



Sveriges lantbruksuniversitet
Swedish University of Agricultural Sciences



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A Serious Game for Collaborative Sanitation Planning

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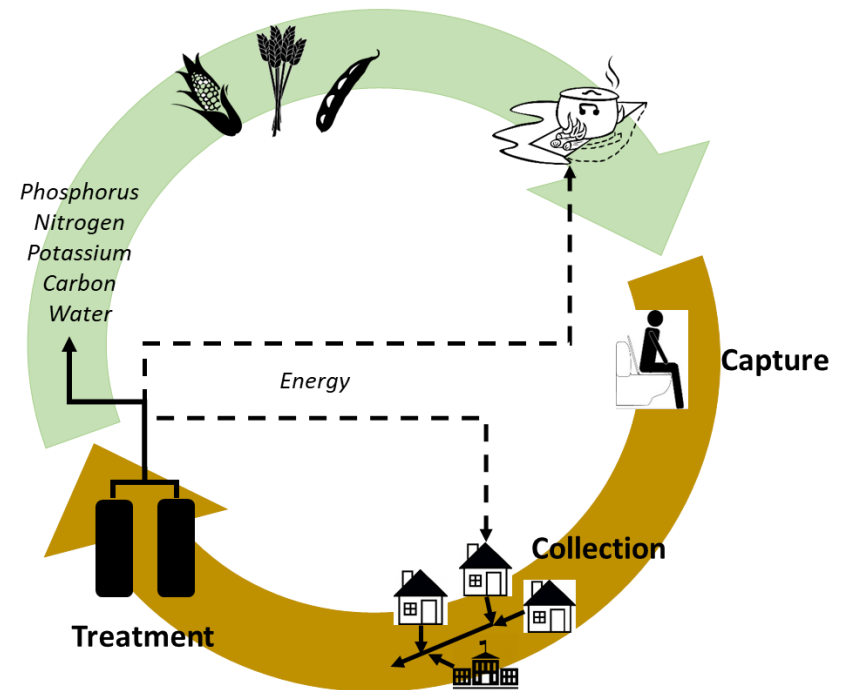


SPANS project - Sanitation Planning for Alternative Nutrient-recovery Systems

The project is exploring how new technologies and ways of planning can improve the recovery and reuse of important fertilizing nutrients from wastewater/faecal sludge

Objectives

- Investigate the [technical and market readiness](#) of nutrient-recovery technologies,
- Study the [readiness of society](#) to accept alternative systems,
- **Evaluate alternative planning techniques for promoting innovation.**



Why Games?

Research has shown serious games to be effective for:

Motivating learning

- Visualization enhances understanding of complexity situations
- Fun = increased learning

Problem-solving

- Improves decision-making and analytical skills
- Stimulates creativity

Increasing engagement & participation

- Creates trust and partnerships
- Develops the ability to function cooperatively

Collective learning

- Understanding other perspectives
- Understanding stakeholder roles & responsibilities
- Reflecting together



*The game aims to share knowledge about **nutrient resource recovery** from sanitation and supports **attitude-change** and **collaboration** between players.*

Other aims of the game:

- Increase understanding of the need for sanitation
- Increase understanding of other stakeholder perspectives
- Increase collaboration between actors
- Inform about new technologies
- Having fun - be engaging

Concepts included in the game

- Potential **benefits** of safe reuse
 - Fertilizers
 - Link to food production
- Potential **negative** consequences:
 - Water pollution
 - Disease
- Different **roles** within sanitation chain
 - Housing
 - Treatment
 - Farming
 - Private Contractor
- **Unexpected** event cards
 - Negative – e.g. floods, disease
 - Positive – e.g. innovations, development



Target audience

*Politicians and professionals
in decision-making positions*

Other possible users of the game:

- Students
- Professionals involved in sanitation planning
- Citizens (private entrepreneurs, landlords, home owners, community groups, farmers)



Context

Players work together to manage the sanitation situation in a growing city.

- Each round the city grows
- Improper management leads to a collective loss!
- Follow your personal agenda



Personal Agendas



Environment – *e.g. keep the water clean*



Economy – *e.g. avoid expensive imports*



Happiness – *e.g. clean housing areas*



Public Good – *e.g. keep people healthy*

Infrastructure cards: Buildings

	 HOUSING, LEVEL 1 1p [Icons: House, Gear, Leaf]	 HOUSING, LEVEL 1 1p [Icons: House, Gear, Leaf]	 HOUSING, LEVEL 1 1p [Icons: House, Leaf, House]	 TREATMENT, LEVEL 2 2p [Icons: Leaf, House, Leaf, Leaf]	 TREATMENT, LEVEL 2 2p [Icons: Leaf, House, Leaf, Leaf]	 TREATMENT, LEVEL 2 2p [Icons: Leaf, Leaf, Leaf, Leaf]
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Earn Points
for built
Infrastructure

Infrastructure cards: Communications







 FOOD/SLUDGE/NPK ROAD 1p	 MIXED WASTE PIPE 1p	 SEPARATED WASTE PIPE 2p
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RECLAIM Game

Board

-  Urban areas
-  Rural areas
-  Water
-  Unusable land (e.g. swamp)
- 

Resource Dice

-  Food
-  Waste
-  Sorted Waste
-  Sludge
-  Fertilizer
-  Disease outbreak



Infrastructure

Housing blocks

- Unconnected
- Improved
- "Safe collection"



LEVEL 0 HOUSING BLOCK



LEVEL 1 HOUSING BLOCK



LEVEL 2 HOUSING BLOCK

Transportation

- Roads
- Pipes



ROAD FOR FOOD, NPK & SLUDGE



PIPE FOR MIXED WASTE



PIPE FOR SEPARATED WASTE

Treatment

- Existing system
- Improved
- Resource recovery



LEVEL 0 TREATMENT PLANT



LEVEL 1 TREATMENT PLANT



LEVEL 2 TREATMENT PLANT

50% risk of failure!



Farms

- Simple
- Improved (2x food)



LEVEL 1 FARM



LEVEL 2 FARM

Limits

Max 4 of same resource per hexagon!

4 Houses per Hexagon



LEVEL 0 HOUSING BLOCK

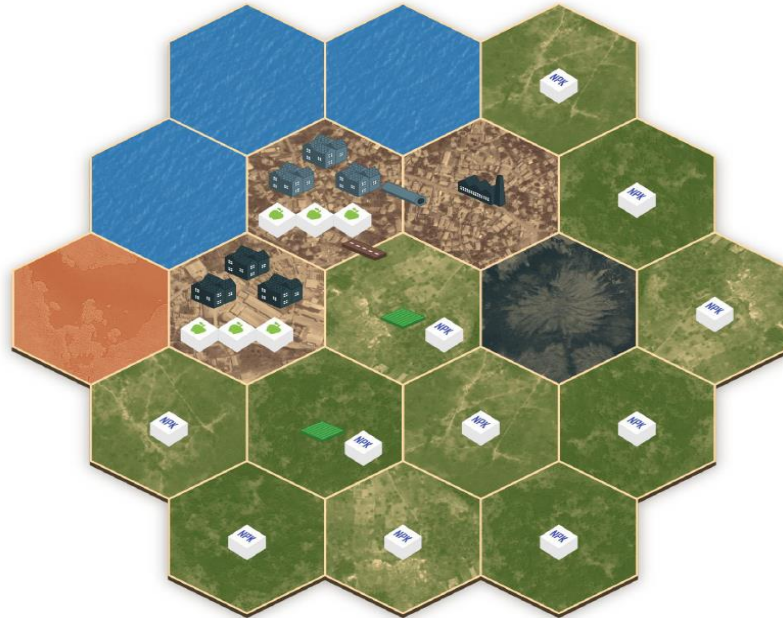


LEVEL 1 HOUSING BLOCK

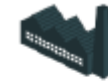


LEVEL 2 HOUSING BLOCK

Each House needs 1 Food
→ 1 Waste



2 Treatment plants per hexagon



LEVEL 0 TREATMENT PLANT



LEVEL 1 TREATMENT PLANT



LEVEL 2 TREATMENT PLANT

Treats 4 Waste

Treat 2 Waste

1 Farm per hexagon



LEVEL 1 FARM

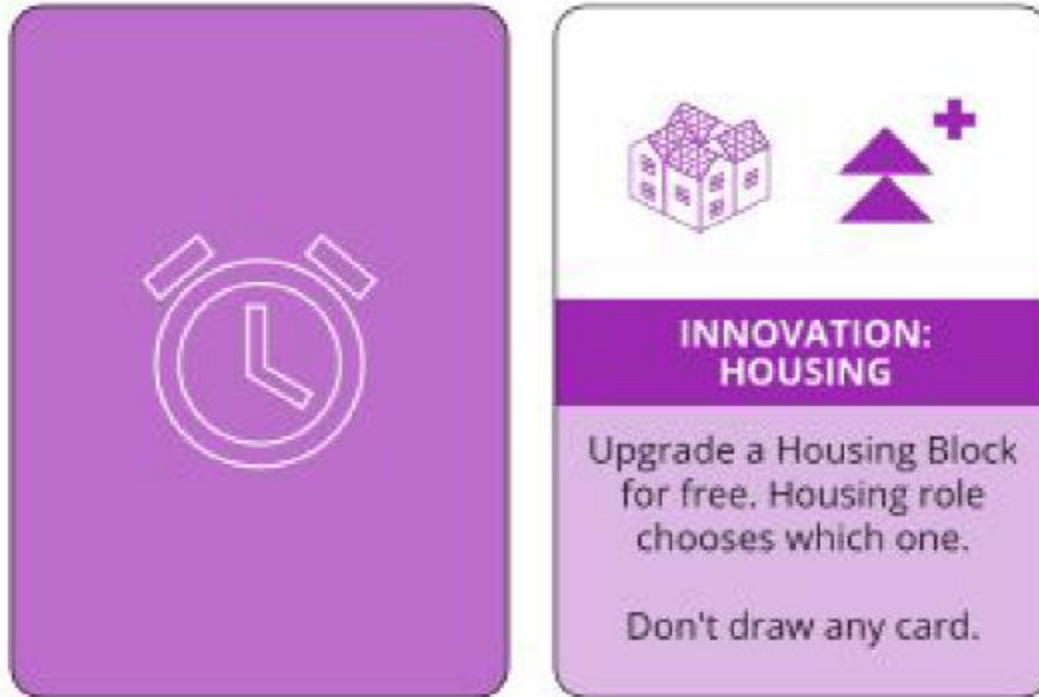


LEVEL 2 FARM

Converts 2 NKP → 2 Food

Converts 4 NKP → 4 Food

Event cards – every 10 min



Tutorial



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Gameplay

Order of play:

Housing → Treatment → Farming → Independent Contractor

I Each player's turn:

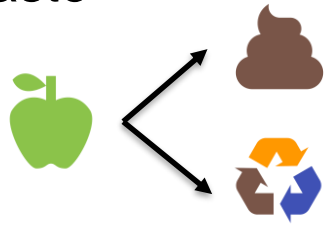
1. 3 build actions
2. Fetch resources
3. Convert resources
4. Send resources

II: Political decisions – all players together

Game consists of 4 rounds – roles rotate each round

Housing role starts

- Builds **houses** & transportation
- Converts **food** to waste



LEVEL 0
HOUSING
BLOCK



LEVEL 1
HOUSING
BLOCK



LEVEL 2
HOUSING
BLOCK









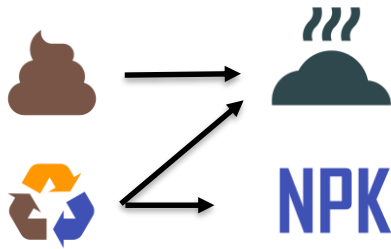


Treatment Role

- Builds **treatment plants** & transportation



- Converts **waste** to sludge or NPK

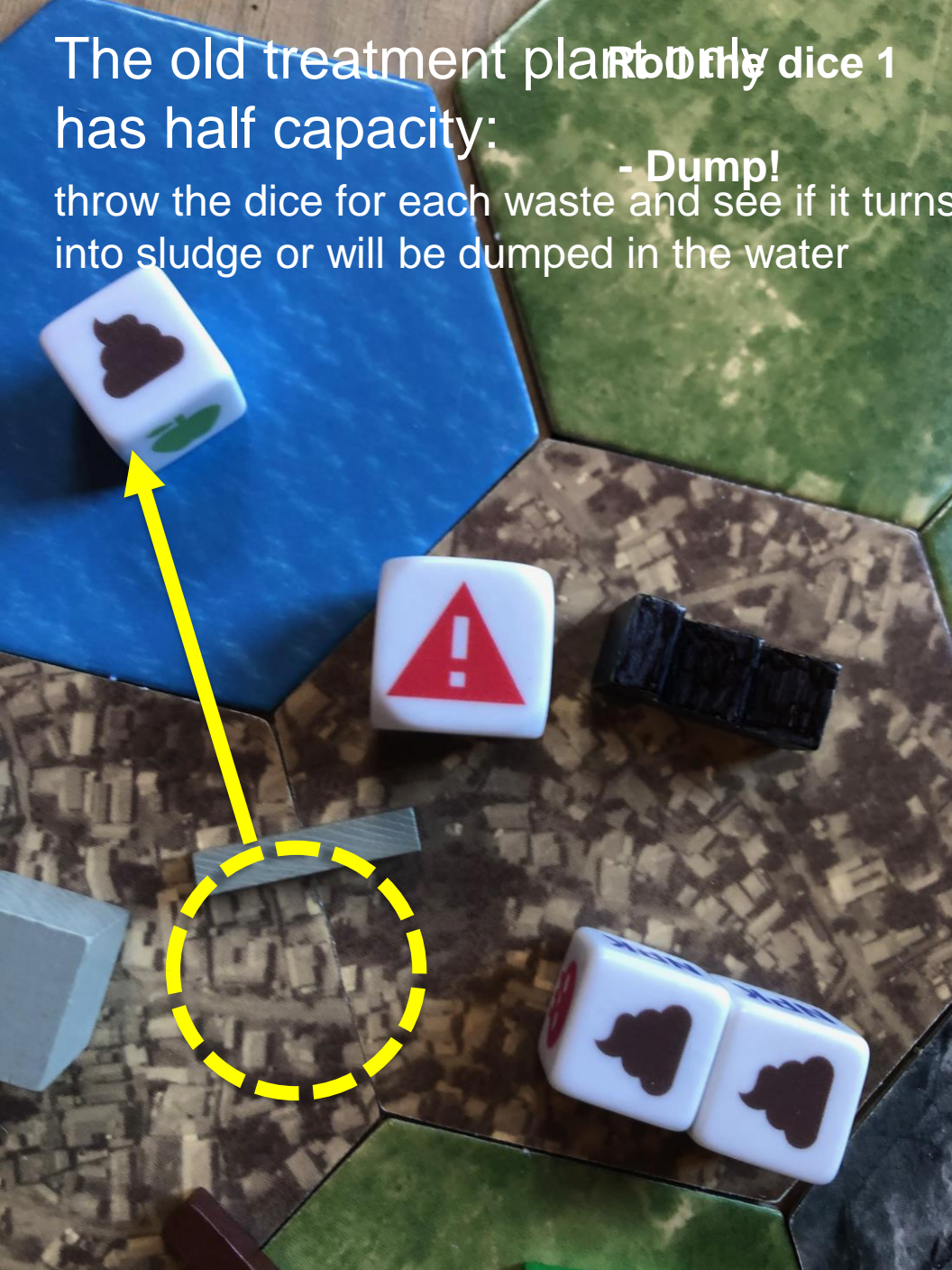






The old treatment plant **Roll the dice 1**
has half capacity:

- **Dump!**
throw the dice for each waste and see if it turns
into sludge or will be dumped in the water



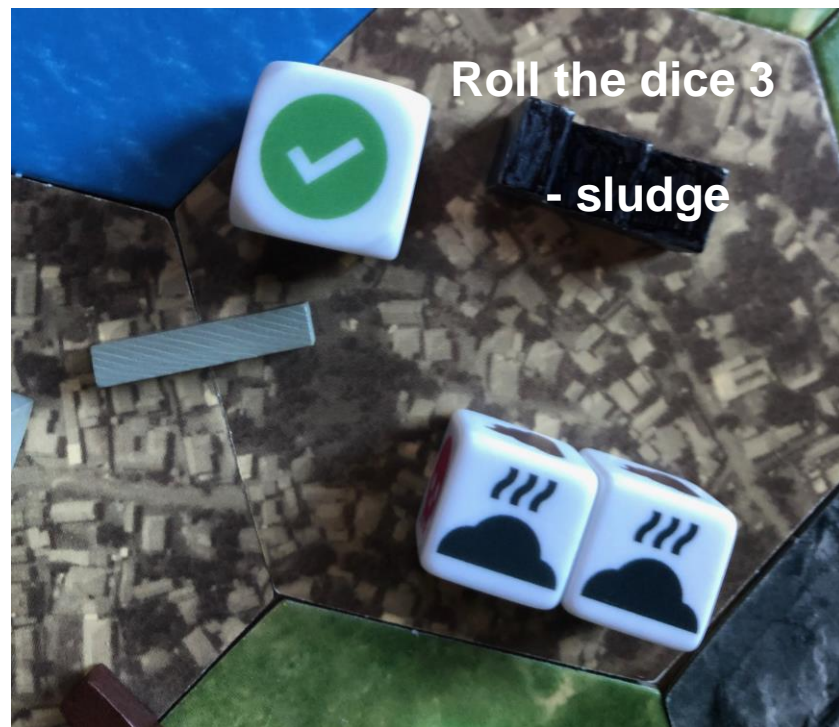
Roll the dice 2

- **sludge**



Roll the dice 3

- **sludge**

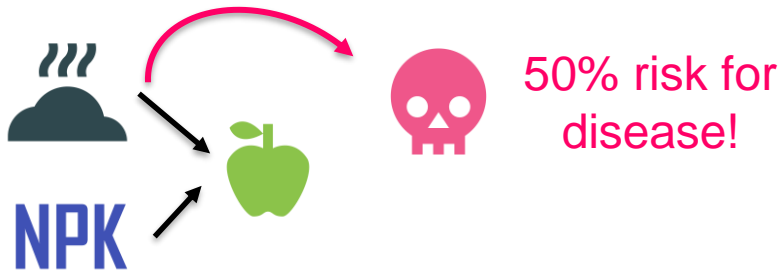


Farming Role

- Builds farms & transportation



- Converts NPK or sludge to food











Private Contractor Role

Can choose to act as any of the other roles

However, everything is built to a higher cost







Political decisions

Vaccinate

Import Food

Import NPK

Dump Waste

			
 300 C	 200 C	 100 C	 FREE
 400 C	 300 C	 200 C	 100 C



Watch your progress on sanitation provision!

BASIC SANITATION COVERAGE

60 000



Current Population

30 000



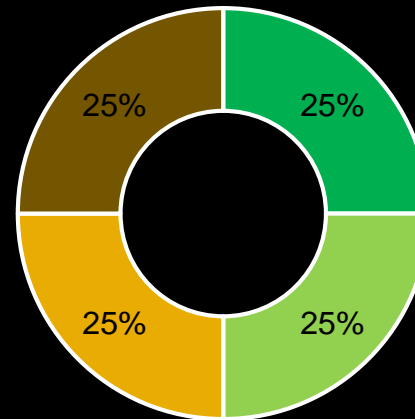
Number of people covered

30 000



Number of people remaining

SANITATION LEVELS



■ Safely managed sanitation

■ Basic sanitation

■ Limited sanitation

■ Unimproved sanitation

End of Game



All players have **lost**,

If at the end of a round:

- River is fully polluted
- More than 4 disease dice on the board
- Not enough food

If the players have not lost, then the player with the most points at the end of Round 4 **Wins!**

Let's play!

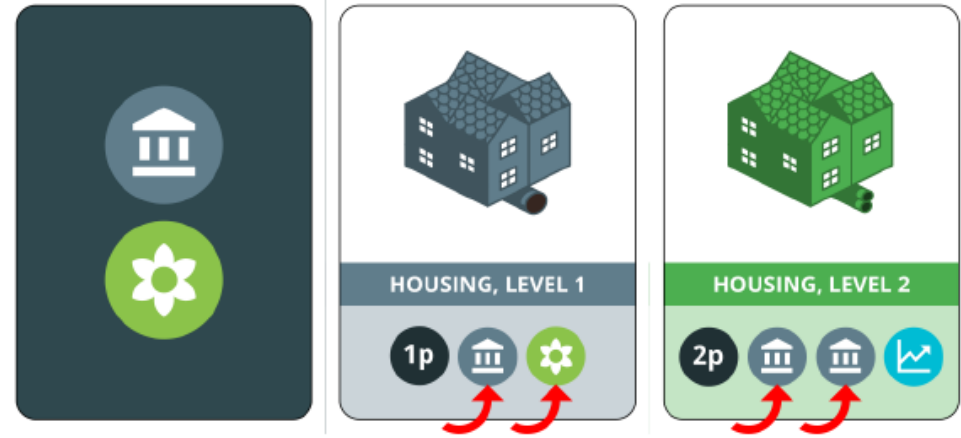


Counting Points



Points for Infrastructure

Points for Hidden Agendas



Post-discussion



Presentation of overall results (*Excel model*)

- How do you think that you performed?
- Do you wish you had played differently? In what way?
- In what ways does this game reflect reality?
- Can you apply lessons from this game in your own work?

(Present the Reuse-Compilation)

- What else is missing to improve the sanitation situation in your town?
- What more knowledge is needed to improve the sanitation situation in your town?
- What can you start working with now?

SPANS TEAM



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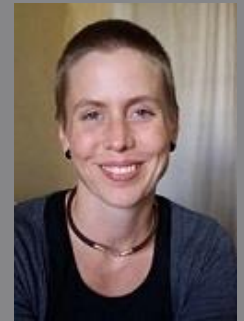
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