

HUMANITARIAN ENGINEERING: LOCAL ENERGY & DISASTER RESPONSE SOLUTIONS IN REMOTE COMMUNITIES

Abstract: 456.A Systems Approach to Off-grid Hydropower for Community-led Flood Resilience

Presenter: Spyros Schismenos

Project: Hydropower for Disaster Resilience Applications (HYDRA)

6th European Conference on Energy Efficiency and Behaviour Change

HADRI's profile

3 main thematic research areas:

- Disaster Preparedness, Response and Management
- Migration and Diaspora
- Sustainable Development and Human Security



OUR MISSION:

- Bridge academia and humanitarian response, rehabilitation and development
- Inform policy decisions of government, international organisations and other stakeholders
- Ensure synergies, innovation, knowledge sharing and translation with global partners
- Engage with our university's degrees in Humanitarian and Development Studies

Consortium in Humanitarian Engineering

**WESTERN SYDNEY
UNIVERSITY**



Humanitarian and
Development Research
Initiative

AUSTRALIA

- School of Social Sciences
- Humanitarian and Development Research Initiative (HADRI)
- Western Sydney University



United Nations
Educational, Scientific and
Cultural Organization



UNESCO Chair on Conservation and
Ecotourism of Riparian and Deltaic Ecosystems
• Eastern Macedonia and Thrace Institute
of Technology (EMaTTech), Greece



CONNECT

GREECE

- UNESCO Chair on Conservation and Ecotourism of Riparian and Deltaic Ecosystems
- International Hellenic University (*former Eastern Macedonia and Thrace Institute of Technology*)



INTERNATIONAL
HELLENIC
UNIVERSITY

NEPAL

- Turbine Testing Lab
- Department of Mechanical Engineering
- Kathmandu University





AGGITIS, GREECE



SUNKOSHI, NEPAL



A photograph showing a man in a grey t-shirt wading through murky, fast-moving floodwaters. He is carrying a young child in an orange shirt on his back. The man is looking forward with a determined expression, and the child is holding onto him. To the right, a brick wall is partially submerged in the water. The water is brown and turbulent, with white foam from the current.

It's 2am, you're sleeping, and a flash flood hits your home. Without a warning system, what do you do?

February 24, 2021 6.10am AEDT

Source: <https://theconversation.com/its-2am-youre-sleeping-and-a-flash-flood-hits-your-home-without-a-warning-system-what-do-you-do-154805>

Vulnerable communities: Characteristics



- Small
- Rural
- Remote
- Low-income
- Mono-economy (e.g. agriculture)
- Riparian (live by the river)
- Power insufficiency
- High flood risk
- Poor disaster resilience
- Poor telecommunications

Source: <https://www.thedailystar.net/op-ed/reaching-the-most-vulnerable-communities-1263520>

How to support communities in need?

Early-warning
(EWS)



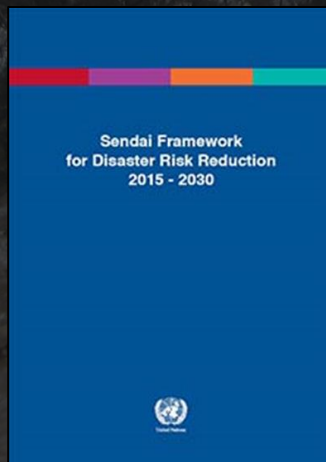
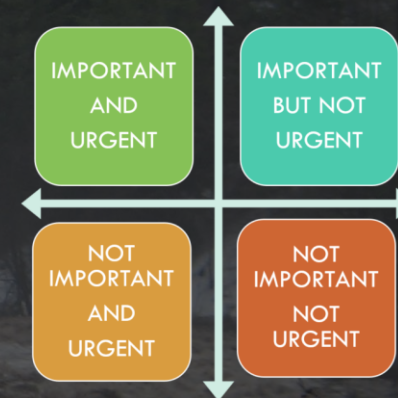
+

Local energy /
Renewables



+

Prioritizing
needs



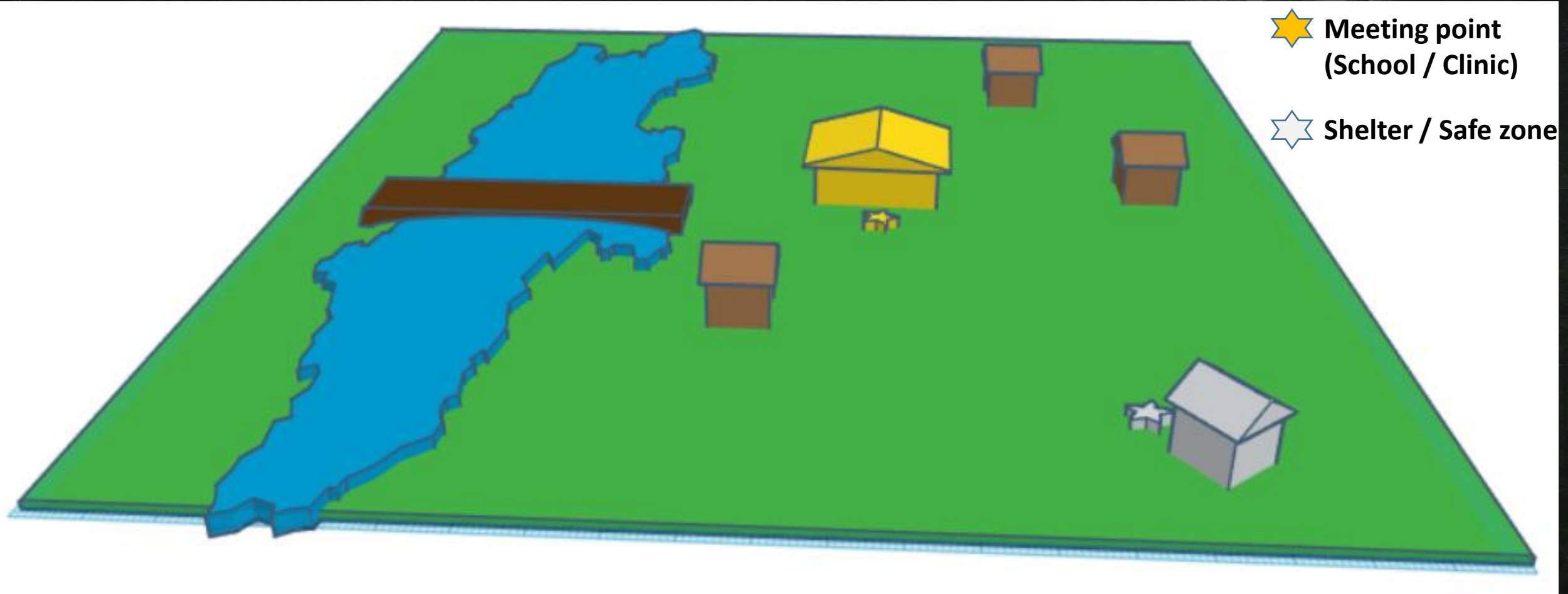
7 GLOBAL TARGETS	Reduce	Increase
	Mortality/ global population 2020-2030 Average << 2005-2015 Average	Countries with national & local DRR strategies 2020 Value >> 2015 Value
	Affected people/ global population 2020-2030 Average << 2005-2015 Average	International cooperation to developing countries 2030 Value >> 2015 Value
	Economic loss/ global GDP 2030 Ratio << 2015 Ratio	Availability and access to multi-hazard early warning systems & disaster risk information and assessments 2030 Values >> 2015 Values
	Damage to critical infrastructure & disruption of basic services 2030 Values << 2015 Values	



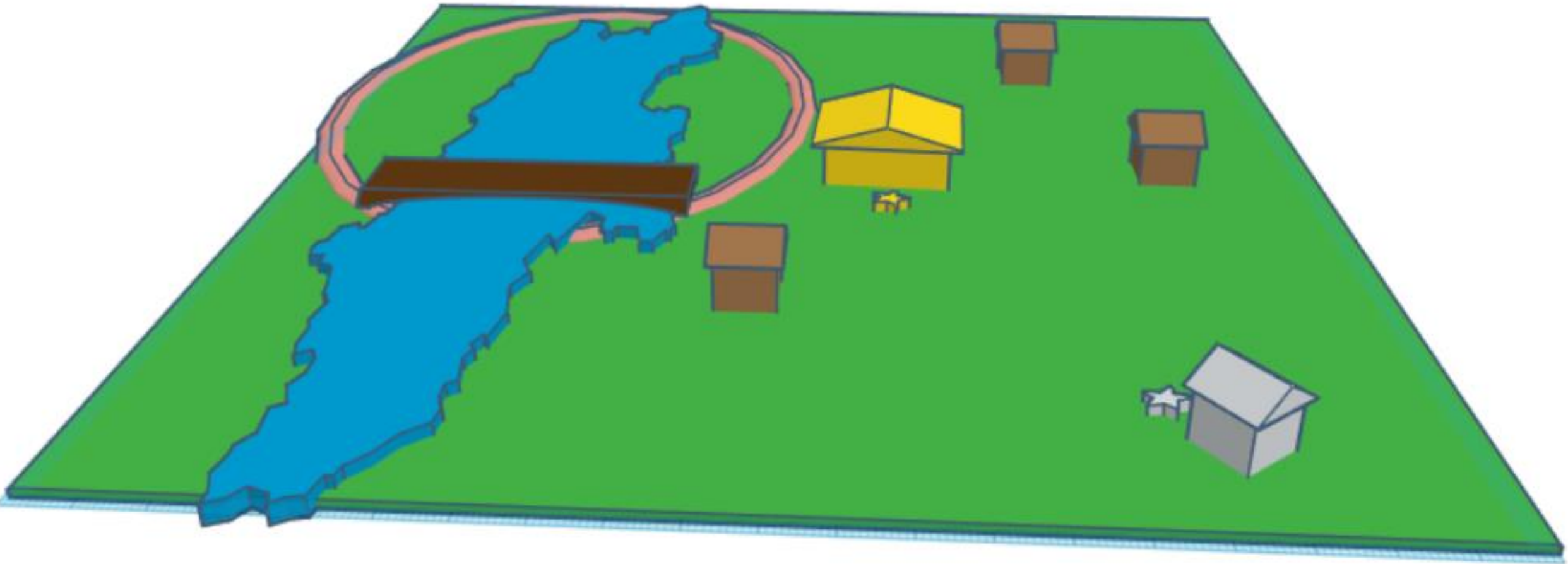
HYDRA prototype

- What is it?
- How does it work?

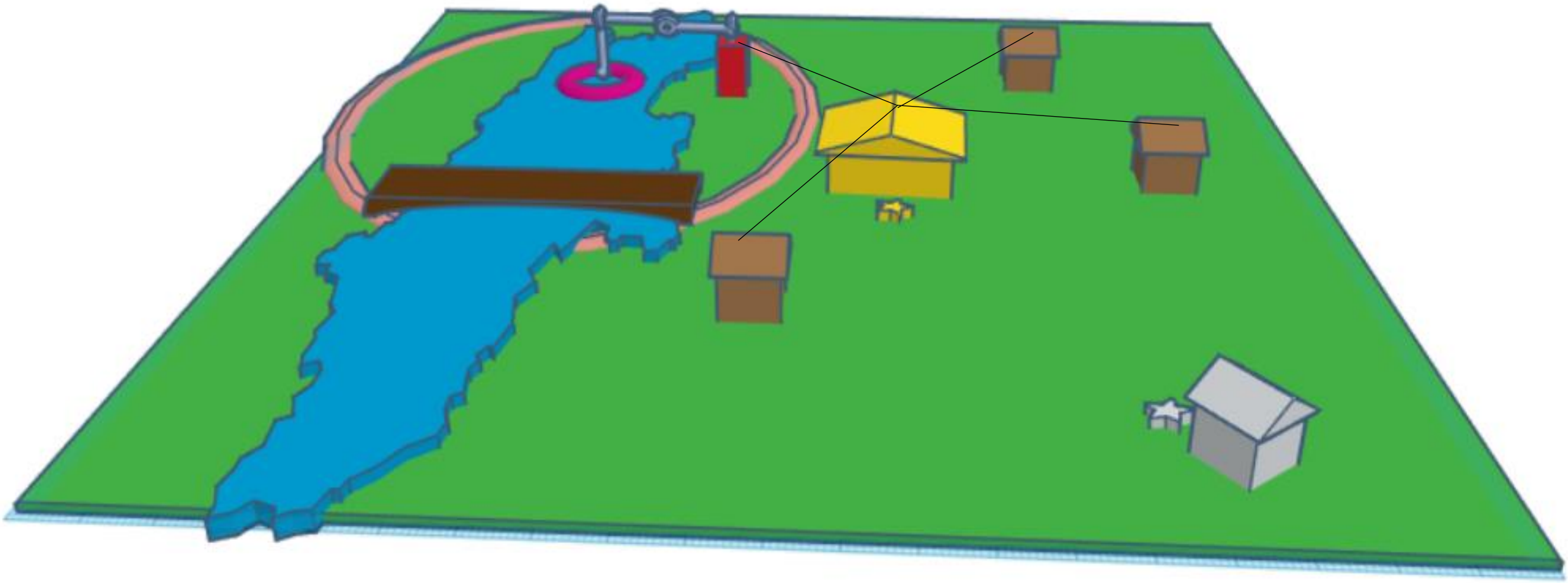
Site Selection



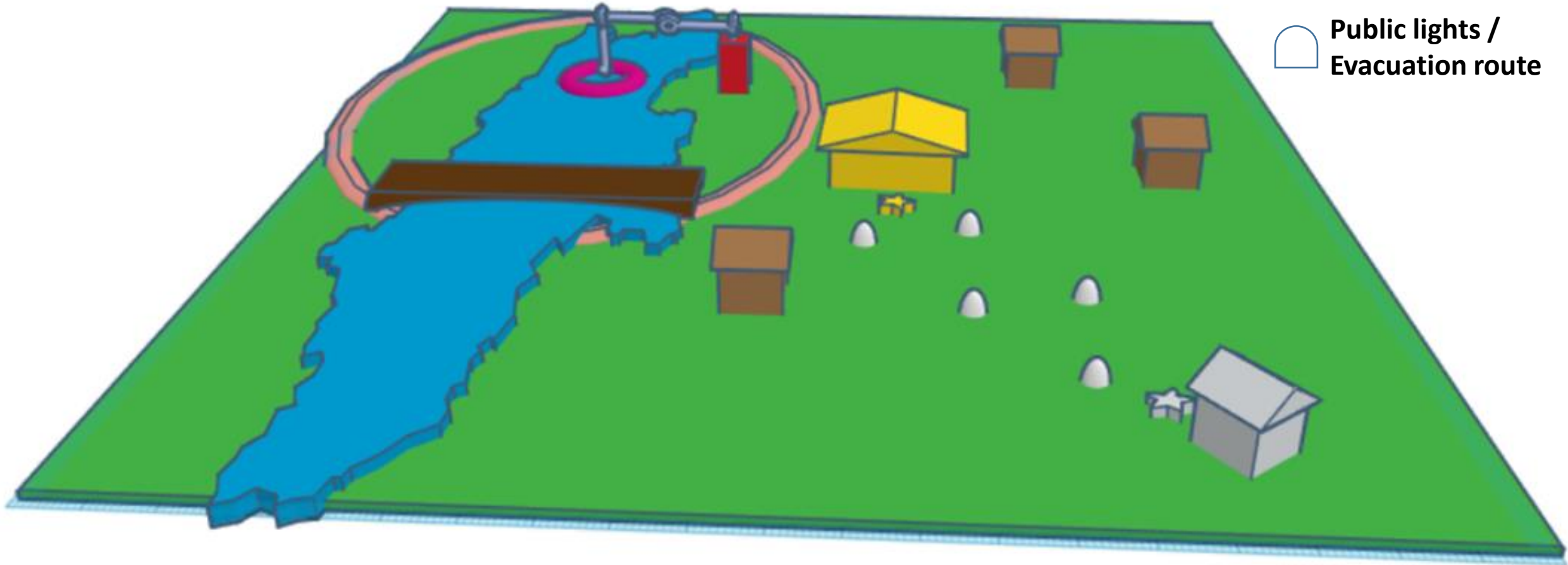
Flood Risk Estimations



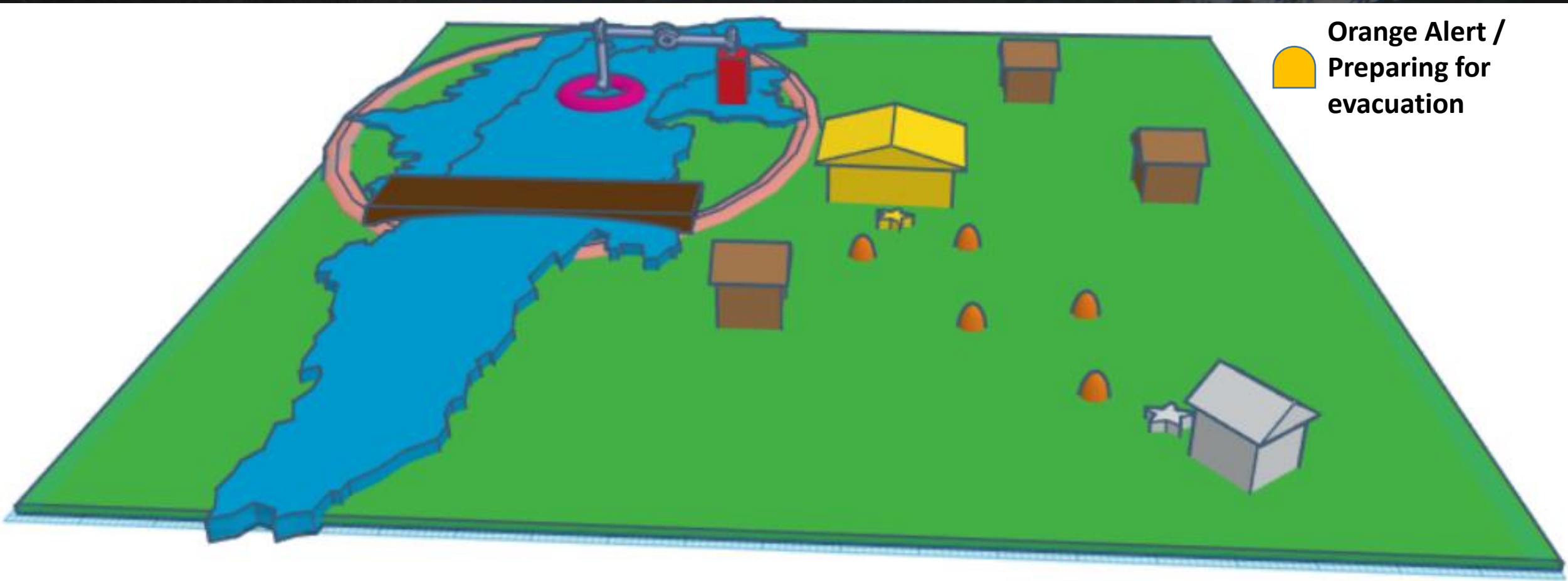
Hybrid Installation & Daily Use



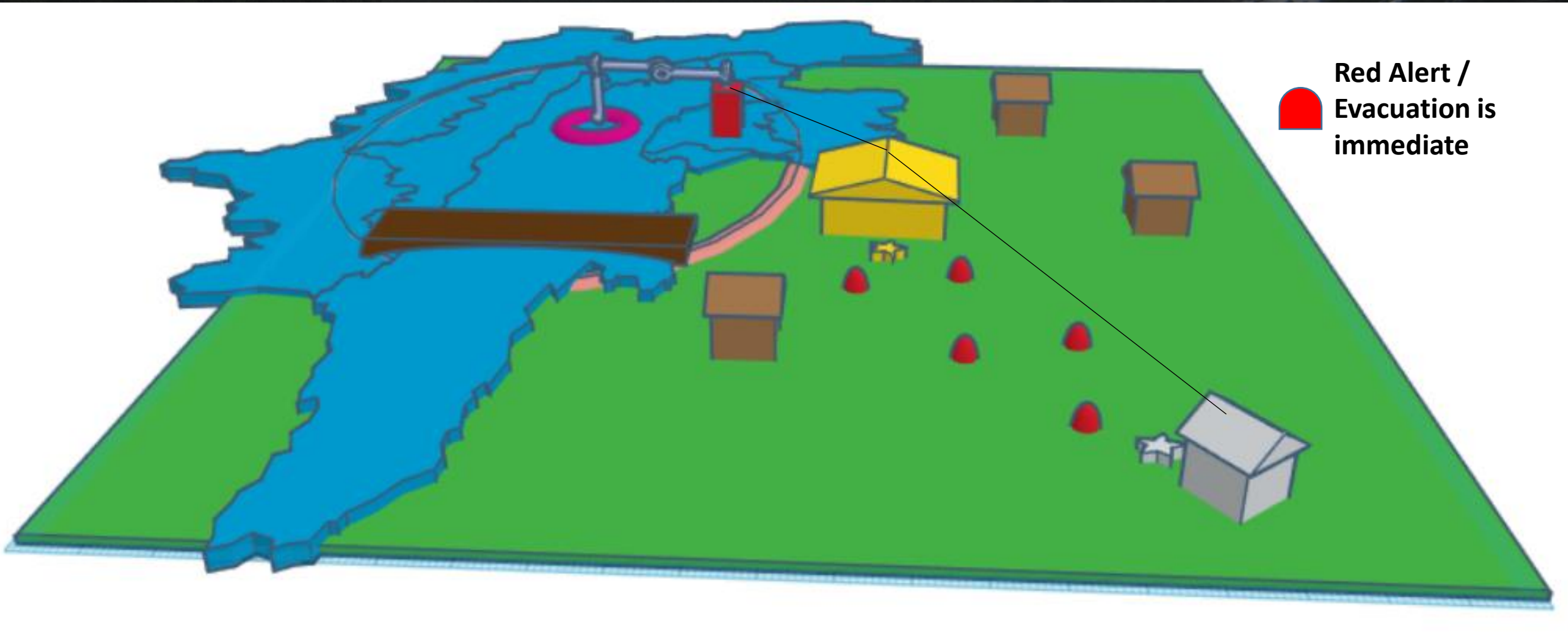
Community Disaster Preparedness



Warning for Upcoming Flood



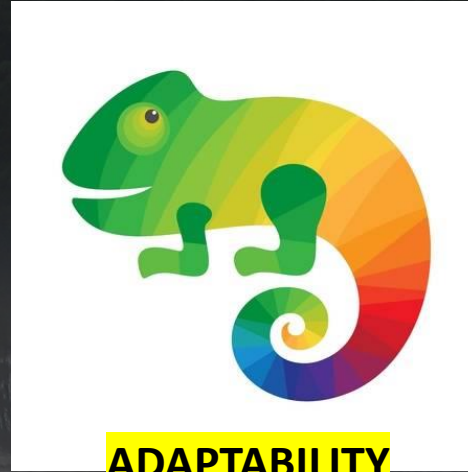
Evacuation Plan



Features



WORKABILITY 24/7



ADAPTABILITY



PORTABILITY



DIY/EDO



COMMUNITY ENGAGEMENT



AFFORDABILITY

Q & A -

For inquiries and collaboration ideas reach us at: S.Schismenos@westernsydney.edu.au

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HADRI's website:

https://www.westernsydney.edu.au/hadri/humanitarian_and_development_research_initiative/research_themes

THANK YOU



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Please note: Some elements of this study are still under investigation and may change in content, data and research approach.