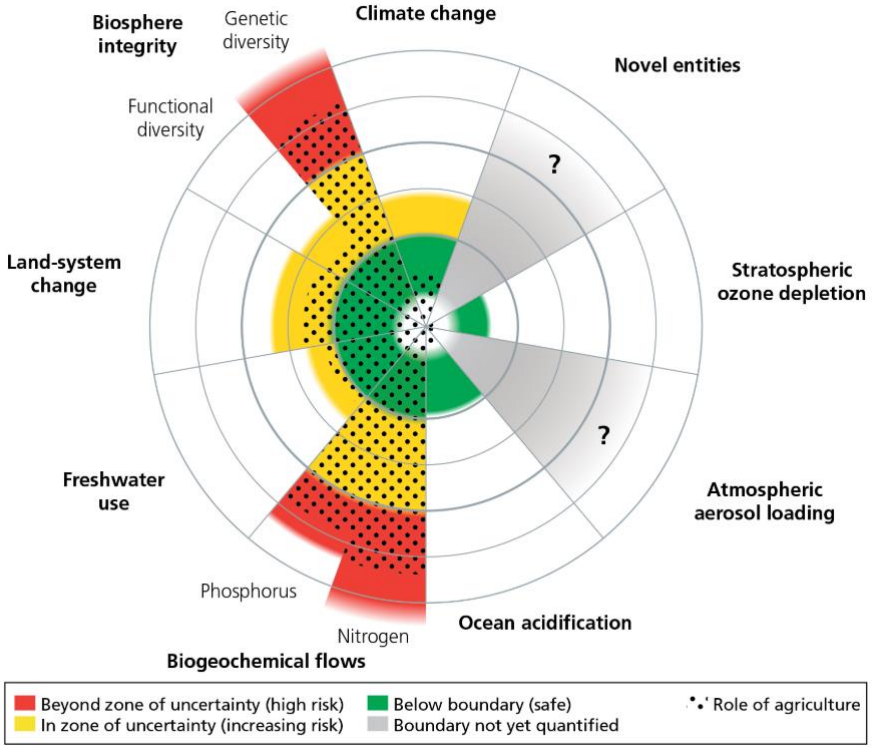
- "Urban Footprints" at the Junior professorship "Transformation to Sustainable Energy Systems", Albert-Ludwigs-Universität Freiburg
- Research Assistance: blockchain for resilience of food supply; ecosystem services and governance; "Economic Evaluation of Hamburg's Green Roofs"
- NGOs: World Wind Energy Association (WWEA), World Future Council (WFC)

Source: https://www.researchgate.net/profile/Lisa_Harseim/research

The Phosphorus Nexus

Introduction

- Water: Planetary Boundaries, (renewable) Energy, Food production
- Social, economic & ecological
- Multi-scalar: local to global governance



Campbell, B. M. *et al.* (2017) 'Agriculture production as a major driver of the earth system exceeding planetary boundaries', *Ecology and Society*, 22(4). doi: 10.5751/ES-09595-220408.

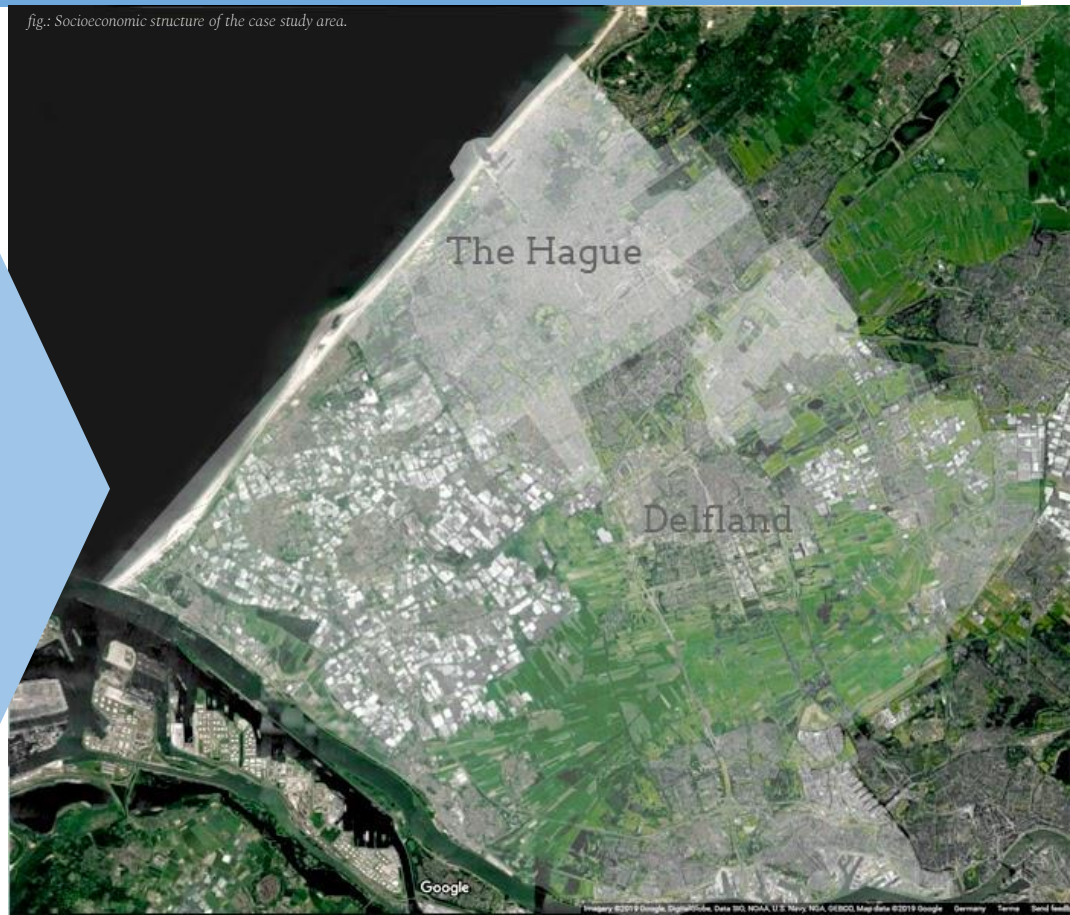
The Hague, Netherlands

The Case Study

NASA (2015). *algae bloom in the North Sea* [Online] Available at: https://eoimages.gsfc.nasa.gov/images/imagerecords/.../northsea_tmo_2015157_lrg.jpg [Accessed 11 Nov. 2018].

*"What if **cities** could have a **cumulative impact** and change the system?"*

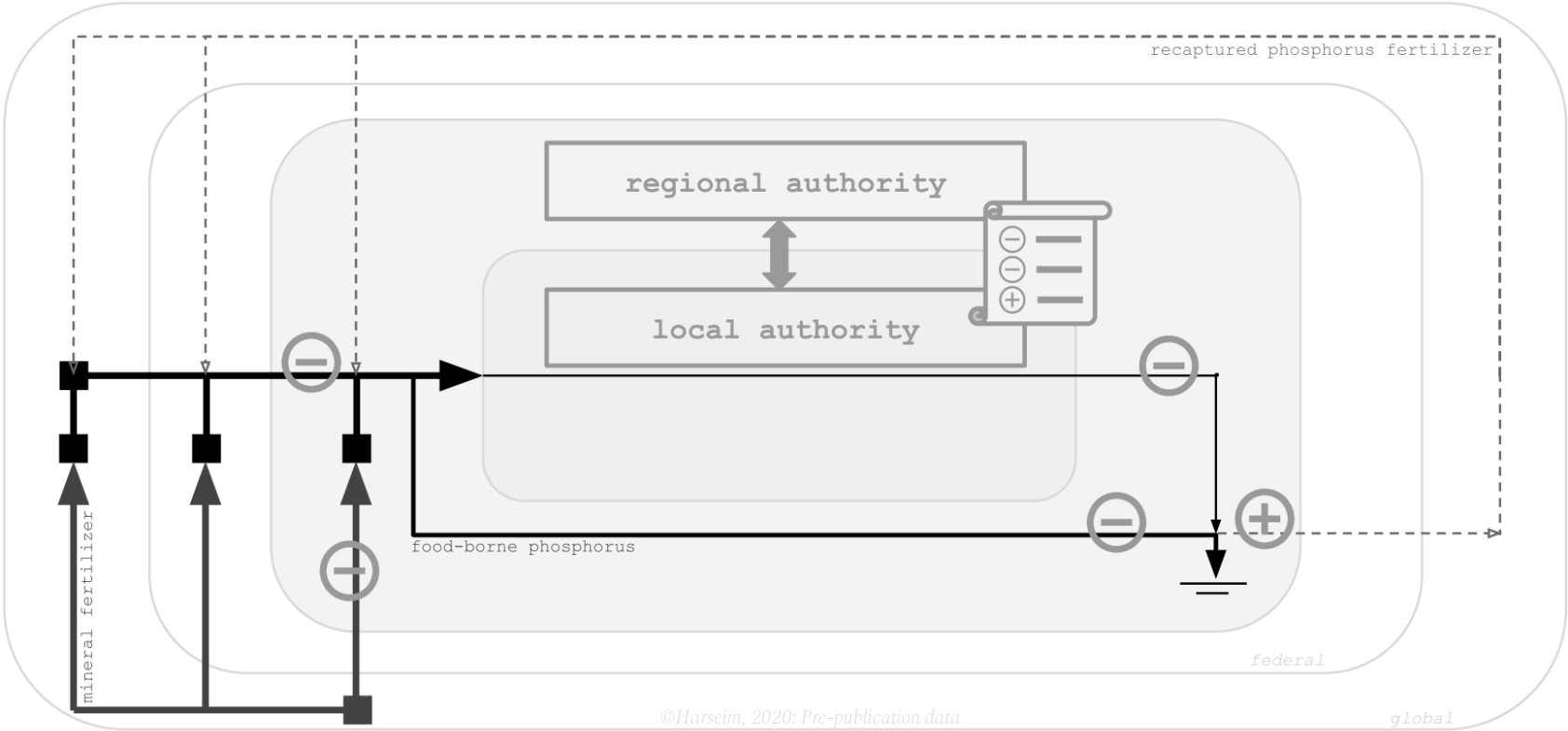
fig.: Socioeconomic structure of the case study area.



Problem Framing

Setting a Direction

...but how can the flows be "improved"?



Import-Export Balance

Global P Flows

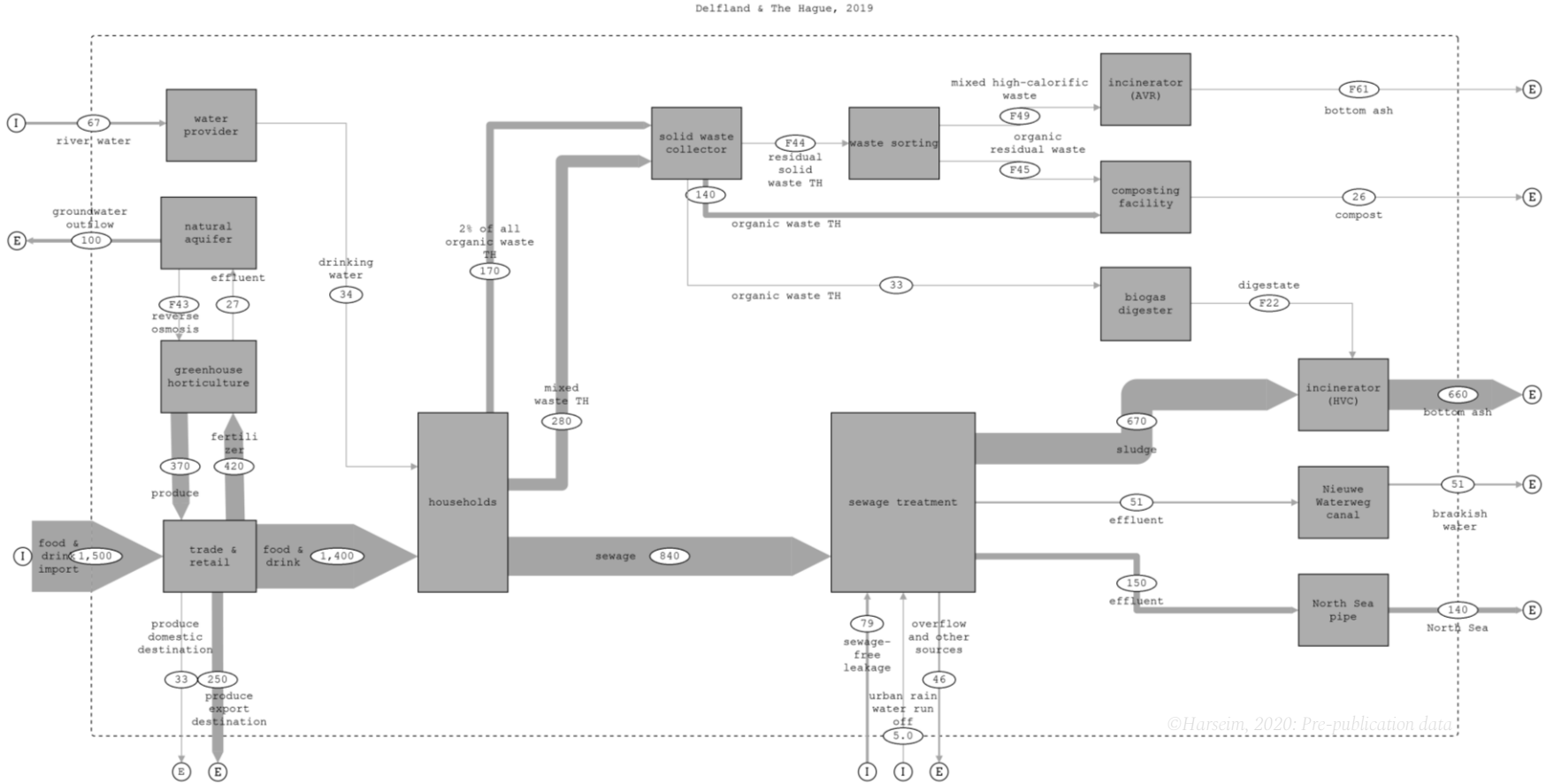
- calculated from trade statistics of P rich food products
- export stress for all countries except for US (own P reserves)
- small P export losses of NL

Total P Trade Balance in t	Countries
11,989,81	UnitedStates
7,472,76	Brazil
4,423,97	Ukraine
3,762,90	IvoryCoast
2,144,68	Paraguay
1,322,41	Ghana
1,313,03	Argentina
1,059,16	Australia
873,19	Canada
826,34	Cameroon
821,35	Nigeria
655,72	Uruguay
270,97	Moldova
258,87	Ecuador
246,50	SierraLeone
183,29	ChinaPeoplesRepublicof
102,49	Indonesia
97,76	Peru
97,06	Liberia
83,98	DominicanRepublic
28,00	Myanmar
5,31	NewZealand
4,85	India
0,30	Yemen
0,17	Malaysia
0,03	SouthAfrica
-	Niger
-	Niger
- 0,08	Mali
- 0,11	CentralAfricanRepublic
- 0,16	Thailand
- 0,30	Afghanistan
- 0,31	Pakistan
- 0,36	Trinidad&Tobago
- 0,50	Kenya
- 0,54	Morocco
- 0,77	Egypt
- 1,07	Taiwan
- 1,19	Iran
- 1,44	CapeVerde
- 1,71	Ceuta
- 2,07	KoreaRepublicof
- 3,78	Mexico
- 4,73	Iraq
- 5,30	Liechtenstein
- 5,53	Jordan
- 8,10	Israel
- 8,75	Iceland
- 12,80	Serbia
- 54,18	Lebanon
- 75,32	Oman
- 76,33	Norway
- 76,42	Singapore
- 91,40	Qatar
- 451,46	UnitedArabEmirates
35,294,85	**sum of P trade via food [t]**

fig. Annual P im- and exports of The Netherlands via food.

SFA of The Hague

Local Flows



Local P Regulation

Legal Framework

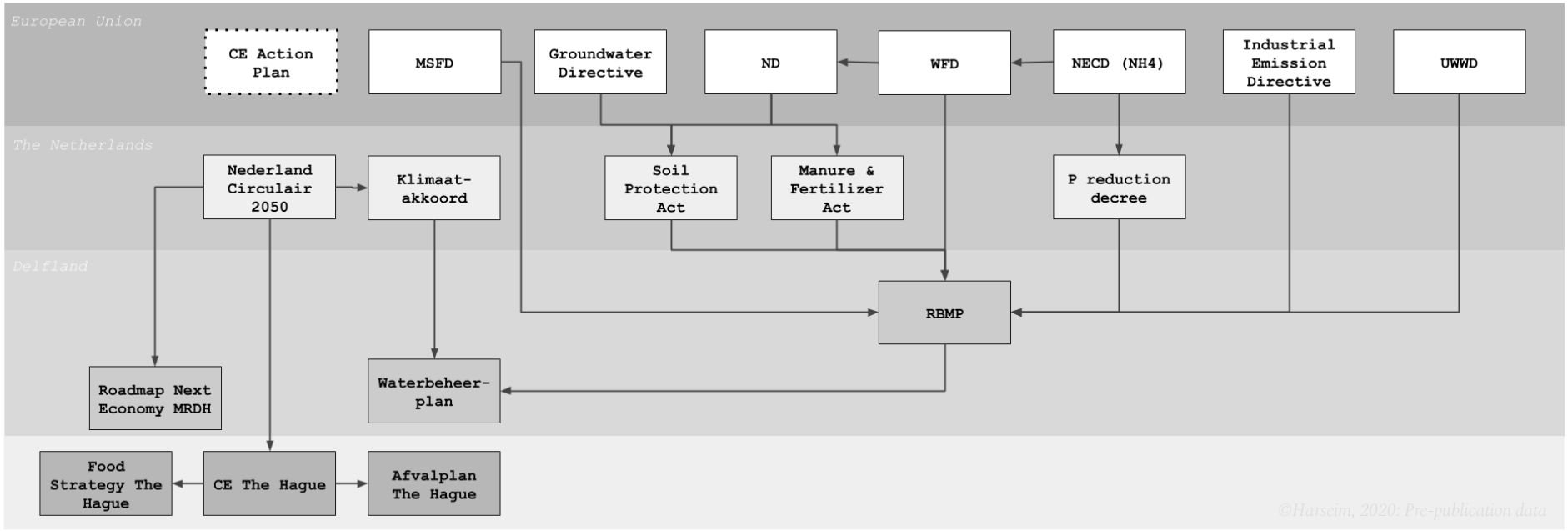
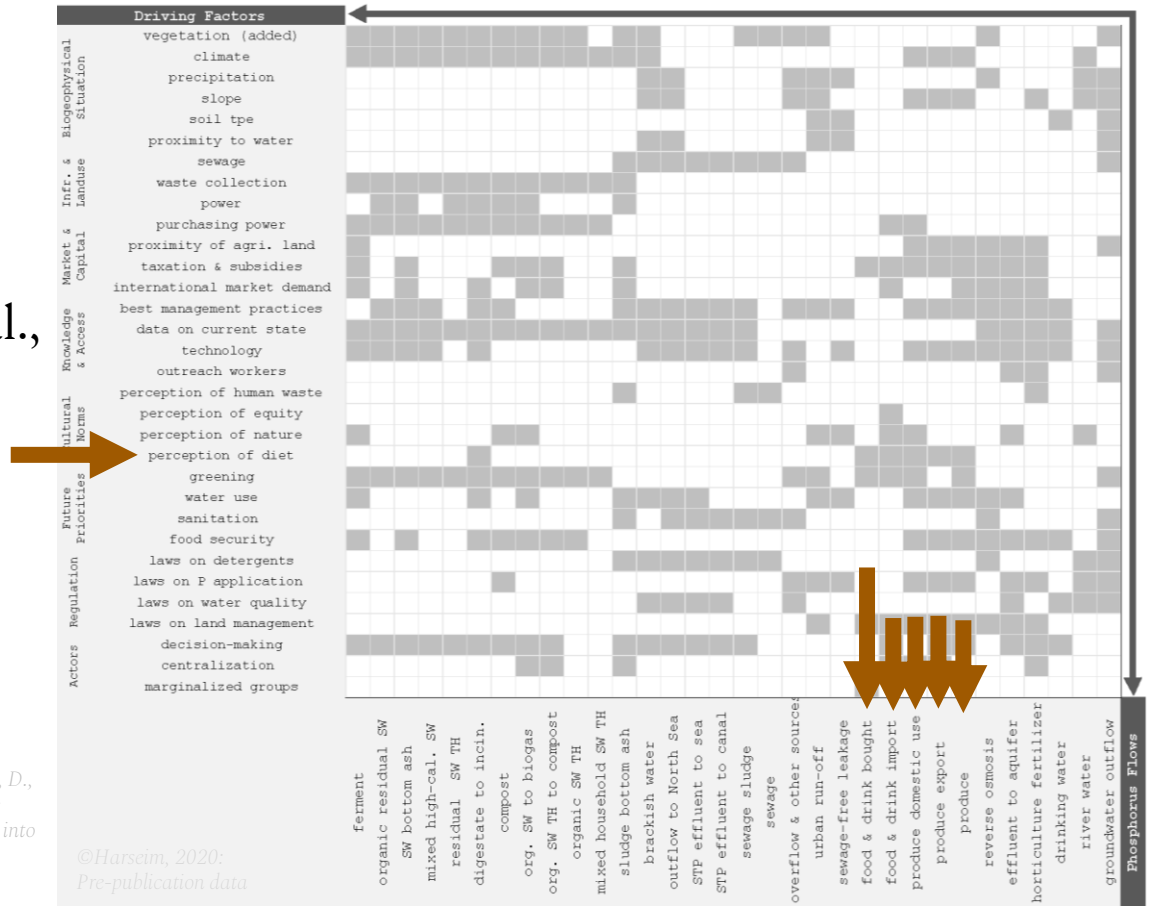


fig. 11: Multi-scalar regulatory context of P flows.

Substance Flows

Driving Factors

- Factors based on Metson et al., 2015*
- Links to Urban Metabolism

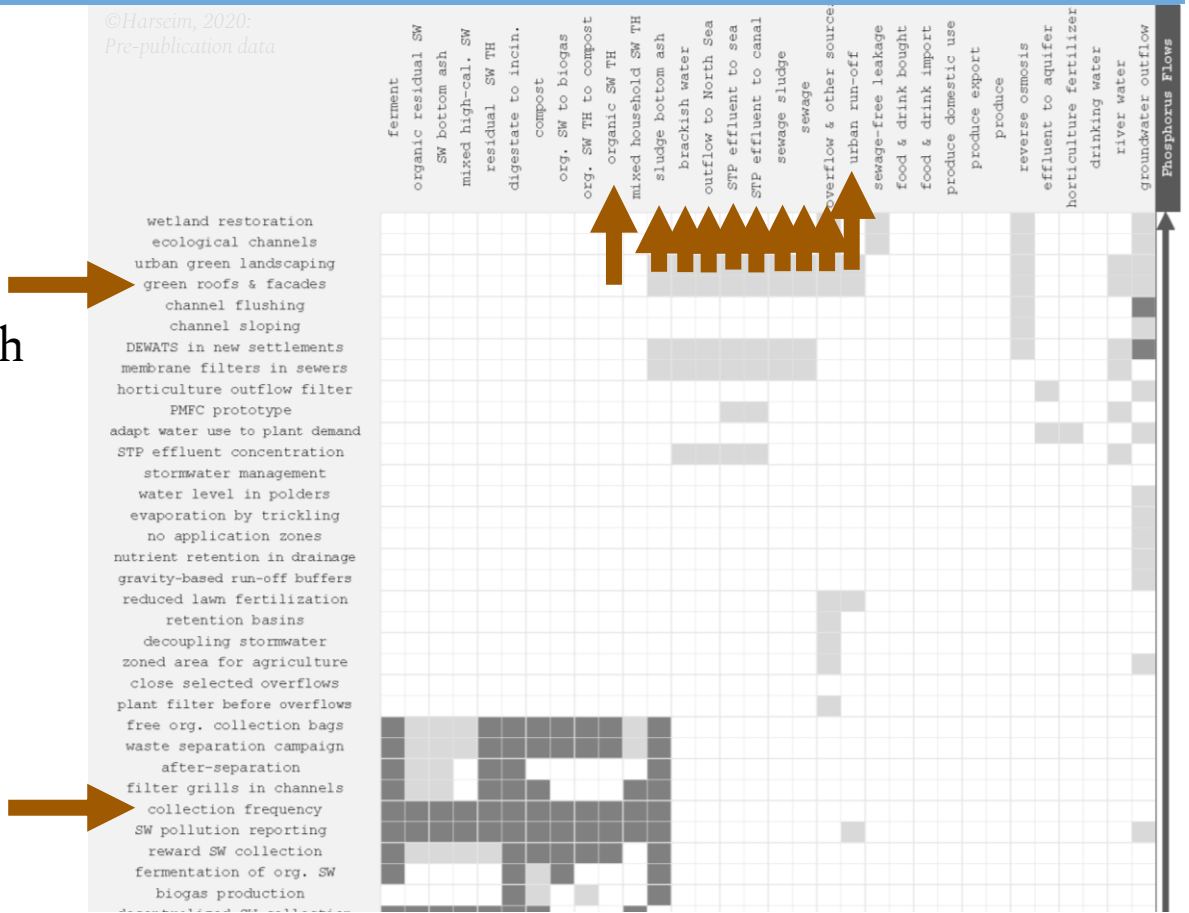


*Metson, G. S., Iwaniec, D. M., Baker, L. A., Bennett, E. M., Childers, D. L., Cordell, D., Grimm, N. B., Grove, J. M., Nidzgorski, D. A. & White, S. (2015). Urban phosphorus sustainability: Systemically incorporating social, ecological, and technological factors into phosphorus flow analysis}. Environmental Science and Policy, 47, 1--11. https://doi.org/10.1016/j.envsci.2014.10.005

Activating Measures

Substance Flows

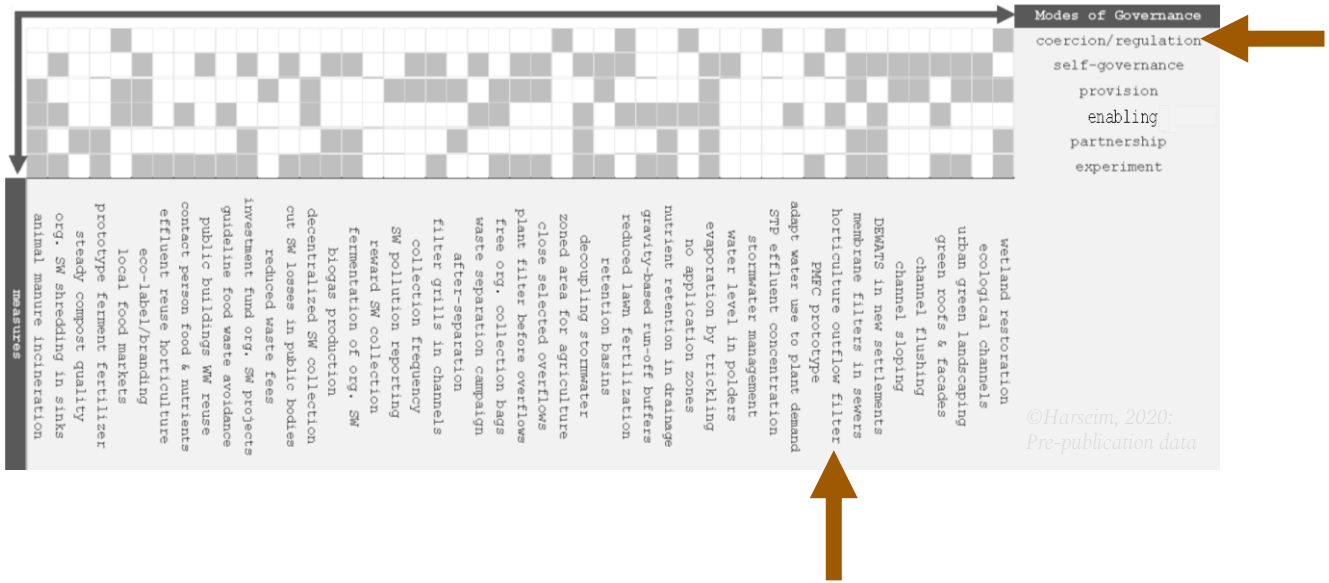
- Improvement measures with cascading effects on flows
- Increasing or decreasing respective flows



Modes of Governance

Activating Measures

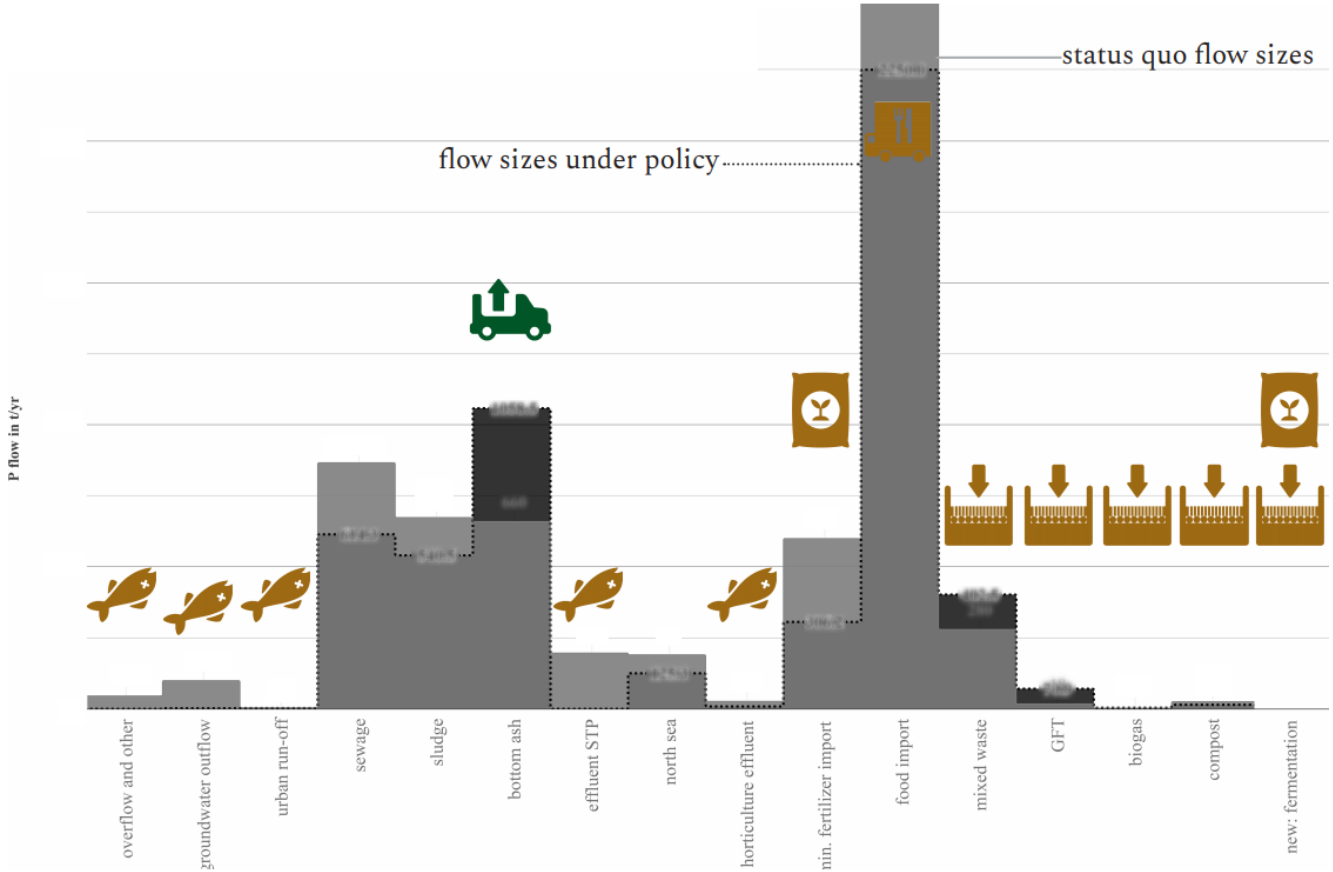
- Applicability of governance modes to flow measures



"Think Global – Act Local"

Policy Impact

- Local pollution reduced (PB)
- Increase P export potential (incineration)
- Reduce P imports due to circular supply (horticulture)



Takeaways

- P (and nutrients) are **transdisciplinary** subjects. **Cities can change their urban metabolism** despite limited legal scope of action - if they collaborate across boundaries and sectors.
- **Polycentric governance** could have far reaching impacts and **local action** may pave a way towards **global transition for circularity**.
- Cities are embedded in a global network, likely **linking substance flows and governance ties.** Many governance failures may be alleviated by an **accountability** concept.

Accountability of Governance

Way Forward

- Detecting substance flow & governance links among world cities
- Identifying governance drivers
- Explore the potential of accountability towards circularity

Working title:

The role of world cities for accountable multi-scalar phosphorus flow governance in globalized food production

Keywords: urban studies, human geography, industrial ecology, environmental resource management, globalization

Thank you for your attention!