

NATURE-BASED SOLUTIONS (NBS) FOR A MORE ENGAGED SOCIETY

PROJECTS WITH CITIZEN & CHILDREN ENGAGEMENT AT THE UNIVERSITY OF TWENTE

Partner in COOLSCHOOLS WP4:

Role of perception of quality & safety of school climate shelters interactive approach of Fuzzy Cognitive Mapping (FCM) with children and teachers; Green schoolyard Assessment tool; Remote sensing heat differences

**Diana Reckien, Javier Martinez, Funda Atun,
University of Twente**







UNIVERSITY OF TWENTE.

HIGH-TECH HUMAN TOUCH



- An entrepreneurial campus university established in 1963
- Over 12,000 students
- 3,900 staff members

- Societal impact: making a real difference
- Synergy: excellence in combinations
- Entrepreneurship and innovation
- Internationalization: tomorrow's global citizens

UNIVERSITY OF TWENTE.

Faculty of Geo-Information Science and Earth Observation (ITC)
Faculty of Behavioural, Management and Social Sciences
Faculty of Electrical Engineering, Mathematics and Computer Science
Faculty of Engineering Technology
Faculty of Science and Technology

ITC is recognized worldwide for achievements in capacity development in the field of geo-information science and earth observation. We do this through **education, research and institutional strengthening/ capacity building.**



1950: ITC founded (International Training Centre for Aerial Survey)
1971: ITC moves from Delft to Enschede
2010: ITC becomes a Faculty of the UT
2023: ITC moves to UT campus



ITC FACULTY

PURPOSE

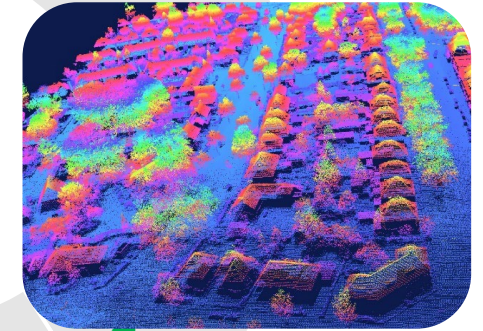
Spatial planning and governance
(Natural)Resource management
Disaster resilience

DATA COLLECTION

Satellite data
Aerial photography
Map data
Fieldwork data
Census data
Citizen Science data
Laser scan data

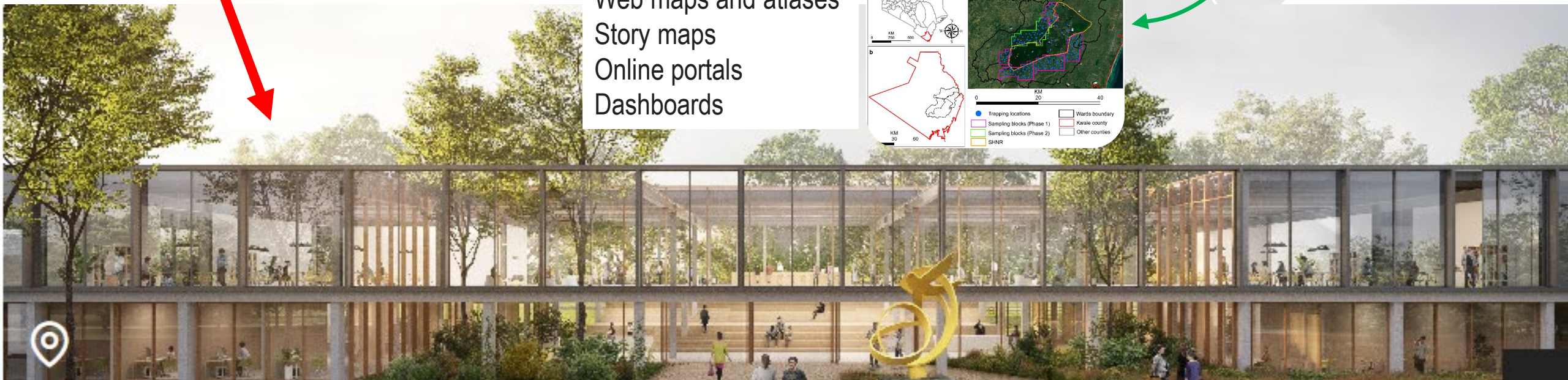
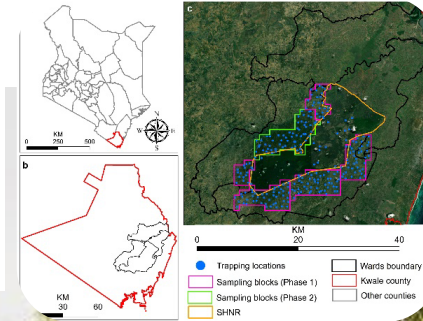


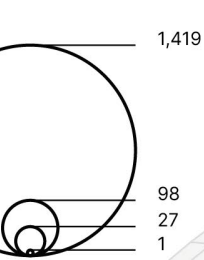
Modelling
GIS
Artificial Intelligence
Machine learning
Cloud computing
Digital Twins
GIS ANALYSIS



DATA & INFORMATION DISSEMINATION

Web maps and atlases
Story maps
Online portals
Dashboards



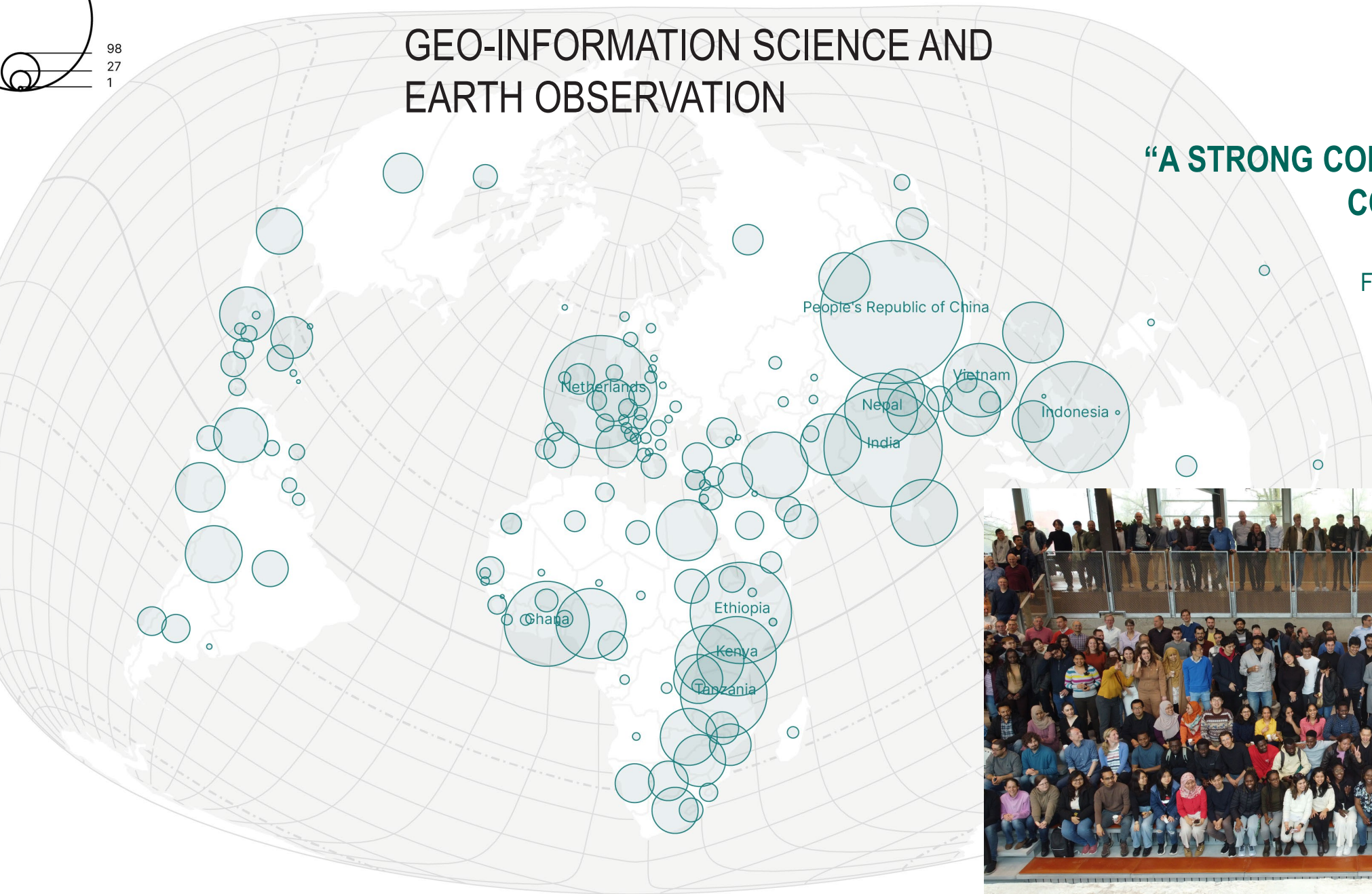


ITC FACULTY

GEO-INFORMATION SCIENCE AND EARTH OBSERVATION

ITC ALUMNI
BY COUNTRY OF ORIGIN
(AS KNOWN IN 2023)

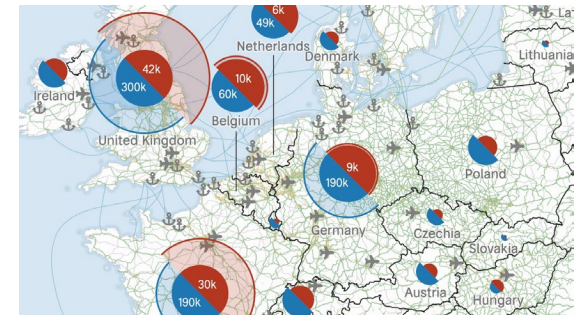
**“A STRONG COMMUNITY OF EXPERTS
COMMITTED TO A MORE
RESILIENT WORLD”**
FREEK VAN DER MEER, DEAN ITC



DEPARTMENT OF URBAN AND REGIONAL PLANNING AND GEO-INFORMATION MANAGEMENT (PGM)

Research goal:

Analyze the **spatial and temporal interactions** between people, land, and urban systems & underlying governance processes to support **inclusive planning and decision-making**



Research Clusters	Cross-cutting topics	Cross-cutting tools, methods and technologies
Sustainable Urban and Regional Futures	equity, justice, human well-being, locational privacy, geo-ethics	advanced GI&EO, 3D models and digital twins, collaborative decision-making and planning support
Responsible Land Administration and Information Modelling		
Governance of Risk		

1) Keeping track of urban green spaces in Suriname

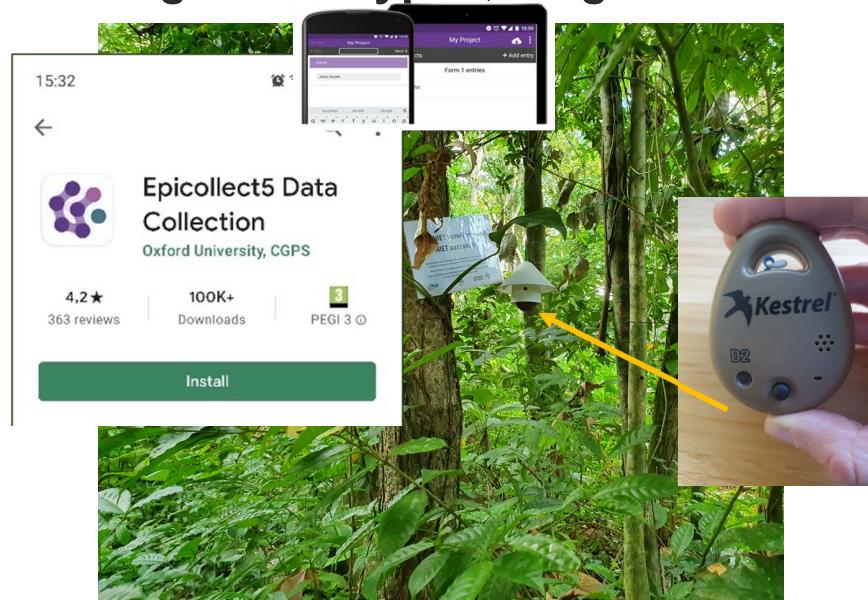
Nina Schwarz & LOUISE (Wieteke) Willemen, Robert Ohuru (UT-ITC); Lisa Best, Davita Obergh, Rudi van Kantén: TropenBOS Suriname



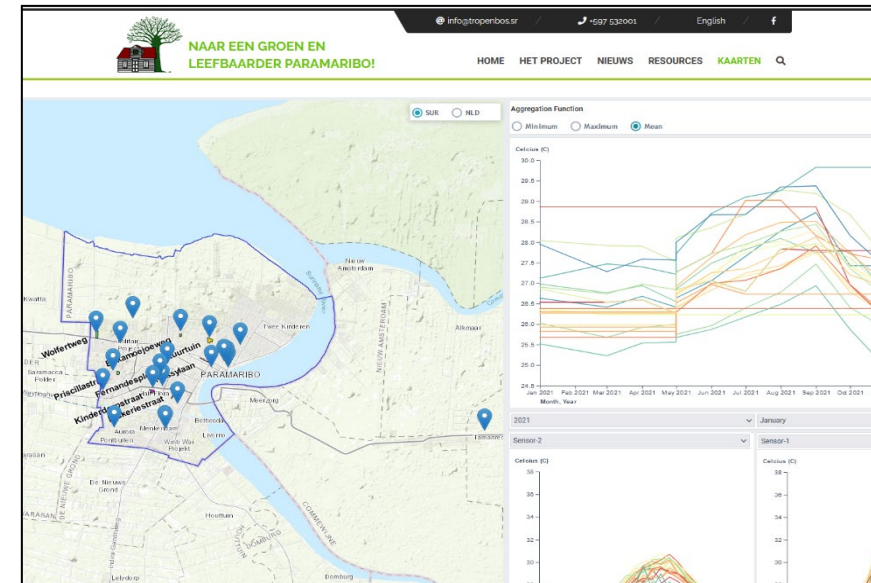
Citizen-based monitoring & learning: Capturing benefits of urban green spaces to inform and activate stakeholders in Suriname, across vegetation types, neighbourhoods, day and season



1) Community building, research training, training & education



2) Monitoring urban green spaces: survey app (offline) and sensors



3) Streamlining and sharing data for action
www.groenparamaribo.org





1) Keeping track of urban green spaces in Suriname

Nina Schwarz & LOUISE (Wieteke) Willemen, Robert Ohuru (UT-ITC); Lisa Best, Davita Obergh, Rudi van Kantén: TropenBOS Suriname

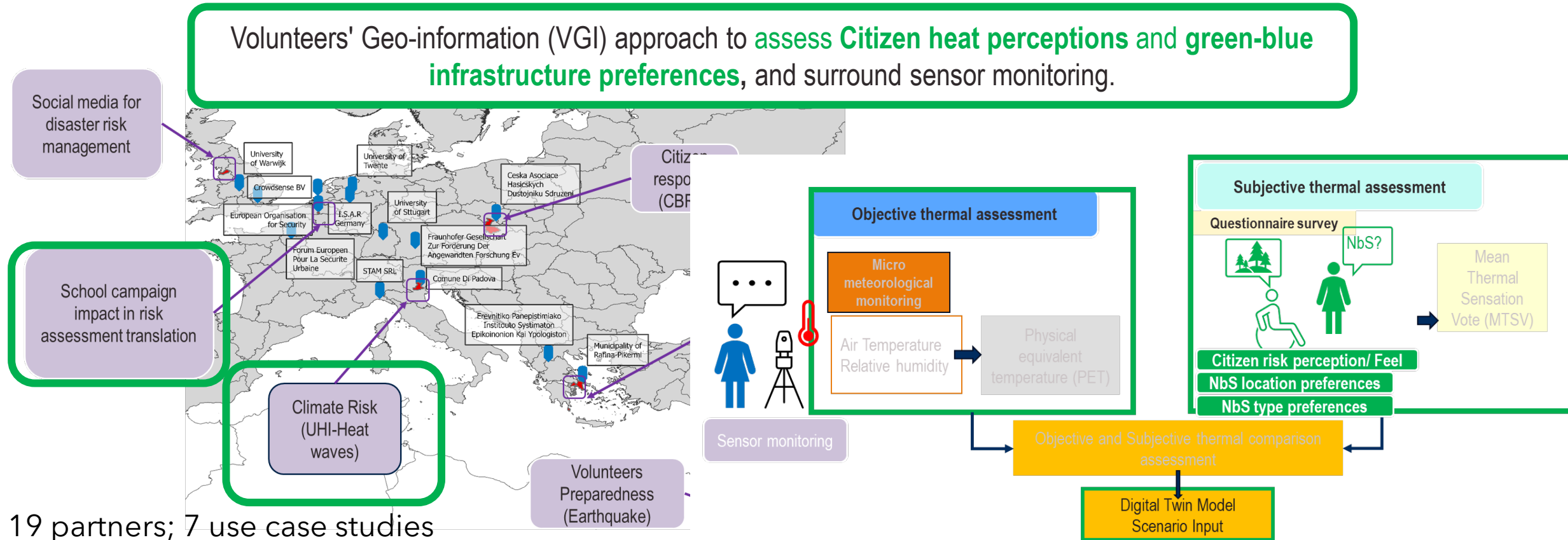
Involvement of children

1. Involvement in outreach activities (scavenger hunts, drawing contest at primary schools)
2. Schools as part of the citizen science monitoring network
3. Re-purposing the sensors for educational kits for primary schools and other organisations (e.g., scouts) on how to use sensors to explore local climate



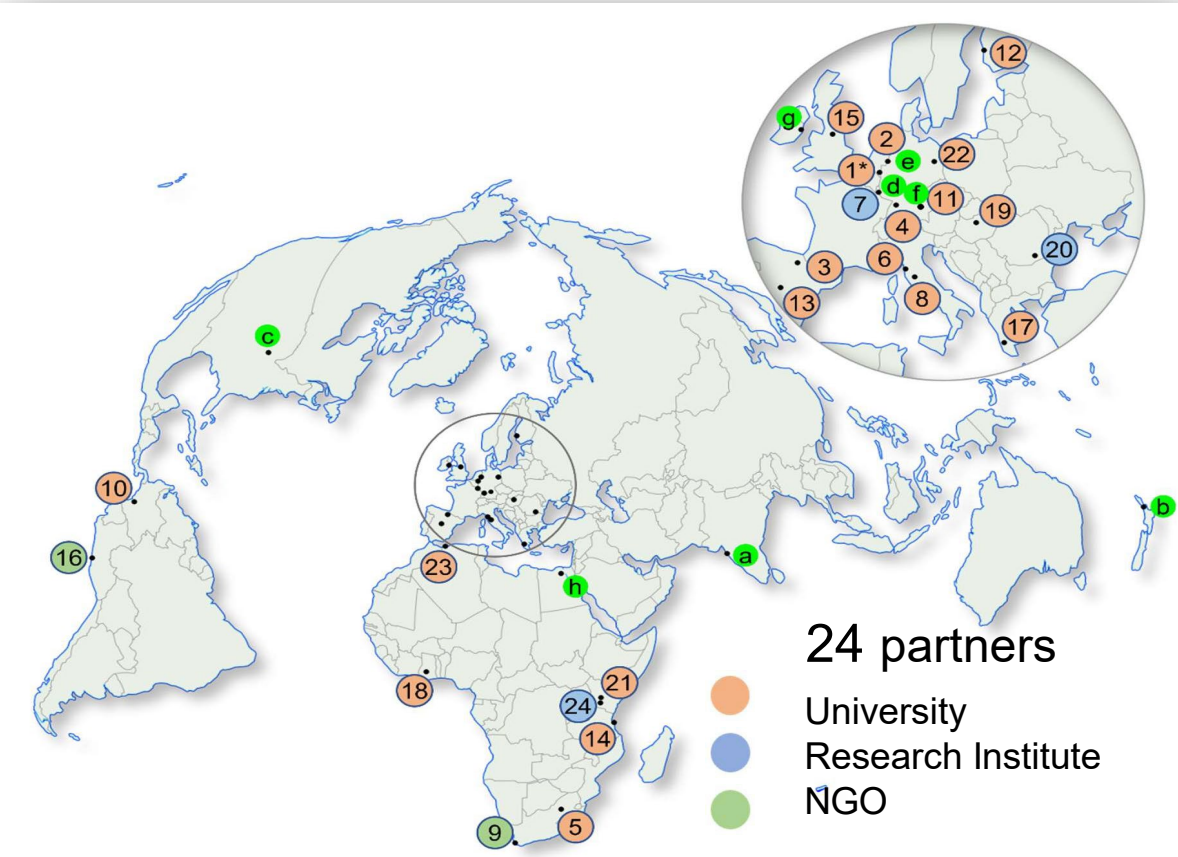
2) RiskPACC project: Increase preparedness to disasters by closing the gap between risk perceptions and actions among Civil Protection Agency (CPA) and Citizens, involving citizen engagement in the process and decision-making.

Norman Kerle, Diana Reckien, Mila Koeva, Marija Bockarjova, Aulia Sukma



3) WISER project: Identifying Best Options for building a high well-being society that combines productivity growth with social, economic, and environmental sustainability

Marija Bockarjova, Javier Martinez, tba...



AIMS:

- Assess how **disadvantaged groups** perceive the **qualities of the built/ natural environment (blue & green spaces)** and **impact their well-being, livelihoods and environmental justice.**
- Identify how **governance arrangements** could be improved by **and co-produced** with disadvantaged groups in society.
- Just started.....

5) Co-design of green & blue spaces with vulnerable people

Carmen Anthonj

.....Just started

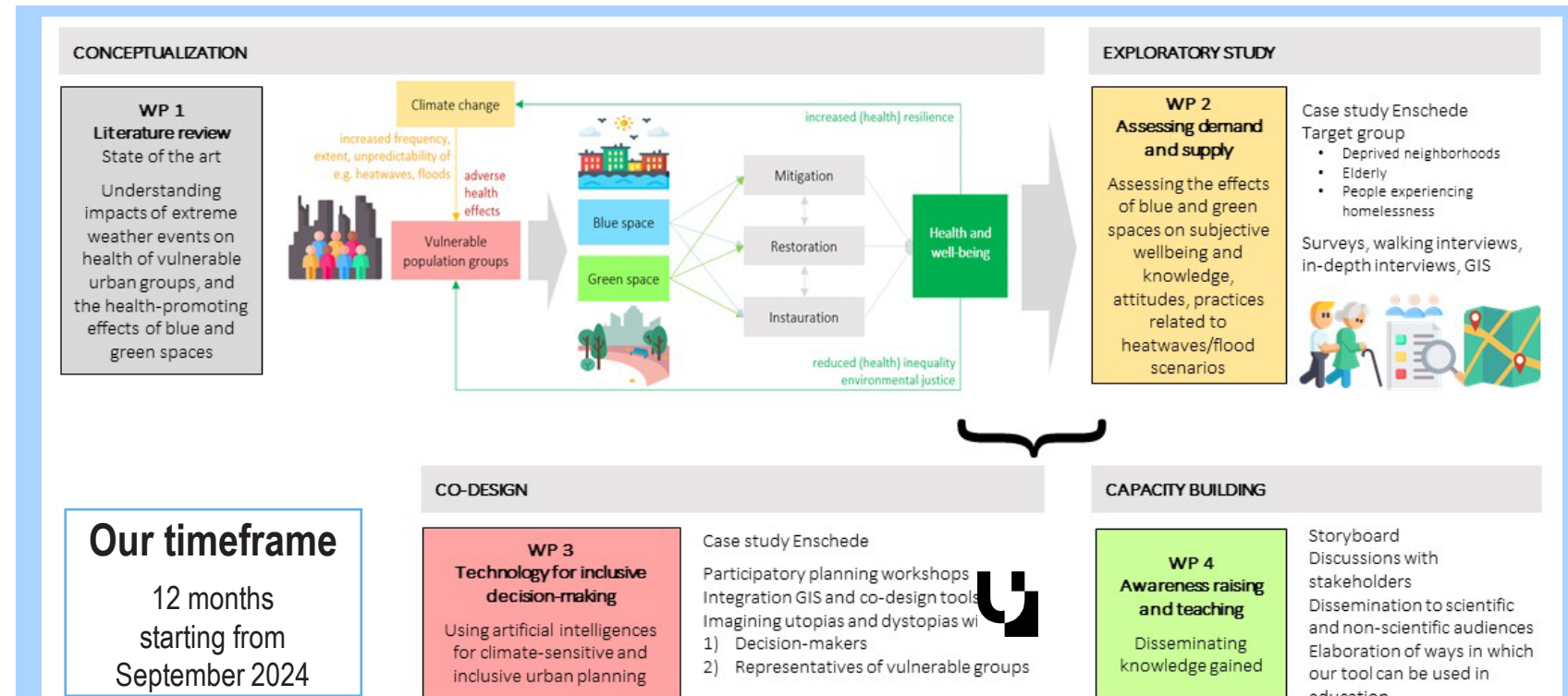
Our idea

The most disadvantaged parts of the population often miss out on nature's benefits due to a lack of such spaces nearby and barriers related to infrastructure, stigma, and lack of involvement in planning processes.

We aim to counteract these barriers considering their needs in urban planning processes. We use GIS & AI, these population groups & decision-makers in a co-design approach.

Our approach, work packages and outcomes

Which climate-related challenges are the most vulnerable population groups in cities facing?
Which role can blue and green spaces play in strengthening their health and well-being?





Kamwele, N.M., (2023) 'Integrating Nature-Based Solutions to Mitigate the IntraUrban Heat Island using 3D Modelling. A Case Study for Zwolle, The Netherlands'.



Bos, D.M. (2023) 'Design principles and policies on ecotourism as a way to preserve mangrove forest and the local culture of Panju Island, India'.



Ghani, A.Z. (2023) 'Environmental Justice: Assessing the scope of Small Scale Nature-based Solutions with the Capability Approach'.



Gangwar, Druti (2022) [Mapping the quality of public urban green spaces for physical activity in Paramaribo, Suriname.](#)

Master of Sciences regarding UGI/ NBS @

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Ghorbanzadeh Bahadori, Maliheh (2022) [Characteristics of urban green space \(UGS\) to promote the diversity of users in a compact urban development.](#)



Buohemaa, Bernice Osei (2022) [Urban green in Greater Paramaribo: Explorations of accessibility and social inequality.](#)



Kotecha, M. (2022) [Interlinking lakes: Decision support tool for sustainable lake ecosystem, Ahmedabad, India.](#)



Asare, P. (2021) [Nature-based solutions \(NBS\) as an urban flood mitigation measure: the case of Ga East Municipality, Accra, Ghana.](#)



Chaturvedi, Harsh (2021) [*Spatial effects of urban green spaces on real estate: A case study of Mumbai, India.*](#)



Moradi Kelardeh, Marjan (2021) [*Developing a framework for building-level analysis of green facade potentials on mitigating urban heat island, using BIM and GIS integration.*](#)



Osei Owusu, Rexford (2021) [*Urban green in deprived areas: the match between supply of and demand for ecosystem services of urban green spaces – the case of Kumasi, Ghana.*](#)



Shrestha, S. (2021) [*Nature-based Solution \(NbS\) for local adaptation of neighborhood to urban flooding: A case study of Enschede, Netherlands.*](#)

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Rosales, Ana Isabel Maldonado (2016) [*Understanding the benefits of green infrastructure planning in developing countries.*](#)



Padmaningsih, Astuti Tri (2015) [*Carbon balance for sustainable land use scenarios and a green campus at the University of Twente.*](#)



Paramita, G.A. (2015) [*Planning of urban green spaces as evacuation area in earthquake disaster.*](#)



Wardana, I.K. (2015) [*Analysis of urban surface temperature for green spaces planning in Bandung City, Indonesia.*](#)

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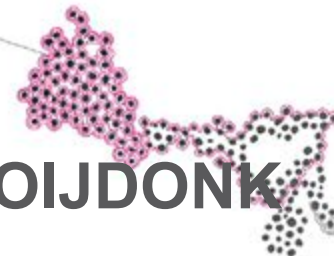
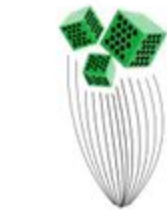
**UNIVERSITY
OF TWENTE.**





Kidwise Research

itc.nl/kidwiseresearch



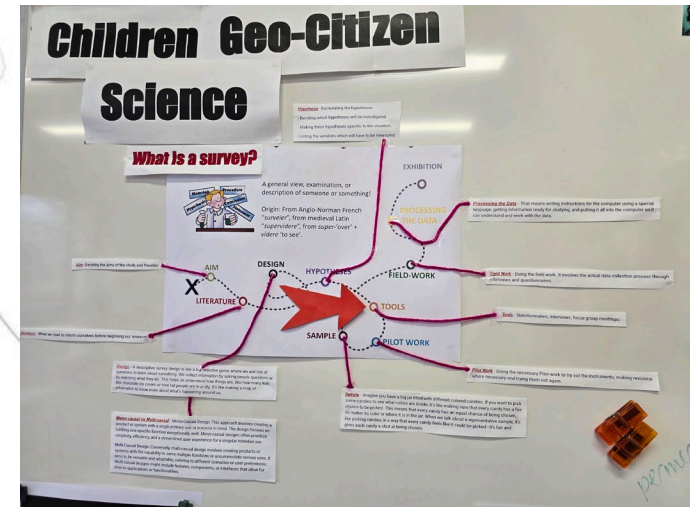
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FACULTY ITC

FUNDA ATUN, JAVIER MARTINEZ, MARTIN VAN HOOIJDONK



"RISING WATER, SAFER SHORES" BOARD GAME

CHILDREN CITIZEN GEOSCIENCE FOR CLIMATE ADAPTATION



Co-funded by the Erasmus+ Programme of the European Union





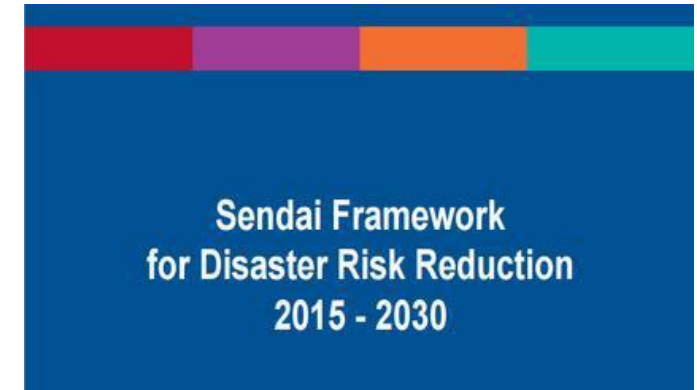
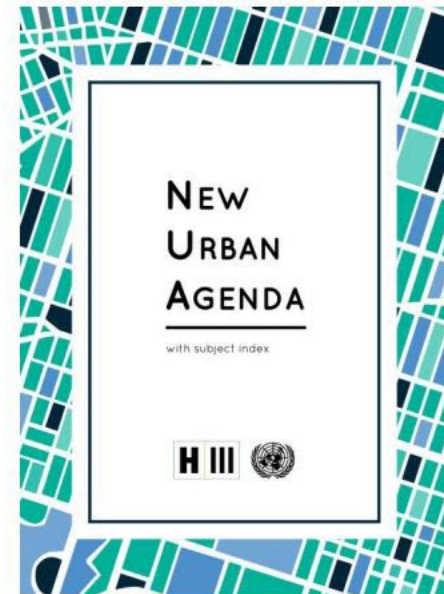
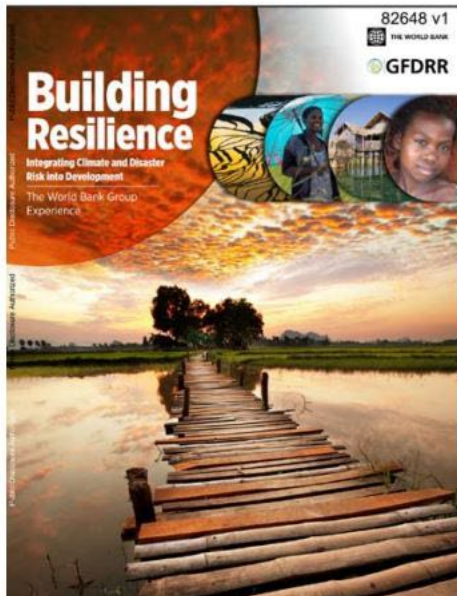
INCLUSION, DIVERSITY, EQUALITY

‘Involving children and young people as agents of change’

**Child Led –
Disaster Risk Reduction**



Global Platform, Geneva, June 2009



Complexity

Diversity

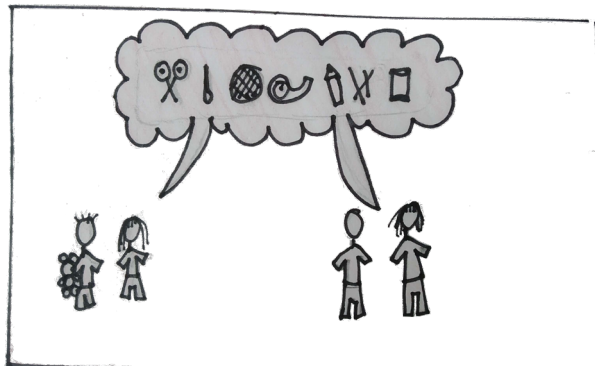
Inclusion

CHILDREN LED DISASTER RISK REDUCTION (CLDRR)

THREE MAIN FOCUS AREAS

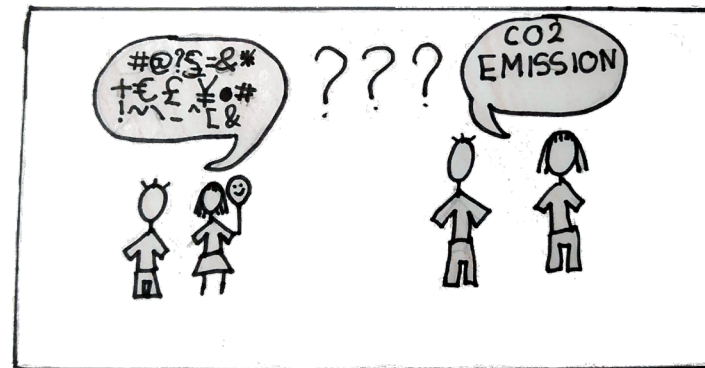
Focus on children's vulnerabilities & special needs.

Identification of child-sensitive strategies to respond to the environmental & social impacts caused by disasters.

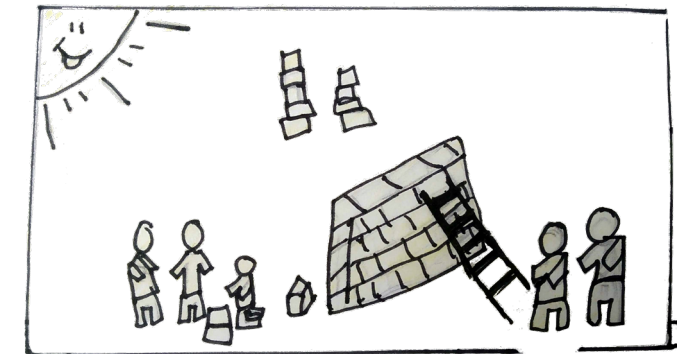


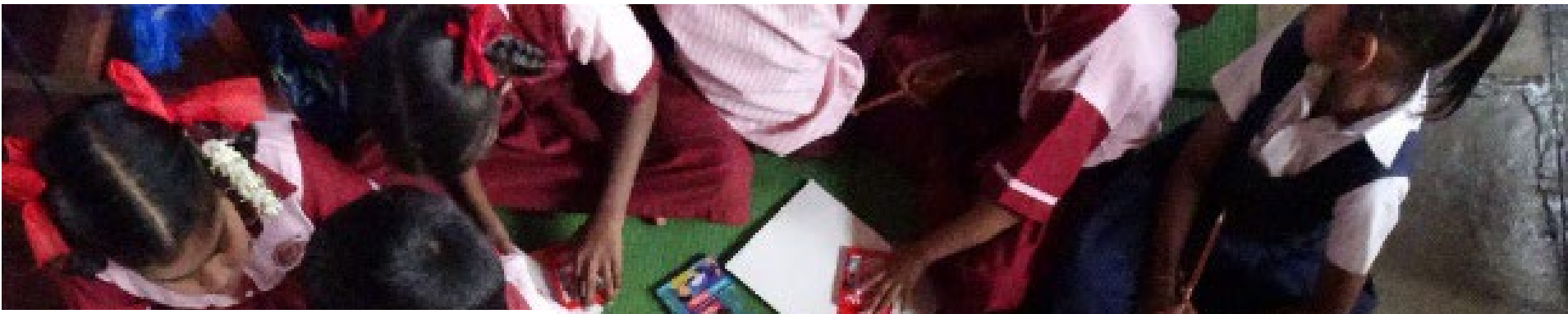
Focus on DRR education in schools

Preparation of educational materials



Children have the potential to increase the resilience of their community in the long term by participating in DRR activities.





What constitutes children's capacities for facing climate-change-related disasters?

How to harness children's capacities in disaster risk and climate change adaptation studies?



PANJU ISLAND



Projected Scenario : 2.1m sea level rise
<https://coastal.climatecentral.org/map>

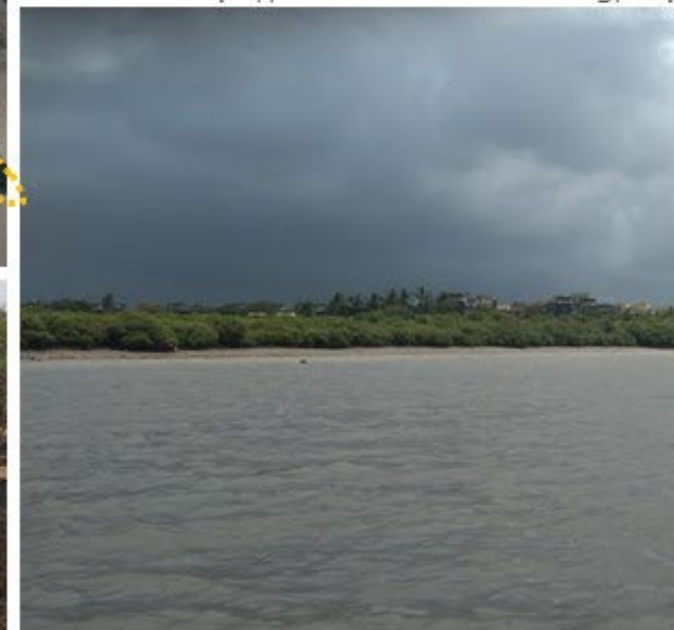


Photo Source: Sandeep Menon | KRVA

RISING WATER SAFER SHORES GAME



CHILDREN

Aged 5 - 11 years old from the Municipal School on Panju Island (India) and the International School Twente (Netherlands) helped developing the game



QUESTIONS

Where developed to provide children with the knowledge of what to do before, during and after a flood event.



COOPERATING PARTIES

Two institutions from India (KRIVIA & SPARC), DesignLab University of Twente, Pre-University Twente, ITC Faculty Geo-Information Science and Earth Observation



Rising Water, Safe Shores - The flood resilience game!



Rising Water, Safe Shores is a 90-minute game for 2-4 players aged 9 and up. Players help characters prepare for, survive, and recover from a flood, earning "helping badges" along the way. Gameplay involves moving along the board, answering questions, and using items to assist characters. The goal is not to collect the most helping badges. The game also encourages educational discussions about floods, climate adaptation, well-being and sustainable lifestyle.



FINAL TEST UNIVERSITY OF TWENTE

JUNE, ENSCHEDE NETHERLANDS



WORKSHOP

INDIA & NETHERLANDS

Children are seen as a potentially active and highly interconnected part of society and purposive actors.



Children are **knowledgeable agents** who can understand complex phenomena like climate change.

Children can **develop innovative and responsible solutions** to create a livable environment that will contribute directly to **achieving strategies and solutions for climate-adaptive cities.**

Children are **the agents of change** in the face of the climate crisis.

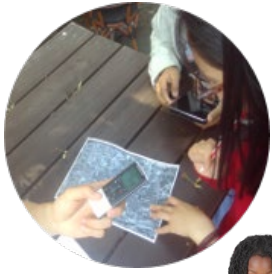


Citizen science:

'Scientific work undertaken by members of the general public, often in collaboration with or under the direction of professional scientists and scientific institutions'
(Oxford English Dictionary 2014)

How can children's geo-citizen science support the structural and societal transformation in cities to reduce the impact of climate change?





Development of map-based survey

- Determine/develop questions to help investigate positive and negative aspects regarding climate adaptation impacting their (community) well-being.
- Prepare a research booklet to guide other children co-researchers when conducting map-based surveys.

Data collection

- Identify problematic locations on Google Earth® images and illustrate and highlight them with photos. Data collection will be based on survey walks that will be tracked and traced.

Analysis and synthesis of data

- Categorise, complete, read and interpret data in tables, graphs, etc.
- Carry out focus group discussions in the class to synthesise and make sense of the collected data based on the MoSCoW approach (Must have, Should have, Could have, Wishes) to achieve climate adaptation in the surveyed areas.

Deciding and communicating actions

- Visualise the findings/outcomes of research in an artistic format (yet to be determined) and display them in an exhibition.

2. Guided tour by an urban planner in Enschede Municipality



3. Application of the **MoSCoW** (Must have, Should have, Could have, Wishes) approach

Geo-Citizen Science MoSCoW Analysis

What we think a Climate Adaptive City needs.

DO NOT CHANGE THIS TABLE, CHANGE THE ONE BELOW!!			
<i>Must have</i>	<i>Should have</i>	<i>Could have</i>	<i>Criteria</i>
Plant trees Wind turbines Trash cans Recycling Turn off electricity Energy-efficient homes	Grass Flowers & Plants Drains Green roof Solar Panels Garden Bikes Pipes Bio-diversity Wadi Parks Community Gardens	Water Barrel Education programmes Ponds Streams Community Groups	- Impact - Budget - Usage - Time
<p>- Look at the table and see if there are changes that you think need to be made. - <u>Think about the impact that the change may have, how much it will cost to create/change/look after, how is it used, how often it will be used and the time it takes for a positive change to happen.</u> - Make these changes in the table below.</p>			

Geo-Citizen Science MoSCoW Analysis

CHANGE THIS TABLE			
<i>Must have</i>	<i>Should have</i>	<i>Could have</i>	<i>Criteria</i>

4. Preparation for participatory mapping survey

Park
Please point to the park you like the most on the map :-) Wijs alsjeblieft het park aan dat je het leukst vindt op de kaart :-)

Click to add / Klik om toe te voegen

← [Map] →

Home / thuis

English: Which items from these pictures do you have at home? Dutch: Welke items uit deze foto's heeft u thuis?



Do / Doe

How often do you cycle? / Hoe vaak fietst u?

Never / Nooit Every day / Elke dag

Do you recycle? For example, separating paper and plastic for recycling. / Recyclet u? Bijvoorbeeld door papier en plastic te scheiden voor recycling.

- Yes / Ja
 No / Nee

Do you upcycle your materials? For example, using a tin can as a pencil holder / Hergebruikt u uw materialen? Bijvoorbeeld door een blikje te gebruiken als pennenhouder.

- Yes / Ja
 No / Nee



Satisfied / Tevreden

Please tell me whether you strongly agree, somewhat agree, somewhat disagree or strongly disagree with each of these statements / Vertel me alstublieft of u het hier volledig mee eens bent, enigszins eens bent, enigszins oneens bent of volledig oneens bent met elk van deze stellingen

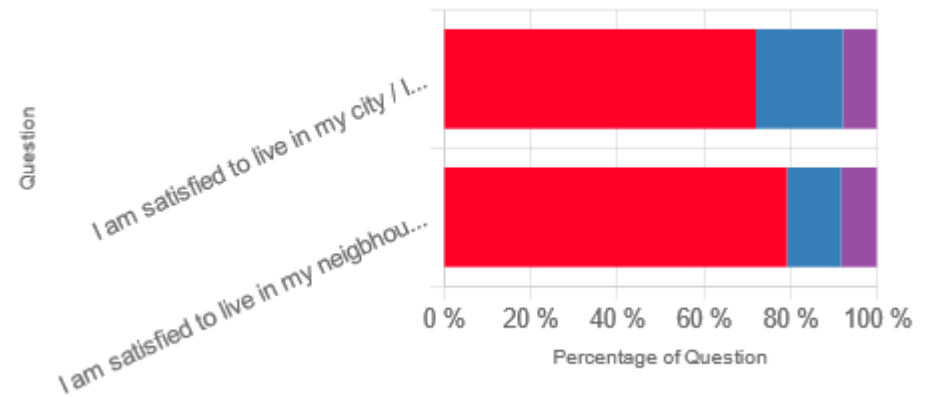
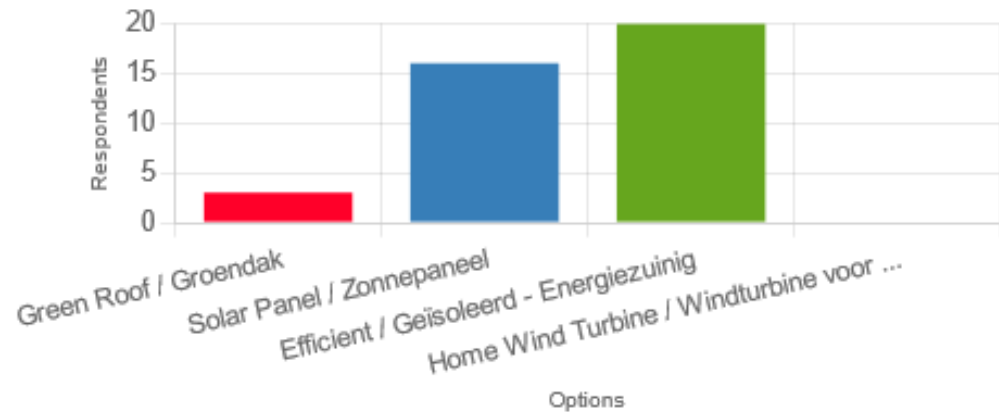
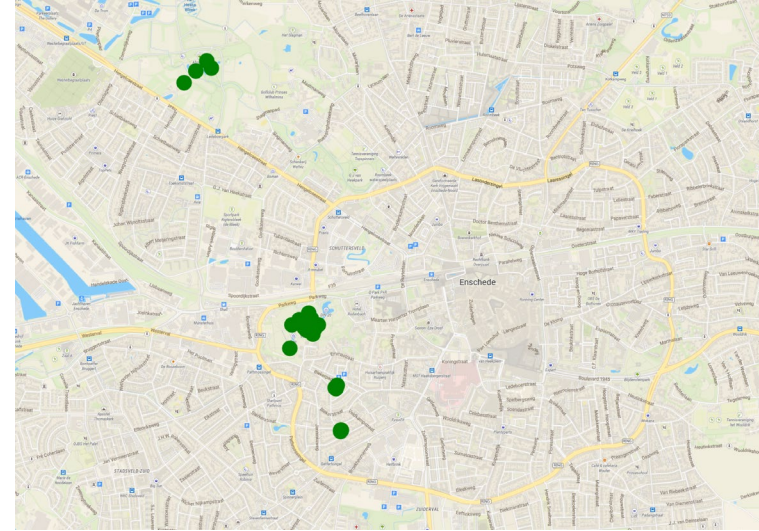
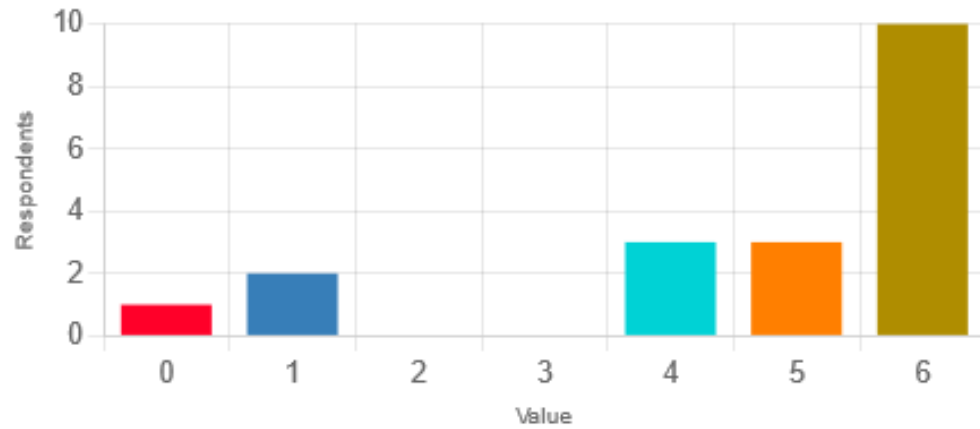
	Strongly agree / Volledig mee eens	Somewhat agree / Enigszins mee eens	Somewhat disagree / Enigszins oneens	Strongly disagree / Volledig oneens
I am satisfied to live in my city / Ik ben tevreden met het wonen in mijn stad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am satisfied to live in my neighbourhood / Ik ben tevreden met het wonen in mijn buurt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



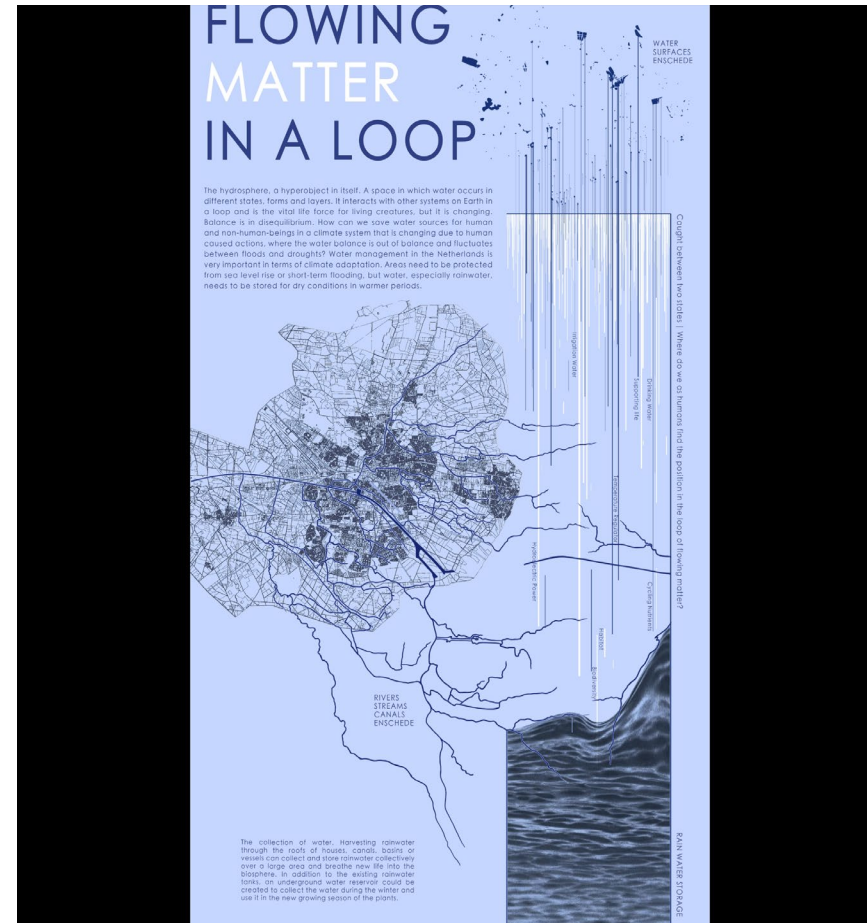
5. Participatory mapping fieldwork



6. Group discussions in the class to synthesize findings.



7. Preparation of **exhibition** with a support of a visualisation artist
8. **Guided tour** by children and exhibition in the exhibition locations in Enschede



Courtesy of: Vivien Reichel



Key Messages to take away 1/4

Children have practised and promoted the European Union's Plan for Children's Rights, particularly the right of children's participation. Children have the right to be involved in the decision-making processes affecting their lives.

The result of collaborating with a local government increase involvement of children's perception on climate change-related problems and potential solutions in their community.

Involving children as co-researchers uncovers and further develops their capacities that will contribute to improving methodologies in citizen and climate adaptation science.

The project outcome will help increasing awareness of citizens as the findings will be displayed in an artistic format to communicate scientific information produced by children.

Key Messages to take away 2/4

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Involving children as co-researchers uncovers and further develops their capacities that will contribute to improving methodologies in citizen and climate adaptation science.

The project outcome will help increasing awareness of citizens as the findings will be displayed in an artistic format to communicate scientific information produced by children.

Key Messages to take away 3/4

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The result of collaborating with a local government increase involvement of children's perception on climate change-related problems and potential solutions in their community.

Involving children as co-researchers uncovers and further develops their capacities that will contribute to improving methodologies in citizen and climate adaptation science.

The project outcome will help increasing awareness of citizens as the findings will be displayed in an artistic format to communicate scientific information produced by children.

Key Messages to take away 4/4

Children have practised and promoted the European Union's Plan for Children's Rights, particularly the right of children's participation. Children have the right to be involved in the decision-making processes affecting their lives.

The result of collaborating with a local government increase involvement of children's perception on climate change-related problems and potential solutions in their community.

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NEEDS INTERNATIONAL CONFERENCE

UNIVERSITY OF TWENTE.

UT / Needs Conference / Panel descriptions

NEEDS CONFERENCE



Children as agents of change in the face of the climate crisis

Session convenors:

Vedant Menon (11 years old), Nora Nepa (10 years old), Dr. Funda Atun & Dr. Javier Martinez (University of Twente), Silke Heesen (Pre-University Twente)

Children as agents of change in the face of the climate crisis There are more than 2 billion children below 14 years old worldwide. The majority of the population considers them vulnerable to the impacts of climate change and associated disasters. The main reason is their dependence on adults for their survival, in addition to several biological factors (UNICEF, 2015). Their lack of knowledge of disasters increases their vulnerability, as they do not know how to act in case of a disaster. The Sendai Framework for Disaster Risk Reduction (2015–2030) states the importance of involving children and young people as agents of change in Disaster Risk Reduction (DRR). The support is called through legislation, and curriculum development (UNDRR, 2015). As a result, the children-led disaster risk reduction (CLDRR) research theme has been developed in disaster studies.



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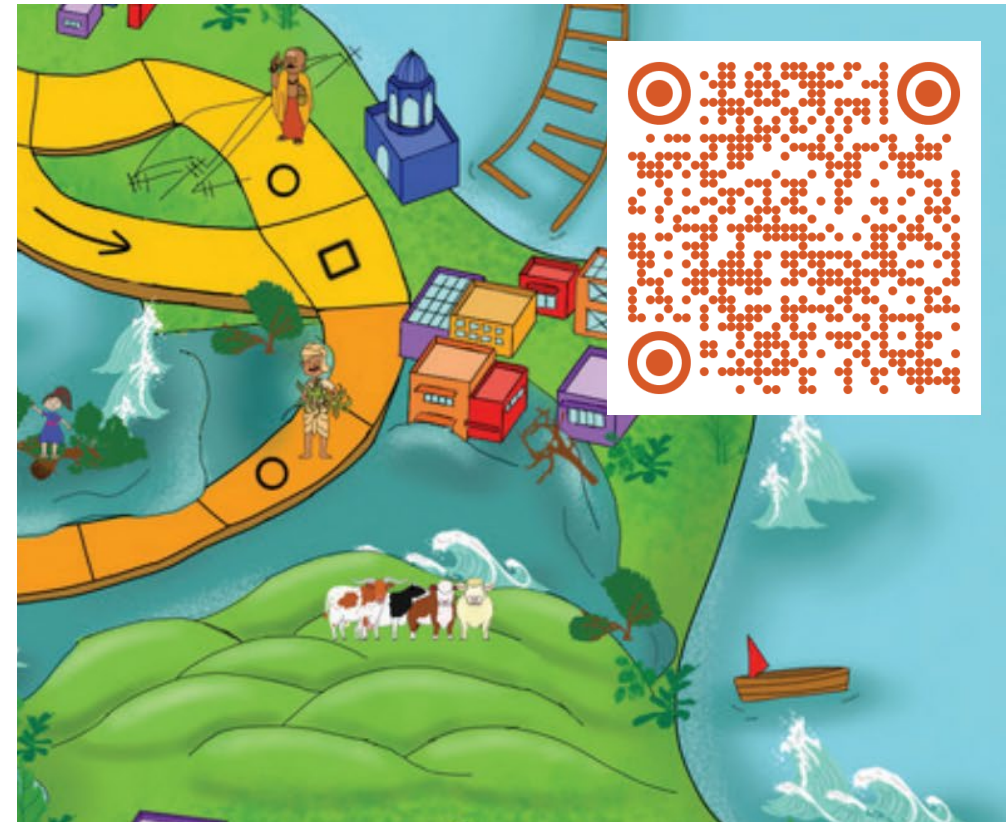
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<https://vimeo.com/813107915>



In collaboration with

Kamla Raheja Vidyaniidhi Institute for Architecture and
Environmental Studies (KRVIA), Mumbai, India
(**Sandeep Menon** and Master's Students Department of Urban
Design and Urban Conversation)

Vedant Menon (9-year-old team member)

Municipal School of Panju Island, Mumbai, India (Teacher,
Principal and 40 children)

International School Twente, Enschede, the Netherlands
(**Martin van Hooijdonk** and 20 children)

Pre-University / University of Twente (**Silke Heesen**)

Interns: **Sadichcha Shrestha, Asmita Patnaik, Anubhav
Borghain, Vera Glas, Vera Jansen**

Society for Promotion of Area Resource Centres (**SPARC**),
Mumbai, India (**Maria Lobo & Sharmila Gimonkar**)

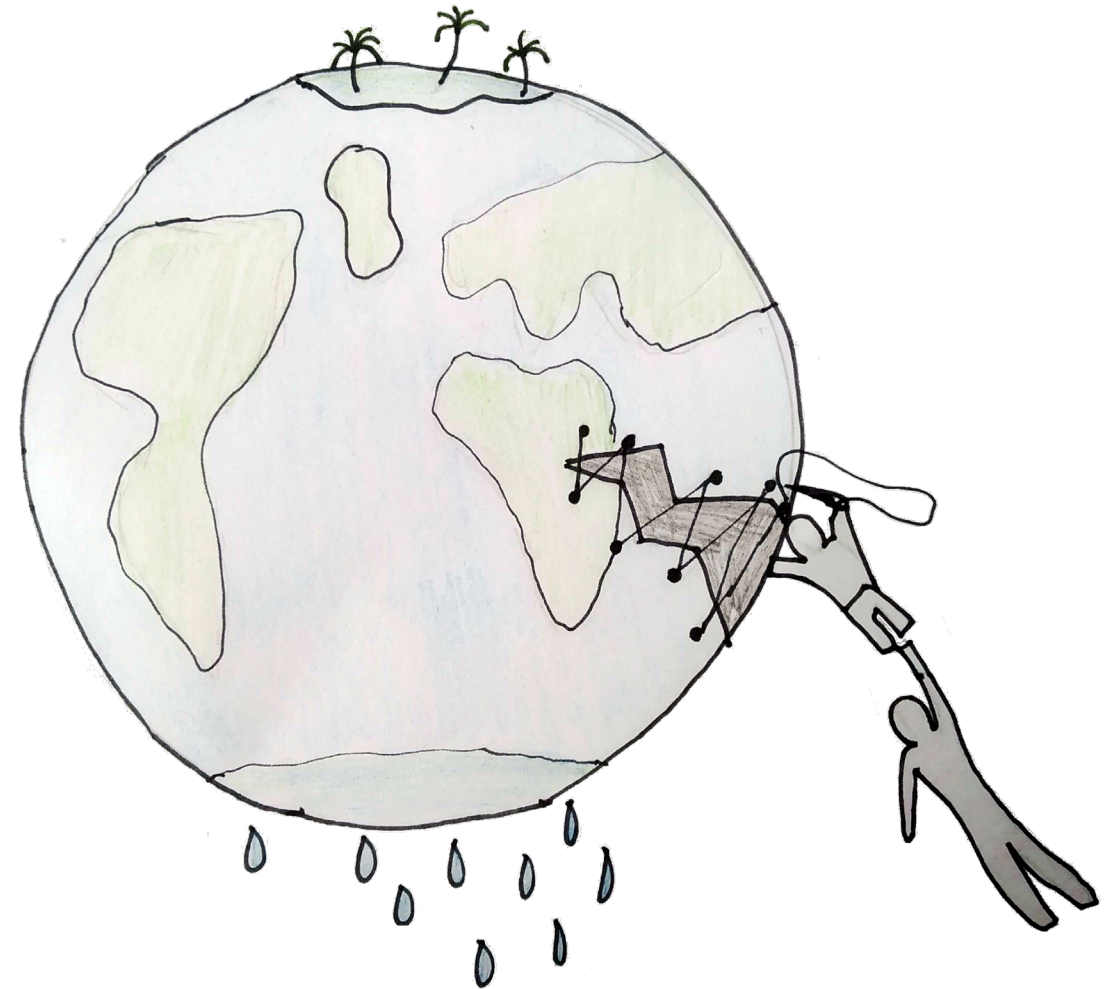
Co-funded by

Design Lab University of Twente

BREUCOM Project ERASMUS+ European Commission

Department of PGM, Faculty of ITC

Thanks to **Stefani Fileva** for the drawings on the presentation



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