Twilight Valley

暮色山谷

Group of Milky Dragons

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Our project studies the impact of climate and natural disasters in the UK, analyzing the role of climate change and environmental pollution in disasters to provide scientific evidence for risk assessment and disaster reduction policies. By integrating our research into a board game, we make climate concepts more accessible through interaction and entertainment, increasing public awareness of environmental issues, promoting responsible lifestyles, and advancing sustainable development.

Context - Climate Crisis

Sea Level Rise

Loss of Biodiversity and Ecosystem Disruption

Ocean Acidification

Impacts on Human Health

Water Scarcity and Resource Stress

Global Warming and Rising Temperatures

Extreme Weather Events

Progress - Our Focus 1.0

UK Disaster Policies

- **National Risk Assesment**
  identifies the threats.
- **Flood Defence Investment**
  mitigate specific risks.
- **Community Preparedness Programs**
  mitigate specific risks.
- **Emergency Response Framework**
  mitigate specific risks.
- **International Collaboration**
  enhances global cooperation.
- **Climate Change Adaptation**
  prepares the nation for future, evolving risks.

Personal Experience

'There was heavy rain and flooding in London before, and the first floor of our apartment got submerged.'

'It was like a tornado, the noise. The sky went a horrible colour... branches off the tree, corrugated iron flying.'

'We were right at the top and there were very high winds and the service hatch on the pod got blown off... The wind was so strong it actually ripped an access hatch off the top of the pod we were in.'

'London is often windy. I couldn't move at all while cycling on the road before, and I felt like I was about to be blown away.'

Progress - Our Focus 1.1 - Flood

3 Main Flood Risks

River Water

This is not just from the Thames, but also many smaller rivers that flow into it.

Tidal Surges

The Thames Barrier and other defences protect large parts of London, but thousands of properties remain at high or medium risk.

Surface Water

At least a hundred thousand properties are at high or medium risk.

Mitigation Measures

'In February 2014, the London Assembly unanimously called on the Mayor to identify funding for further river restoration projects.'

(Greater London Authority, 2014)

'Since 1982, the Thames Barrier, and associated defences, have protected London from tidal surges'.

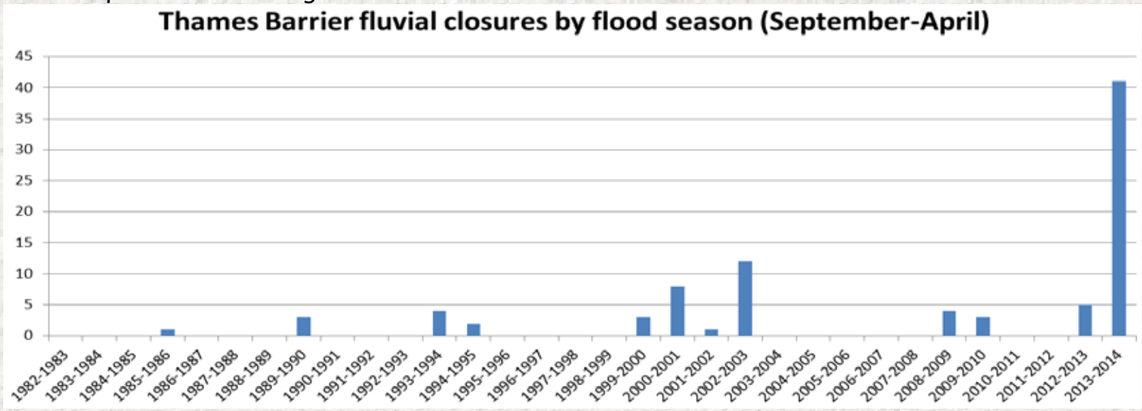
(Greater London Authority, 2014)

'sustainable drainage reduces the flood risk from heavy rain: it allows water to stay on-site, rather than running off quickly into drains or areas vulnerable to flooding'.

(Greater London Authority, 2014)

Thames Barrrier Fluvial Closures

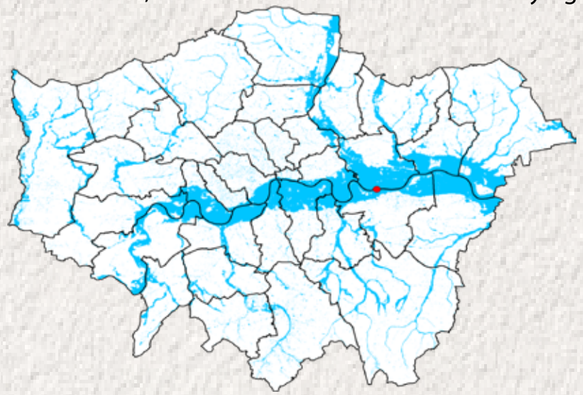
The bar graph below indicates a rising frequency of Thames Barrier closures over years. According to the Environment Committee's report, *Flood Risks in London*, the anticipated impacts of climate change in southern England may involve drier summers and wetter winters. Increased heavy rainfall in the Thames region could result in more frequent river flooding in London.



(Greater London Authority, 2014)

The Thames Barrier

The Thames Barrier is a vital flood defense system for London, designed to protect the city from tidal surges and river flooding. Its primary function is to prevent high tides and storm surges from the North Sea from pushing water up the River Thames, which could otherwise flood low-lying areas of London.



(Greater London Authority, 2014)

Progress - Our Focus 1.2 - Wind

Main Wind Disasters

Strong Winds
London often experiences strong winds during the winter months.

Gusts
Gusts are sudden bursts of high-speed wind.

Storm Surges
It can still cause the Thames River's water levels to rise, potentially leading to localized flooding.

Remnants of Hurricanes
London is not directly hit by hurricanes, but remnants of hurricanes from the Atlantic can bring severe winds and heavy rainfall.

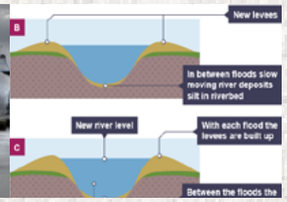
Gales
Gales are defined as winds with speeds of 34 knots (about 62 km/h) or higher. London experiences gales occasionally, often accompanied by adverse weather conditions like heavy rain or hail, posing threats to infrastructure, transport, and personal safety.

Mitigation Measures

· Weather Monitoring and Early Warning Systems
· Building Regulations

· Transportation and Structural Safety
· Public Awareness

· Thames Barrier
· Levee and River Management



· Inter-Agency Collaboration
· Municipal Emergency Response

· Wind-Resistant Infrastructure
· Emergency Evacuation and Rescue Plans

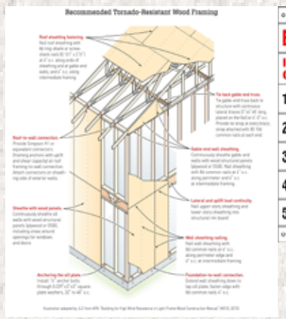
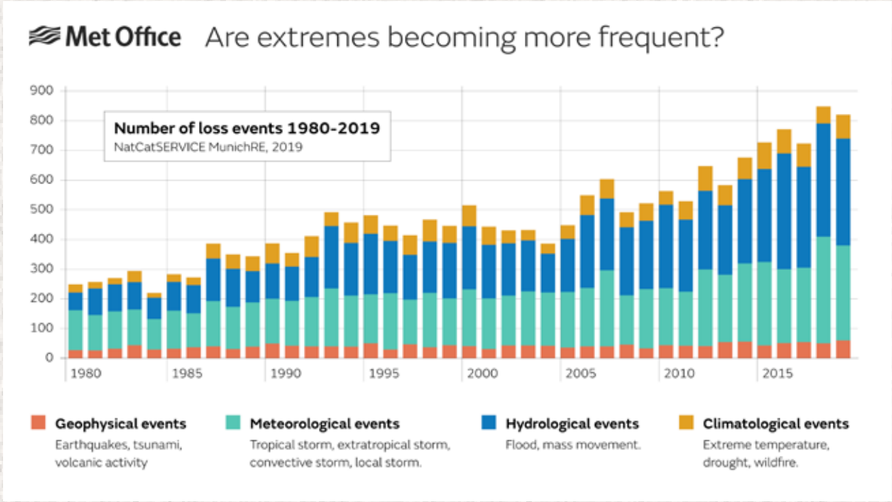


Diagram shows in Met Office Web

This graph from Munich RE shows events causing loss are becoming more frequent.

The green bars represent meteorological events, including wind-related events such as tropical storms, extratropical storms, and local storms. Over the years, the green section has significantly grown, indicating an apparent rise in wind-related meteorological disasters. This suggests that wind-related events are becoming more frequent and likely linked to the effects of climate change.



Progress - Why Choose Wind as Our Main Focus?

Differences in Prevention Systems

London has a relatively well-established flood prevention system, including dams, drainage systems, and emergency response measures.
In contrast, due to their unpredictability, wind disasters have underdeveloped prevention and mitigation systems.

Design Focus:
The Uniqueness of Wind Disasters

Our design focuses on responding to and cooperating in the face of wind disasters rather than floods to explore how to address this unpredictable natural disaster.
The design simulates wind disaster scenarios, encouraging players to collaborate and strategize to cope with unknown threats.

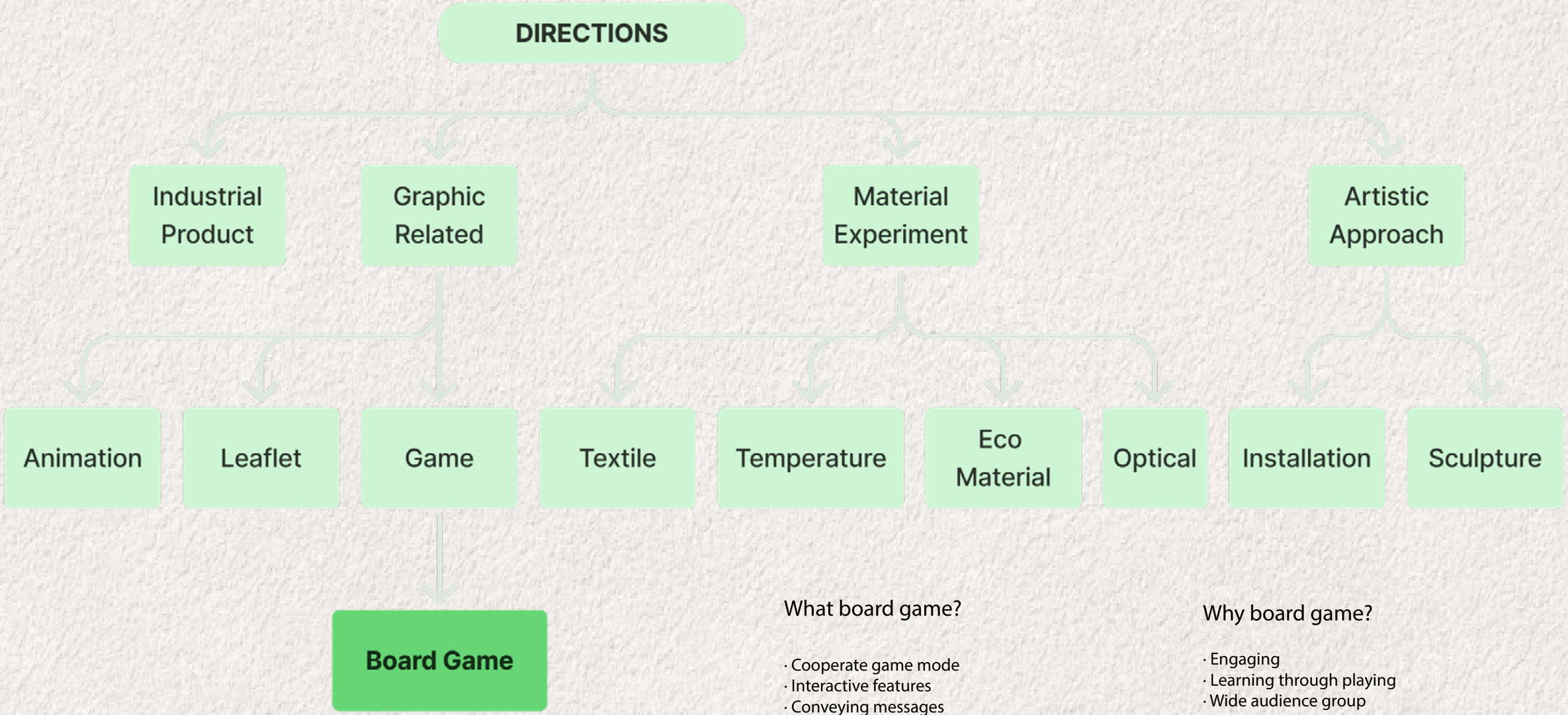
The Unpredictability of Wind Disasters

Wind disasters are difficult to predict in intensity, direction, and timing, making prevention measures more challenging.
This unpredictability means that emergency systems are insufficient to address wind disasters effectively.

Raising Awareness
of Wind Disaster Prevention

Through the design, we aim to raise awareness of wind disaster emergency systems and stimulate the development of more forward-thinking and innovative prevention measures.

Proposal Direction



What board game?

· Cooperate game mode
· Interactive features
· Conveying messages
· Encouraging actions

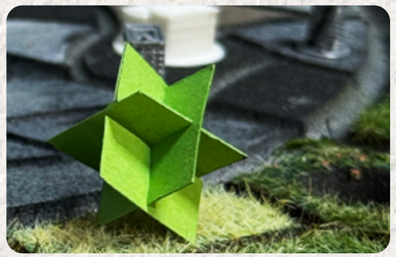
Why board game?

· Engaging
· Learning through playing
· Wide audience group
· Raise awareness

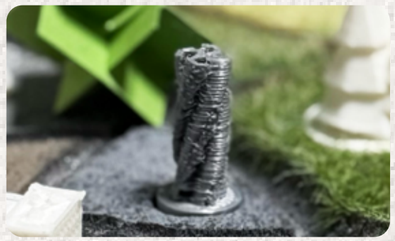
Output Overview

Wind Mechanism

Forest



Character



Wind Power Station

Damage Level

Wind Level

Building Token

Forecast Center

Game Setup & Play

1. Set out the board and pieces

· Fill the city region with level one building tokens
· Place one tree token in each forest region (six in total)
· Place the Damage Level token at zero on the track
· Place the Wind Level token on the level one spot
· Place rest of the tokens at the storage slots
· Place the Wind Blower aside

2. Deal out starting Player Cards

Place the Windstorm Cards aside, shuffle the rest of the Player Cards and deal out cards according to the number of players:

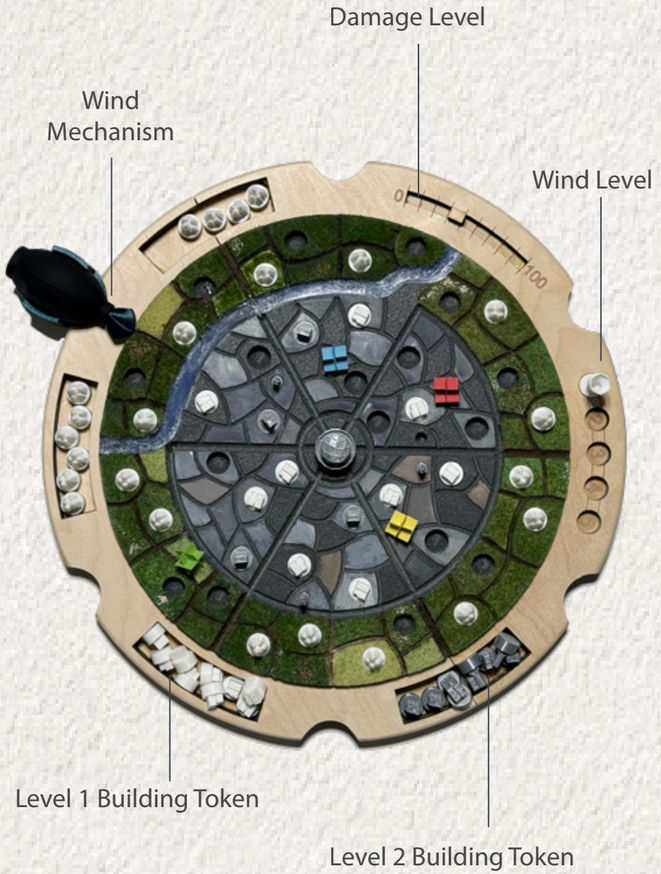
2 player - 5 cards
3 player - 4 cards
4 player - 3 cards

3. Prepare the Player Deck

Shuffle the rest of the Player Cards with the Windstorm Cards

4. Select Characters

Each player select a character and take the pawn with the corresponding colour. Place all the pawns in the centre of the map (research station).



Game Play

Each player turn is divided into 4 steps:
1. Do 4 actions
2. Draw 2 cards
3. Windstorm
4. Check damage level

Action Phase

Each action spends one action point. Player can spend 4 actions points on any of these options:
1. Playing a card
2. Move to one adjacent grid
3. Character abilities (specified on card)

Draw Phase

Draw 2 cards from the Player Deck and add them to player's hands. Maximum hand limit is 10,

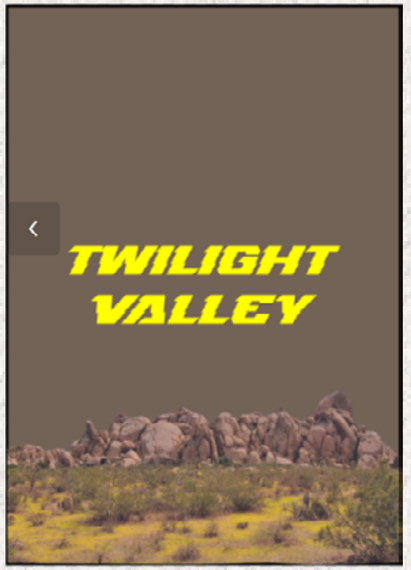
Wind Phase

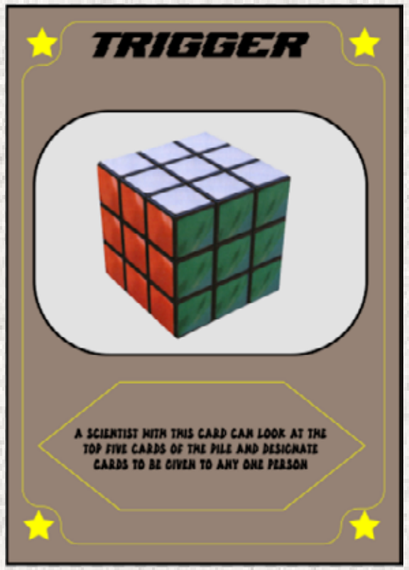
If there is any Windstorm Card from the 2 cards player drew, begin the windstorm phase by throwing the dice to determine the direction of wind. Place the wind blower in position and activate it according to the Wind Level (Wind Level = number of pushes).

End Phase

Adjust the Damage Level according to changes on the map. Check if the Damage Level reached 80%. If yes, you lose the game. Otherwise, the player on the left continues their turn.

Game Card


TWILIGHT VALLEY

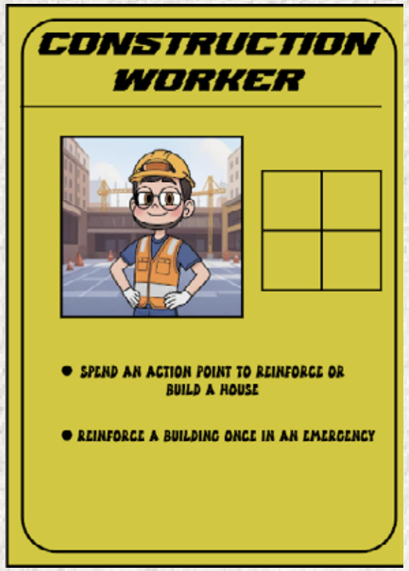

TRIGGER
A SCIENTIST WITH THIS CARD CAN LOOK AT THE TOP FIVE CARDS OF THE PILE AND DESIGNATE CARDS TO BE GIVEN TO ANY ONE PERSON


ACTION
PLAYERS CAN SPEND AN ACTION POINT TO CHANGE THEIR POSITION

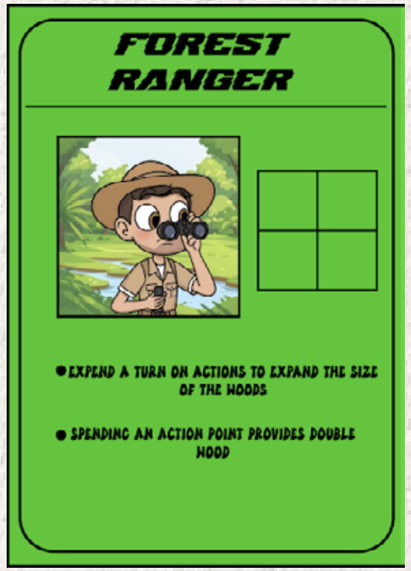

ACTIVATION
PLAYERS CAN GAIN AT LEAST TWO ACTION POINTS PER TURN (DETERMINED BY DAMAGE)


WINDSTORM
WIND RATING: 3
DIRECTION: A


ROLE


CONSTRUCTION WORKER
SPEND AN ACTION POINT TO REINFORCE OR BUILD A HOUSE
REINFORCE A BUILDING ONCE IN AN EMERGENCY


EMERGENCY SPECIALIST
YOU CAN SPEND 1 ACTION POINT TO CHANGE THE DIRECTION OF A WINDSTORM
BUILDING MATERIALS CAN BE PROVIDED ON AN EMERGENCY BASIS


FOREST RANGER
EXPEND A TURN ON ACTIONS TO EXPAND THE SIZE OF THE WOODS
SPENDING AN ACTION POINT PROVIDES DOUBLE WOOD


SCIENTIST
YOU CAN WATCH THE FOUR CARDS ON TOP OF THE PILE AND SWAP THE ORDER OF ONE OF THEM.
ACTION POINTS FOR SPECIAL WINDBREAKS

Player Journey Map

Stages	Onboarding	Early Game	Mid Game	Late Game	End Game
Actions & Strategies	• Choose roles and allocate initial resources • Understand game rules • Discuss step-by-step strategies	• Decide whether to accumulate resources or build in advance • Initial cooperation	• Rebuilding or continue constructing existing buildings • Respond to initial disasters • Cooperate or compete with other players	• Emergency construction or survival • Decide which regions to abandon and protect • Compete for key resources vs. final cooperation	• Calculate final damage level • Review different players' decisions
Challenges	• Difficulty in understanding rules • New players may not be clear on optimal strategies	• Resource management (saving vs. early investment) • Uncertainty in early game decisions	• Increased resource consumption • Changes in player interactions and trades	• Resource shortages • Severe Impact from wind disaster • Final decision-making pressure	• Whether victory conditions are met • Reflect on whether strategies were optimal
Emotions					
Interactions	🎮 Choose the character 📜 read the rule 🎲 Throw the dices	🎴 Drawing cards (possible disaster events) 🌪️ Operate the wind 🏡 initial construction/ reinforcement	🎴 Cards Intrigue the wind disaster 🌪️ forest cards determine survival 🏗️ Houses collapse and repair required	🌪️ Final disaster cards may determine life and death, 🏚️ Last reinforcement of buildings	🗣️ Discuss game experience, possible rule adjustments & strategy re...

Value Proposition

Gain Creator

- Knowledge of wind disaster
- Physical interactions (wind mechanism) increase realism
- Players choose different development paths
- Balanced co-op & competition mechanics
- Random wind events & different role combinations

Game

- Multiple strategic paths (stockpile vs. build)
- Wind disasters are random but predictable
- Wind mechanism & character abilities help players
- Cooperative & competitive mechanics enhance gameplay

Pain Relief

- Scientist role can forecast wind patterns
- **Physical interaction (wind mechanism) provides better feedback**

Value Map

Gains

- Awareness of wind disaster
- Immersion
- Strategic flexibility
- Social interaction
- Replayability

Jobs

- Managing resources
- Developing strategies
- Responding to disasters
- Social interaction

Pain

- Unpredictability of wind disasters
- High resource management stress
- Complex rules for new players

Player Profile

Bibliography

1. Parliamentary Advisory Council for Transport Safety, n.d. *Safe System*. Available at: <https://www.pacts.org.uk/safe-system/> [Accessed 16 March 2025].

2. The HMO Roadmap, n.d. *Introduction to Building Regulations*. Available at: <https://thehmoroadmap.co.uk/blog/introduction-to-building-regulations/> [Accessed 16 March 2025].

3. Met Office, n.d. *About Us*. Available at: <https://www.metoffice.gov.uk/about-us> [Accessed 16 March 2025].

4. Startups Magazine, n.d. *Seven Tips for a Startup Founder to Raise Awareness*. Available at: <https://startupsmagazine.co.uk/article-seven-tips-startup-founder-raise-awareness> [Accessed 16 March 2025].

5. Carbon Brief, 2022. *Thames Barrier's Extraordinary Year Prompts Government to Reconsider Long-Term Flood Plans*. Available at: <https://www.carbonbrief.org/thames-barriers-extraordinary-year-prompts-government-to-reconsider-long-term-flood-plans/> [Accessed 16 March 2025].

6. BBC Bitesize, n.d. *How Human Activity Can Change the Size of Populations*. Available at: <https://www.bbc.co.uk/bitesize/guides/ztpkqty/revision/3> [Accessed 16 March 2025].

7. Transition Technical Assistance, n.d. *Interagency Collaboration*. Available at: <https://transitionta.org/interagency-collaboration/> [Accessed 16 March 2025].

8. Park Hills, n.d. *Emergency Management*. Available at: <https://parkhillsmo.net/safety/emergency-management/> [Accessed 16 March 2025].

9. Lstiburek, J., 2018. *Wind-Resilient Buildings*. Available at: <https://www.jlconline.com/projects/disaster-resistant-building/wind-resilient-buildings_o> [Accessed 16 March 2025].

10. Reliable Fire, n.d. *Emergency Evacuation Plans*. Available at: <https://reliablefire.com/emergency-evacuation-plans/> [Accessed 16 March 2025].

11. Met Office, n.d. *Effects of Climate Change*. Available at: <https://weather.metoffice.gov.uk/climate-change/effects-of-climate-change> [Accessed 16 March 2025].