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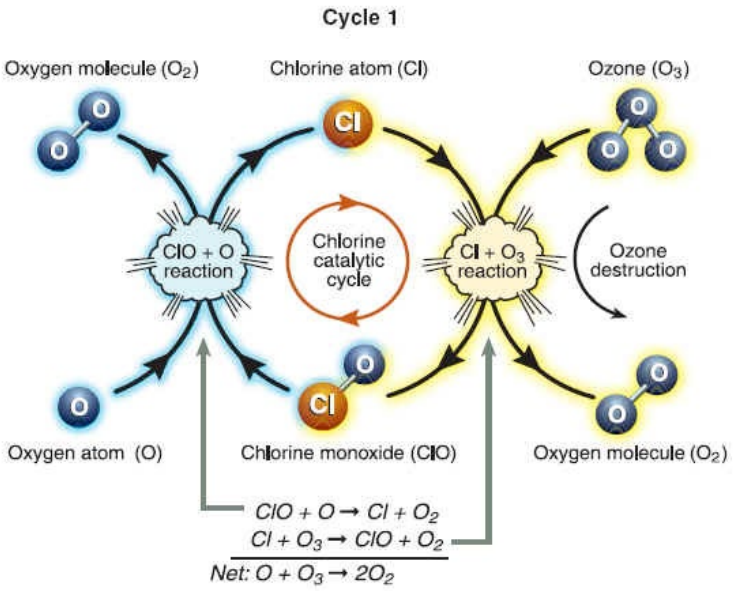
From volatile metabolites to addressing waste in informal settlements

Ozone chemistry and rice agriculture



Beyond CFCs, methyl halides (CH3X) are responsible for ~25% of the annual ozone loss

Rice is well known for methane emissions, so the potential to produce methyl halides was a possibility

Small things (<1 part per billion) can lead to outsized/global impacts

Good intentions can lead to bad outcomes

Land use change and volatiles

We wish to understand how land use affects functional, incl gaseous outcomes

Realigned salt marshes are attempts to restore salt marshes to the local region

However, after 100+ years the communities established are never the same as those in natural marshes close by.

Sometimes systems that look similar can have very different functionality

Some capacity exists for prediction of sediment function based on volatiles at the surface

Anaerobic Digester (AD) systems

Prof. James Chong (Dept. of Biology)

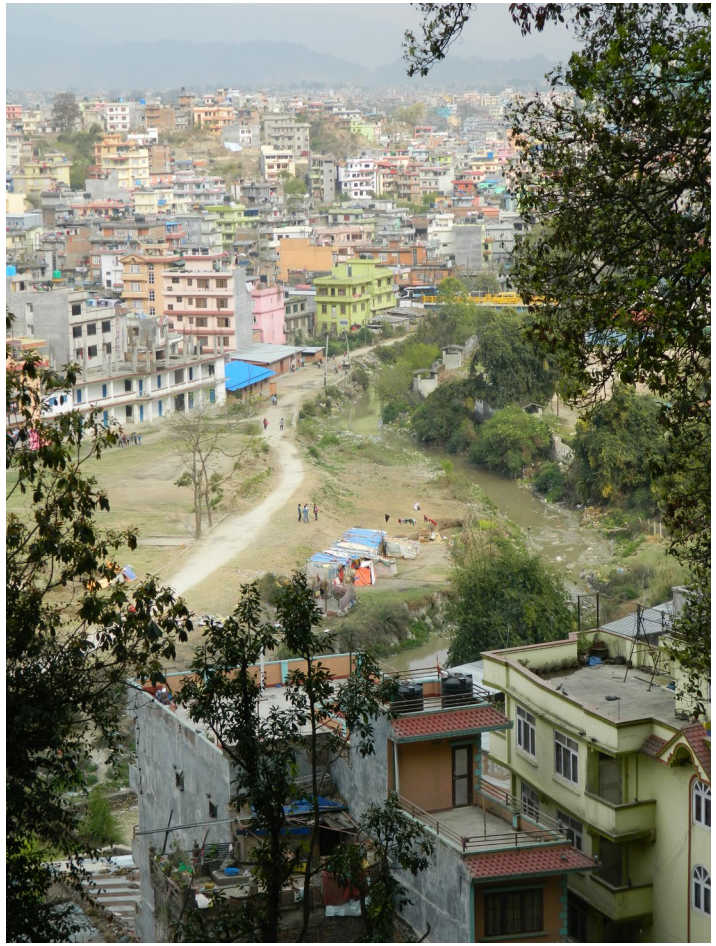
archaeal specialist → microbial and AD specialist

- Using volatiles to diagnose the status/health of an AD system
- Identifying the base microbial community needed for efficient AD systems
- Identifying capacity of AD systems to accommodate unusual feedstocks

AD as a waste, water, energy, health solution

Prof. James Chong

Dr. Richard Friend (Dept. of Environment and Geography)



Governance dimensions of transformations

Kathmandu, Nepal ➔ combines substantial waste in rivers, incomplete sewage connectivity, inequal access to clean water and energy and health issues arising from sewage exposure.

Exacerbated by earthquake of 2015, which caused breakdown in power, water and sanitation provision

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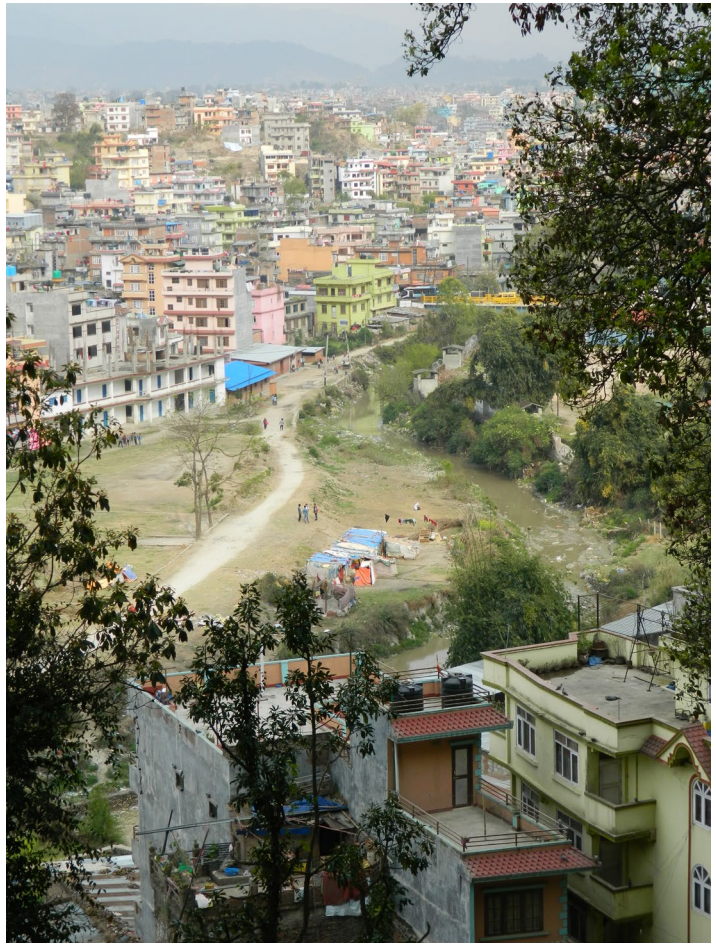

Governance dimensions of transformations

- Waste is “dirty” and requires re-education/select community involvement
- Substantial community engagement/interest but 5/7 sewage treatment facilities have failed within a few years of installation
- Large scale infrastructure may not be the most effective means forward- multiple smaller scale installations may be more equitable and resilient

Caught in the middle ground- testing these ideas with replication is not something most funders are willing to contemplate

Interventions in refugee camps

Prof. James Chong, Dr. Richard Friend

Dr. Sarah West (SEI-York)

Explored waste management in Aida camp and other communities on the West Bank, through Shatha Alazzeh (Aida Camp)

Lack of info, connectivity ➔ burning

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Interventions incl. upcycling, composting

➔ Ecological redundancy

Interventions in refugee camps

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- The community has to be on board
- Connectivity of waste streams
- Geo-political landscape plays a substantial role in how waste is managed

  Local knowledge is key

The “WasteShed”

JC/RF/SW

Jo Rose (Dept. of Health Sciences) Humanitarian Response

In Israel, Jordan and Palestine = Clive Lipchin, Suleiman Halasah and Monther Hind- AD and grey water treatment engineers

Starting a conversation for cross comparison between waste management/issues/solutions in refugee camps in Jordan, the West Bank and Ugandan refugee camps

Exemplar→ al Zaatari camp- 80,000 people in less than two years

The “WasteShed”

JC/RF/SW

Jo Rose (Dept. of Health Sciences) Humanitarian Response

In Israel and Palestine = Clive Lipchin and Monther Hind- AD and grey water treatment engineers

Taking lessons from evaluations of large scale refugee interventions-

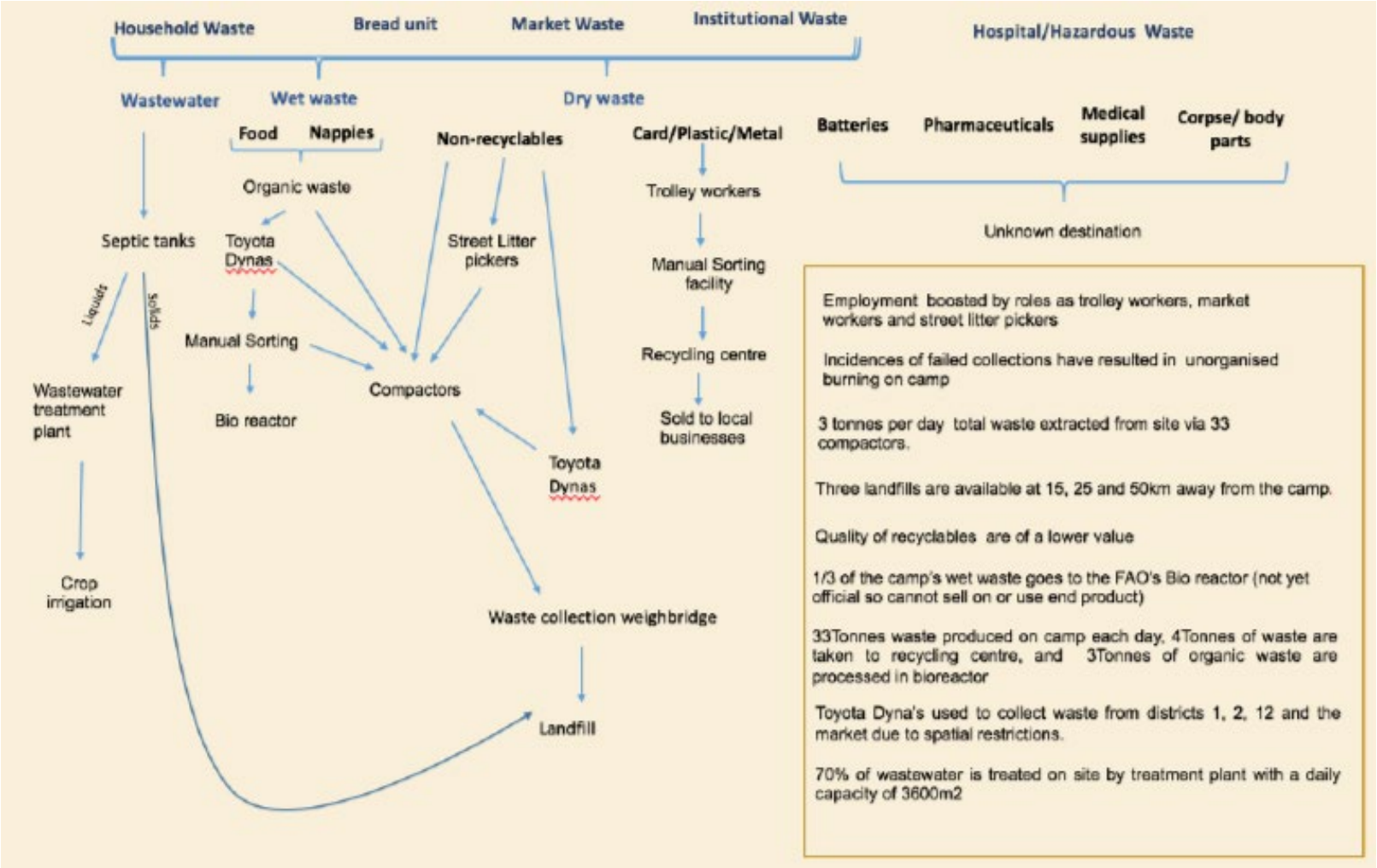
- Nearly half of all interventions fail
- Refugee camps are still designed and treated as temporary, precluding permanent structures.
- Sanitation, availability of clean water and sufficient energy remain problematic within refugee camps
- Is it possible to create a co-learning environment for shared solutions across this working space

Recycling, Sewage Treatment, and Solar Energy- why are these available in al Zaatari camp?

Working conclusions

Each waste stream exists within a larger socio-political AND environmental context

Only by understanding the WasteShed can we understand the areas of most effective transformation/intervention



Simplified representation of waste streams in Za'Atari Camp

Working outcomes

Interventions can be technological and/or social

Interventions should be scale specific, depending on community size and needs

Interventions should be sensitive to regional/connected communities-

- Geopolitical connections/boundaries → flow of material
- Equity of provision- “Why are they getting resources and not us?”

The community has to be on board- what doe

Working outcomes

The community has to be on board- what does the community actually want?

Capacity of the community has to be established and incorporated into the solution (multiple capacities)

Often local leaders are drawing on previous personal expertise- this needs to be reflected

Sustainability means that the interventions need to last longer than the funding

Trust but verify- locally (i.e.- with local workers/researchers)

For something completely different- Biofuels in Brazil

Including Eleanor Brown- Education/Paul Walton- Chemistry/Joshua Kirshner&RF – Env &Geography

Biotechnological solution to plant waste→ refining to bioethanol

What are the implications of this intervention and is it possible to intervene more effectively?

Technologically driven interventions may need to incorporate other lenses earlier in order to provide equitable, sustainable outcomes

An ecology/functional lens needed at the outset!!

Law of unintended consequences

Successful interventions seem to incorporate

Community engagement in determining needs, developing solutions

An appreciation for social perceptions and implications

Placing the process in context

Identification of community capacities- matching these to appropriate innovations

Identifying the feasible/useful scales for intervention

Capacity building is a critical component of sustainability

… and for longer term, required in order to establish more comprehensive solutions

Long term commitment on both community and intervention

Forethoughtful and imaginative estimations of future outcomes

Can we incorporate various lenses prior to solution development

Can we identify unintended consequences BEFORE installation