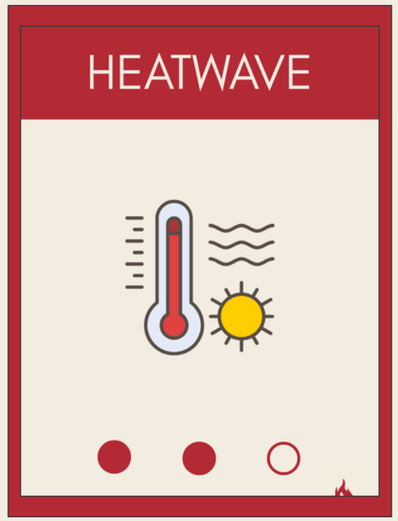
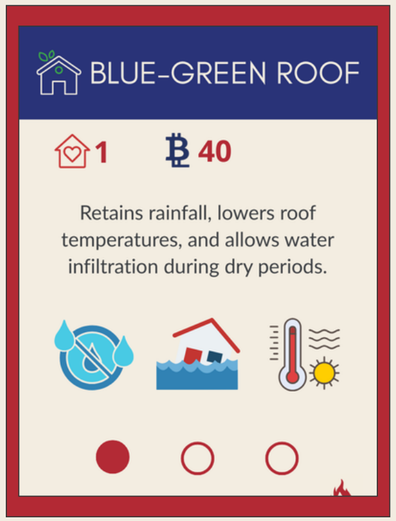
Milica Mijailović, Daan Roos, Hedda Bos, Jessica Muller, Ioannis Dravilas, Yağmur Kenar, and Evita Krasauskaite (VU Amsterdam)

BURNING LOWLANDS

CLIMATE ADAPTATION GAME







The Lowlands are burning.
Climate risks are rising.
Choices are yours.
Will you adapt in time?



D-LAB DEMONSTRATOR LAB AMSTERDAM

VU Dream Teams

PROBLEM

only 46% people in NL believe they will need to adapt their way of life due to climate change

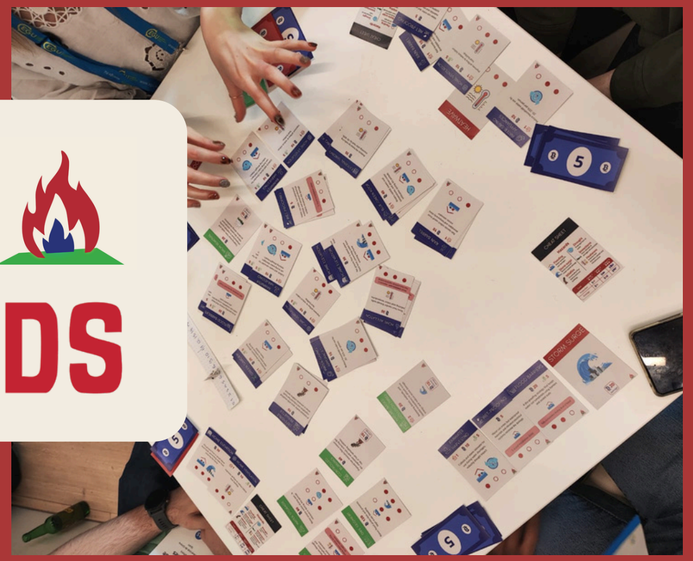
(EU average: 72%)

rising climate risks BUT

public preparedness remains limited

SOLUTION

BURNING LOWLANDS



a collaborative serious game on **climate adaptation and decision-making under uncertainty.**

OVERVIEW

You are a homeowner trying to **protect your household** and **help the Lowlands stay livable** in the face of increasing climate hazards.

- drought
- wildfire
- flooding
- storm surge
- heatwave
- snowstorm

MAIN GOALS

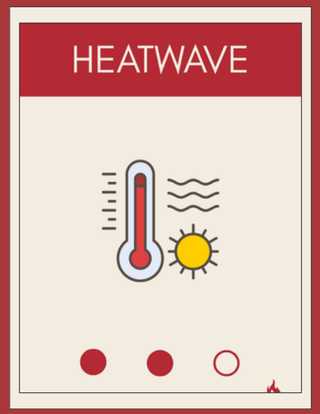
INDIVIDUAL GOAL

Protect your own household and finish with the most BL (money).

COLLECTIVE GOAL

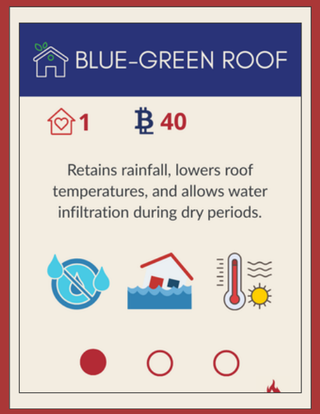
Work together to keep the city livable - if the **livability score** reaches 0, everyone loses.

MAIN ELEMENTS



HAZARD CARDS

INDIVIDUAL ADAPTATION CARDS



COLLECTIVE ADAPTATION CARDS





VU Dream Team
Burning Lowlands

GAMEPLAY

GET INCOME
+ 25 BL each round

PAY TAXES
-5 BL to the shared poll

BUY & PREPARE
Buy cards, receive subsidies, vote on collective card

FACE HAZARDS
Draw hazard card

RESOLVE DAMAGE
Pay damage (if any)

UPDATE LIVABILITY
Adjust livability score

SURVIVE 5 ROUNDS
and keep the city livable!



@vu_burning_lowlands

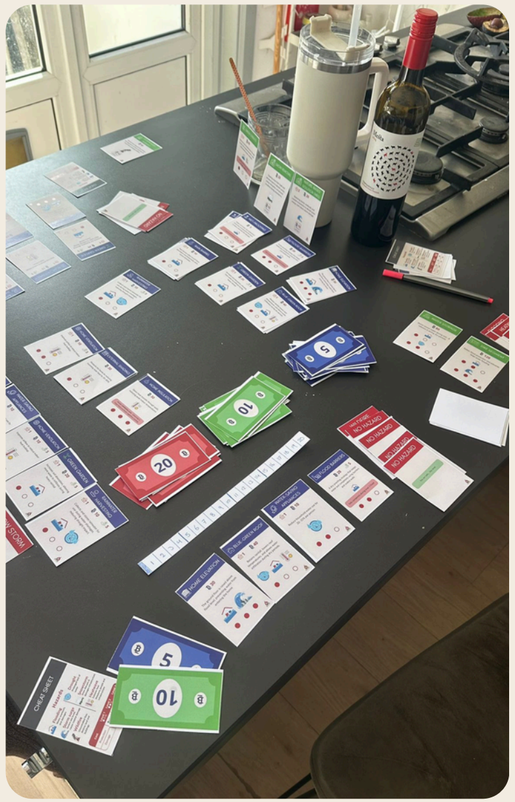
PICO1b.3

Game Development & Testing













Key Findings: Pre-Post Questionnaire

Matched sample: **11 participants**
Overall pattern: Scores **increased** across all outcomes

Significant results

	Absolute Increase*	*p*
Risk Awareness	+0.73	.012
Perceived Likelihood	+0.58	.017
Self-efficacy	+0.77	.018
Collective Knowledge	+1.00	.019

*on an 1-7 Likert Scale

Takeaway

The intervention appears strongest at improving risk awareness, collective adaptation knowledge, perceived likelihood, and self-efficacy. However, more data is needed to draw conclusions.

Not Statistically Significant:

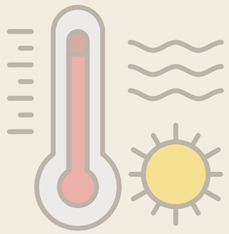
Individual adaptation knowledge, Severity perception (borderline, p = .051), Collective efficacy, Individual intention, and Collective intention

Hazard Card Logic

WHY THESE 6 HAZARDS

- Key **climate risks in the Netherlands** (flood, heat, drought)
- **Compounding** can be represented (e.g., drought → heat/wildfire)
- **Individual + collective decisions** can both be represented





- **Controlled randomness** (cards, not exact probabilities)
- **8 blanks** → recovery time, realism
- **17 hazards** → based on **relative frequency**

CARD DISTRIBUTION

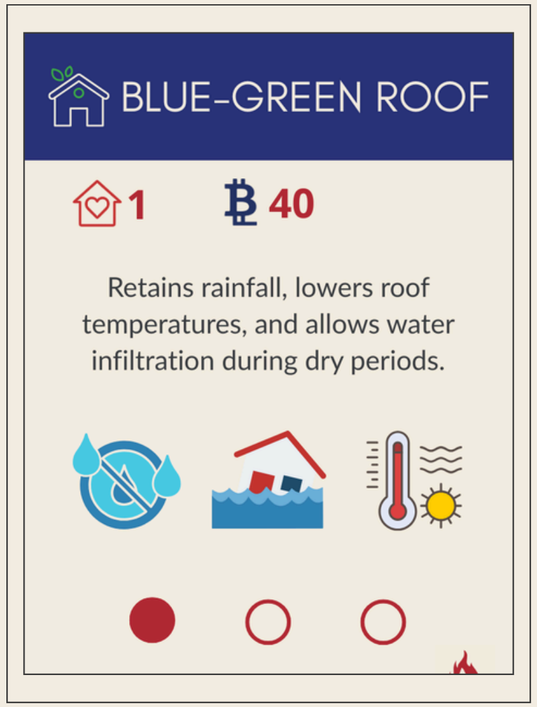
Adaptation Card Logic

The selected adaptation measures are informed by Dutch climate policy, represent all six hazards included in the game, and are **designed to simulate trade-offs between adaptation costs and levels of protection**.

INDIVIDUAL ADAPTATIONS (12 TYPES)

e.g.

- Home Elevation
- Green Garden,
- Home Insulation,
- Defensible Perimeter



COLLECTIVE ADAPTATIONS (6 TYPES)

e.g.

- Dike Segment
- Water Storage,
- Controlled Burning
- Nature-Based Solutions

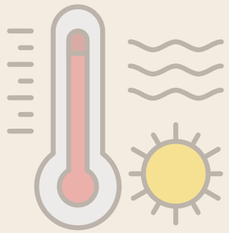


BURNING LOWLANDS
GAME INSTRUCTIONS



The Lowlands are under pressure.
Extreme weather events are becoming more frequent & intense. In this game, you must protect your household while working together to keep the city livable. As a Lowlands citizen, how would you adapt yourself and the city to survive it?





1

GAME MATERIALS



Hazard deck (see breakdown below)



Individual adaptation deck (blue)



Collective adaptation deck (green)



4 Cheat sheets

BL money tokens



x30 x15 x15

- **drought** x3
- **wildfire** x2
- **flooding** x6
- **storm surge** x1
- **heatwave** x4
- **snowstorm** x1
- **no hazard** x8

2

ROUND STRUCTURE

Each round follows these steps:

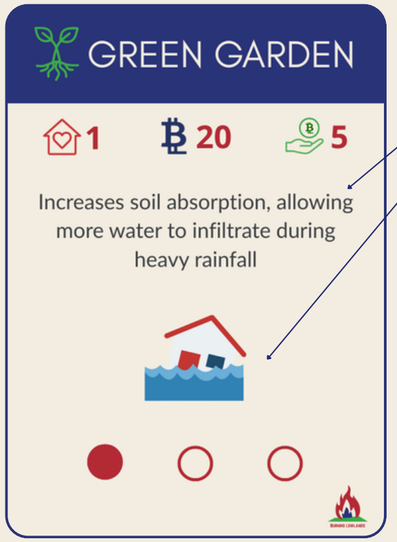
1. Collect income (+25 BL)
2. Pay taxes (-5 BL to shared pool)
3. Buy individual adaptations
4. Receive subsidies (if applicable)
5. Vote on collective adaptations (using tax pool)
6. Draw hazard cards (1 per player)
7. Resolve damage
8. Update livability score

Then, the next round starts.

3

INDIVIDUAL ADAPTATIONS

Individual cards help protect your household from specific hazards.



Description of the adaptation measure

Hazard(s) it protects from

COST
Pay this amount of BL to buy the card

LIVABILITY
How much livability rises if 2 players have this card; if all players have it, extra +1

SUBSIDY
Receive immediately when you buy the card, and again at the start of each round

PROTECTION — How much damage the card reduces for the hazard(s) shown on the card

- You can buy multiple adaptation cards.
- You can have > 1 card protecting the same hazard - their protection levels add up.

4

HAZARDS & DAMAGE

Each player draws 1 hazard card.



STEP 1: CHECK THE HAZARD

Look at the hazard type & level (1-3)

STEP 2: CHECK YOUR PROTECTION

Add up your protection levels for that hazard from your individual cards

STEP 3: CALCULATE DAMAGE

To pay = Hazard damage - Your protection

LEVEL	DAMAGE	PROTECTION
● ○ ○	฿ 10	฿ 10
● ● ○	฿ 25	฿ 20
● ● ●	฿ 45	฿ 30

EXAMPLE

- You draw a level 3 flood (45 BL damage)
- You have level 2 flood protection (20 BL protection reduction)
- You pay: 45 - 20 = 25 damage

5

SPECIAL HAZARDS

When drawn, these hazards affect all players.



wildfire



storm surge



snowstorm

For each of these, the damage is 20 BL per player

Special cards do NOT affect the livability score.



THE WILDFIRE CONDITION

A wildfire only occurs if a **heatwave** or **drought** occurred in the same or previous round.





6

LIVABILITY SCORE

After all players resolve their damage payments:

1. Each unprotected hazard level reduces the city's livability score
2. Collective adaptation cards can reduce this impact
3. Some cards increase livability

LIVABILITY LOSS FROM HAZARDS

YOUR PROTECTION LEVEL FOR THE HAZARD − **HAZARD LEVEL**

LIVABILITY INCREASE

Some individual or collective cards increase the livability score; apply these after calculating the losses

If livability reaches 0, all players lose

COLLECTIVE ADAPTATIONS

Collective cards benefit the whole city and are paid for using the tax poll.

HOW IT WORKS

- Players must vote to purchase a card.
- A card is purchased if more than half the players agree.
- Only 1 collective card can be purchased per round.
- Unused tax money carries over to the next round.
- Collective cards can reduce the livability loss from hazards, or provide other city-wide benefits.

EXAMPLES OF COLLECTIVE EFFECTS

- Reduce the livability loss from a hazard
- Increase the city's livability score
- Provide shared protection or resources

SUMMARY

GET INCOME
+ 25 BL each round

PAY TAXES
-5 BL to the shared poll

BUY & PREPARE
Buy cards, receive subsidies, vote on collective card

FACE HAZARDS
Draw hazard card

RESOLVE DAMAGE
Pay damage (if any)

UPDATE LIVABILITY
Adjust livability score

SURVIVE 5 ROUNDS
and keep the city livable!

THE END



BURNING LOWLANDS

GAME