



**(IDeAMapSudan) SUDAN**

INTEGRATED DEPRIVATION AREA MAPPING SYSTEM FOR DISPLACEMENT DURABLE SOLUTIONS AND SOCIOECONOMIC RECONSTRUCTION IN KHARTOUM, SUDAN

# FINAL SYMPOSIUM

FEBRUARY 2023



وزارة التنمية الاجتماعية  
MINISTRY OF SOCIAL DEVELOPMENT



African Population and  
Health Research Center



**nuffic**  
meet the world



# Overview of IDEAMAPSUDAN Project and Outputs

Presenter: Dr. Monika Kuffer

**FEBRUARY 2023**

# CONTENT

1.  
INTRODUCTION

2.  
URBAN  
DEPRIVATION

3.  
RELATED  
PROJECTS

4.  
TIMELINE

5.  
TRAINING

6.  
KHARTOUM  
DEPRIVATION  
MODELLING

7.  
OPEN TRAINING  
MATERIALS

## IDeAMapSudan - The Objective

The Project focuses on building the capacity to co-create and use spatial data on deprived areas to develop a geospatial database for deprivation mapping ‘**IDeaMapSudan**’ to support the understanding of displacement and urban poverty challenges and opportunities associated with socio-economic reconstruction and reform in Sudan leading to more sustainable urban development strategies.

### - Beneficiaries المستفيدون



وزارة التخطيط العمراني  
ولاية الخرطوم



وزارة النقل

وزارة التنمية الاجتماعية  
MINISTRY OF SOCIAL DEVELOPMENT



وزارة التنمية  
الاجتماعية

### - Implementing Organizations

### الجهات المنفذة



منظمة التنمية العمرانية  
السودانية SUDTT -  
تنمية  
عمرانية



African Population and  
Health Research Center

المركز الأفريقي لبحاث  
السكان والصحة -كينيا



جامعة بروكسل  
بلجيكا



ITC  
UNIVERSITY  
OF TWENTE.

جامعة توينتي - هولندا  
Faculty of Geo-Information  
Science and Earth  
Observation

# Technical training of the ToTs

The Team of Trainers (Training of Trainers - ToTs)

## Sudan Urban Development Think Tank (SUDTT)



**Wafa Sakhi**

## Federal Ministry of Transport



**Fatima Ahmed**



**TaHa Elzaki**

## Federal Ministry of Social Development



**Asgad Gummah**



**Julia Kumi**



**Ibrahim Kushieb**

## Ministry of Physical Planning, Khartoum state



**Marwa Ali**



**Mustafa Hamza**



**Mosub Abdallah**

ULB - APHRC - ITC

### Local coordinator



**INAS MOKHTAR**

Architect and Projects management specialist

### Sudan Urban Development Think Tank (SUDTT)



**MAYSOON BADI**

Architect and Urbanist



Dr  
**NUHA ELTINAY**

Senior Urban Planning and Disaster Risk Specialist

### African Population & Health Research Centre (APHRC)



**FRANCIS ONYAMBU**

Research officer



**CAROLINE KABARIA**

Associate Researcher Scientist

### Université Libre de Bruxelles (ULB)



**CHARLOTTE FLASSE**

Researcher



**Prof. Dr. ELÉONORE WOLFF**



**DR. M. KUFFER (MONIKA)**

Associate Professor



**DR. C.M. GEVAERT (CAROLINE)**

Assistant Professor



**DR. J. WANG (JON)**

Assistant Professor



**A. DA SILVA MANO MSC (ANDRE)**

Lecturer



**DR. D. KOHLI - POLL JONKER (DIVYANI)**

Assistant Professor



**DR.ING. S. GIRGIN MSC (SERKAN)**

Researcher



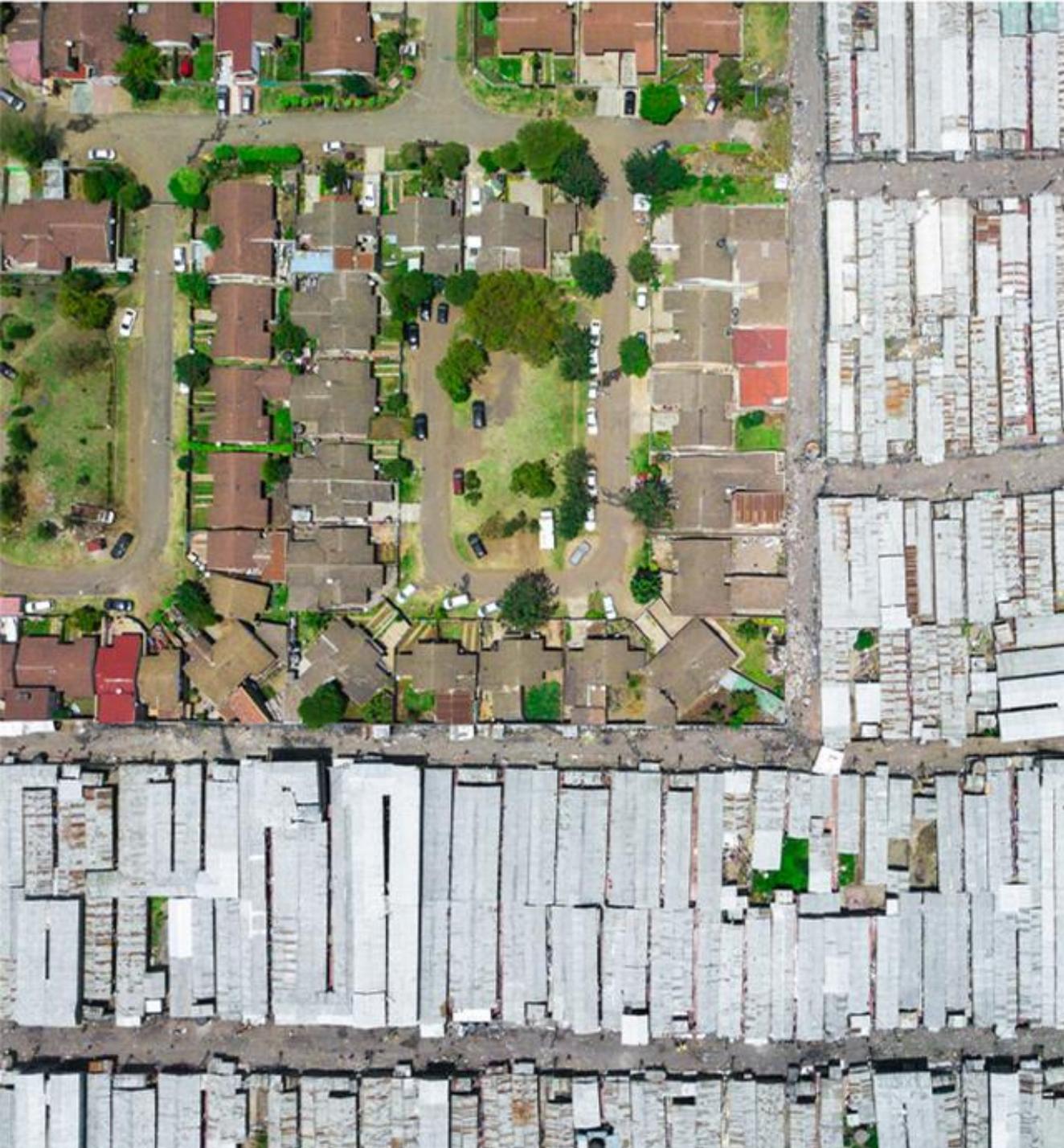
**PROF.DR.IR. C. PERSELLO (CLAUDIO)**

Associate Professor



**Currently, 1+ billion people are estimated to live in slums and informal settlements worldwide**

**Many of them are not visible in the data used for policy and decision making**



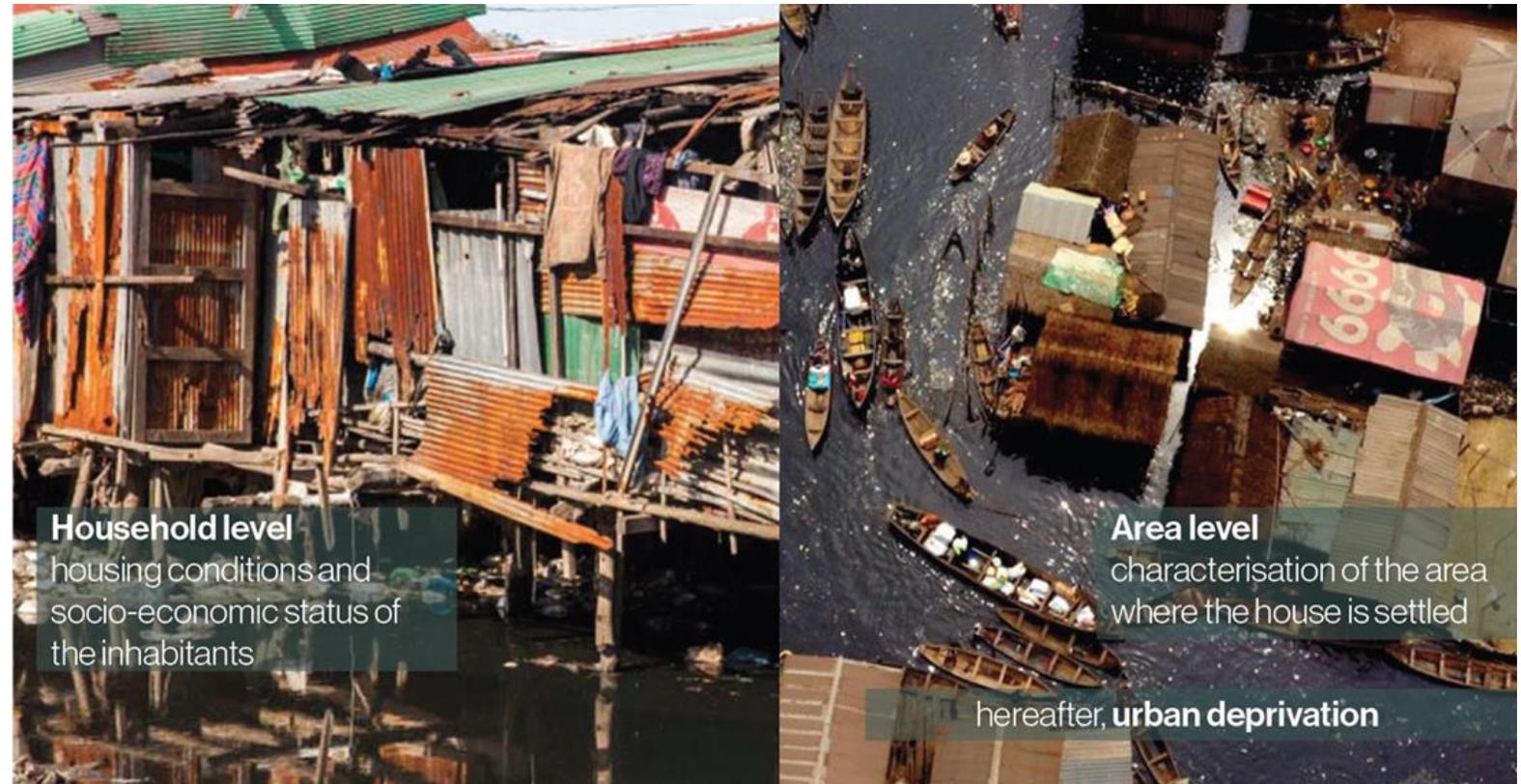
**Where are deprived settlements located?**

**How can we use innovative digital technology to support these changes?**

# Urban Deprivation

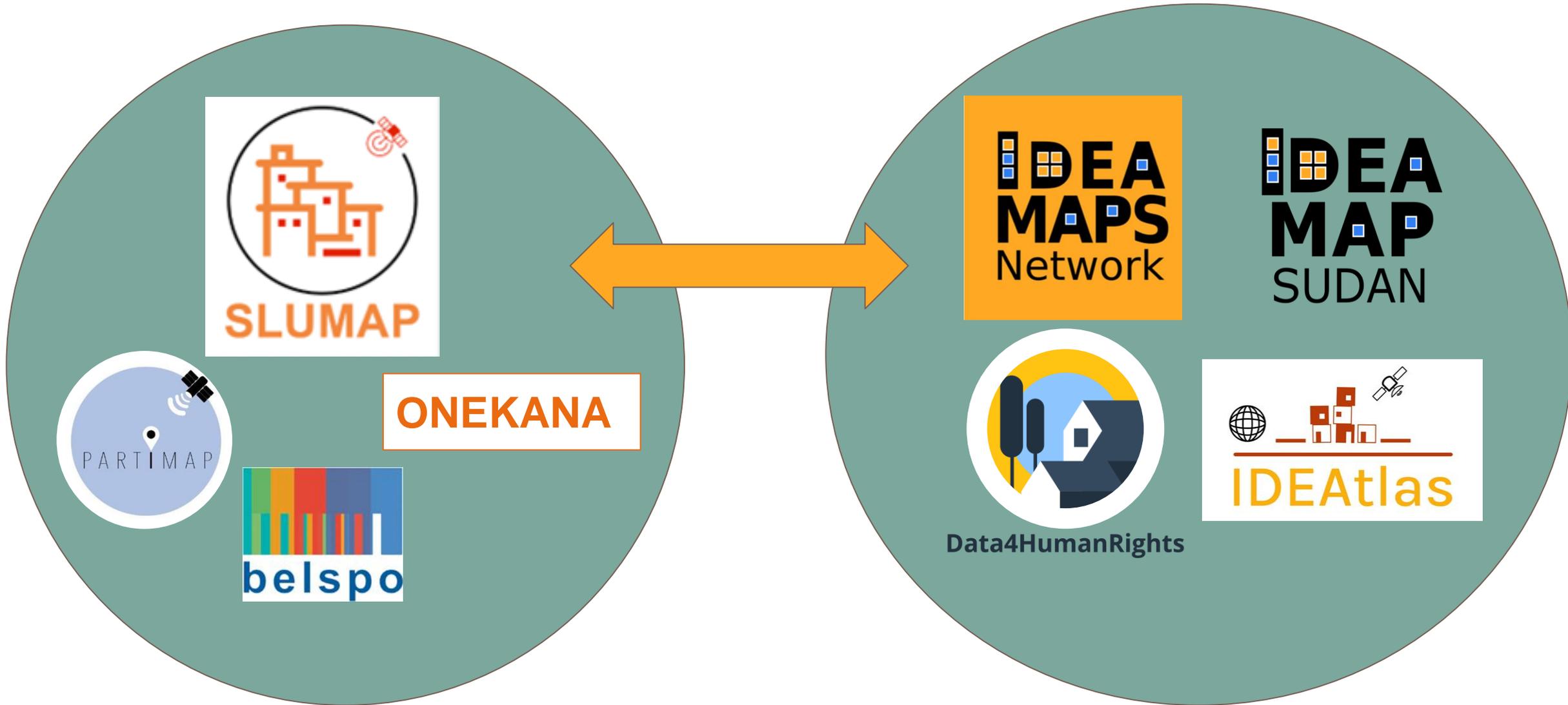
*90% of the global population increase through 2030 will be in Low- and Middle-Income Cities...  
... mostly in deprived urban areas*

- ❑ The concept of a slum household and deprived areas is not the same
- ❑ UN-Habitat slum definition focuses on **households**
- ❑ Importance to add **area level** definition



Source: A. Abascal

# Related Projects on Urban Deprivation



## UKRI-EPSRC-DIDA Networking Grant May 2020 - Apr 2021

### Coordination Team



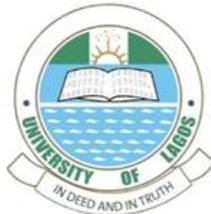
### Partners



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## Bill & Melinda Gates Foundation Development Grant | Oct 2022 - Sep 2025

- 3 focus cities: Lagos, Kano, Nairobi
  - 8-10 expansion cities TBD



UNIVERSITY OF TWENTE.



African Population and Health Research Center



UNIVERSITY of York



Stakeholders mapping, Gap and need analysis was conducted to guide project implementation. Participants are selected from 3 ministries to get the ToT and develop IdemapSudan.



The kick-off workshop introduced IdeaMapSudan project to stakeholders and interested parties, to communicate the value that earth observation data can bring to many aspects of urban planning, development and monitoring. The workshop provided an opportunity to meet, share and discuss the overall priorities of IdeaMapSudan.

January 2021

Preparations, Gap analysis, and Team formation  
Sep. 2020 – Feb. 2021

التحضير للتدريب و تحليل الوضع الخلفي و تقييم الحوثة

Sep. 2020

Gap analysis & Selection of ToT

Kick-off workshop

Technical training of ToT and design of Ideamapsudan System

March 2021 – May. 2022

تدريب المدربين و انشاء نظام IDEAMapsudan



March - December 2021

Local Training

Deprivation modelling (Mini Project)

Aug. 2021



The team worked on a mini-pilot project to apply their knowledge. A workshop was held for Experts consultation

MINI PROJECT OBJECTIVE: Develop a first model of multiple deprivations for Jebel-Aulia

Community mapping training - Kenya

Sept. 2021



Community-based data collection training in Kenya

TP2

Project Timeline

Sep. 2020 - March 2023

Dissemination

City dialogue symposium

Jan 2022

City-to-City (C2C) resilience-building knowledge exchange. Objective is to foster the implementation, sustainability, and regional cross-ventilation of IDEAMapsudan. Including dissemination and stimulation of using the developed IDEAMapsudan framework to neighboring countries.



Up to March 2023

Reporting, Dissemination and development of best practise guide



TP4

City-to-City (C2C) Dialogue

Dec. 2022 – Mar. 2023

تبادل التجربة و نقل المعرفة مع الدول المجاورة

Data System and access to data and knowledge

Training IDEAMapsudan users

July 2022

Transfer knowledge from ToT participants to users from ministries, NGOs, local authorities and community representatives



TP3

Working with IDEAMapsudan

June - Nov. 2022

التدريب على نظام IDEAMapsudan

Local transfer of knowledge

Co-design IDEAMapsudan

May 2022

IDEAMAP SUDAN



Design and local testing of Idemapsudan system

Deprivation modelling, City level

Feb. 2022 - Ongoing



Geo-Spatial Modelling

OBJECTIVE: Develop a first model of multiple deprivations for Khartoum

# ToTs Technical Training

Fundamentals and Advanced topics on GeoSpatial Methods

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1

The **online course on basic methods of working with spatial data**: GIS principles and EO principles. The course covers an introduction into software to work with GIS and EO data.

2

**Community-based data collection (APHRC, Kenya)**. This one-week training in Nairobi (Kenya) on community engagement in deprived areas, packaging data with and for decision-makers, and sustaining quality, routine spatial data creation.

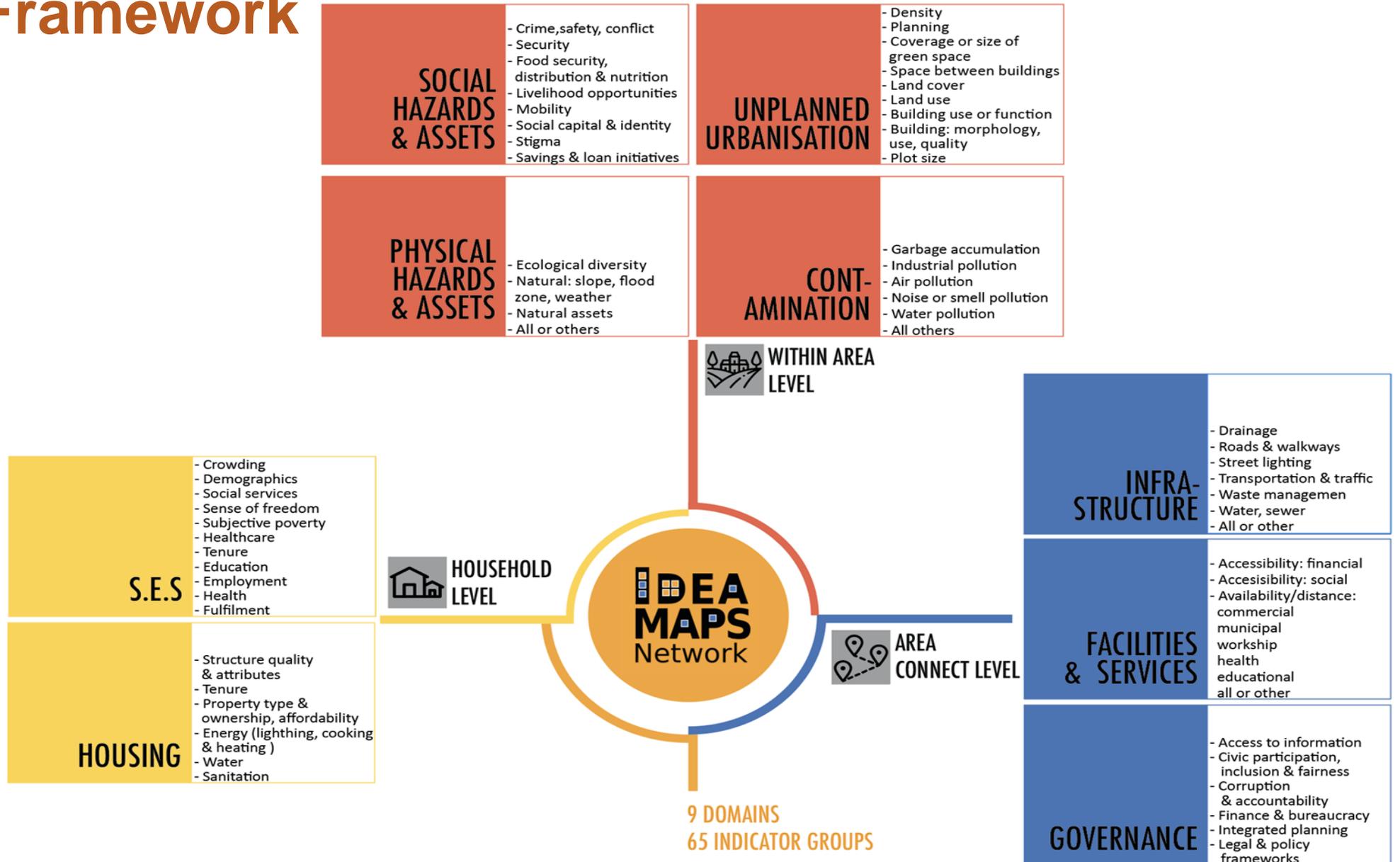
3

**Set-up of an initial spatial databases for IDeAMapSudan (online)** and learn how to design and carry out sequential data processing steps for the creation of spatial databases with open-source tools to support urban planning and management.

4

**Co-designing of IDeAMapSudan (ITC, The Netherlands)**: technical creation of a data ecosystem and the contextual design and information need and requirement analysis.

# Ideamap Framework



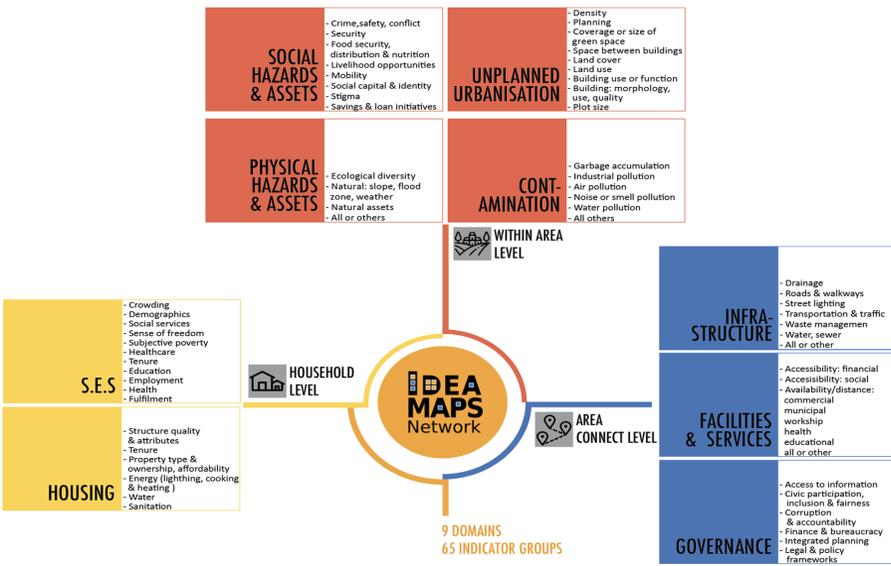
Combining Geospatial Datasets to Conceptualize Deprivation

# Experts Workshop

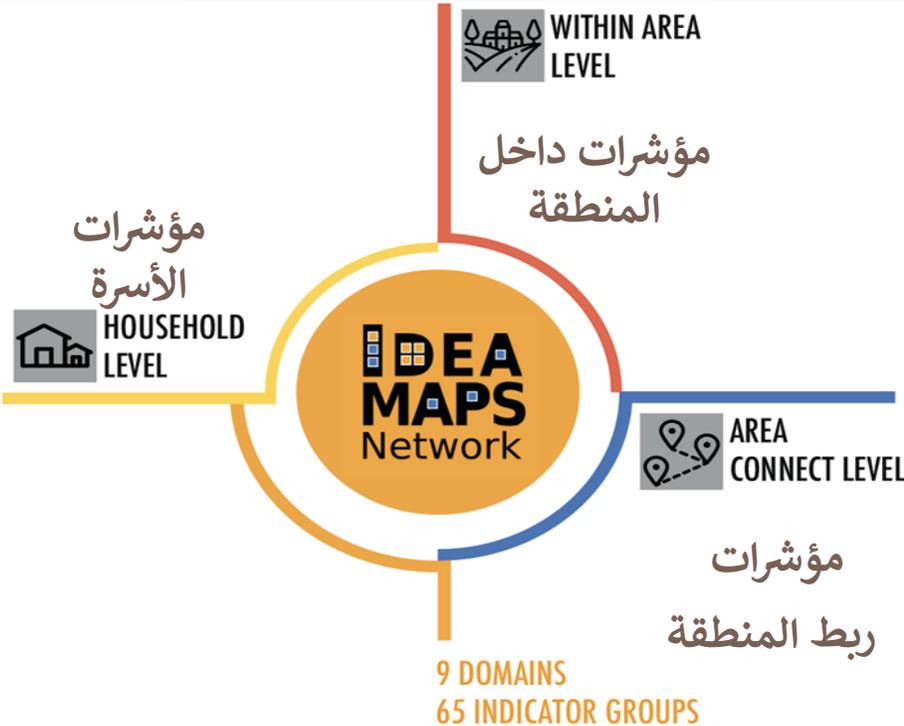
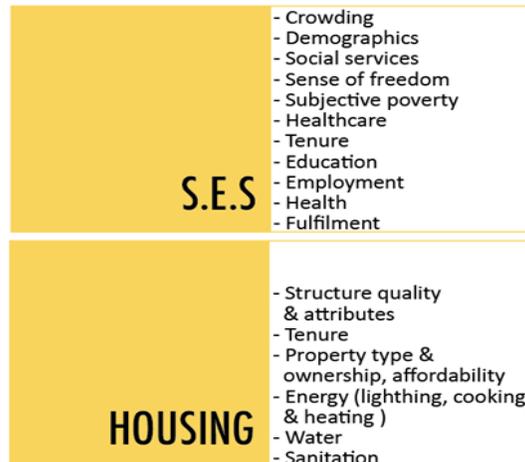
## Deprivation Framework and Identification of Indicators



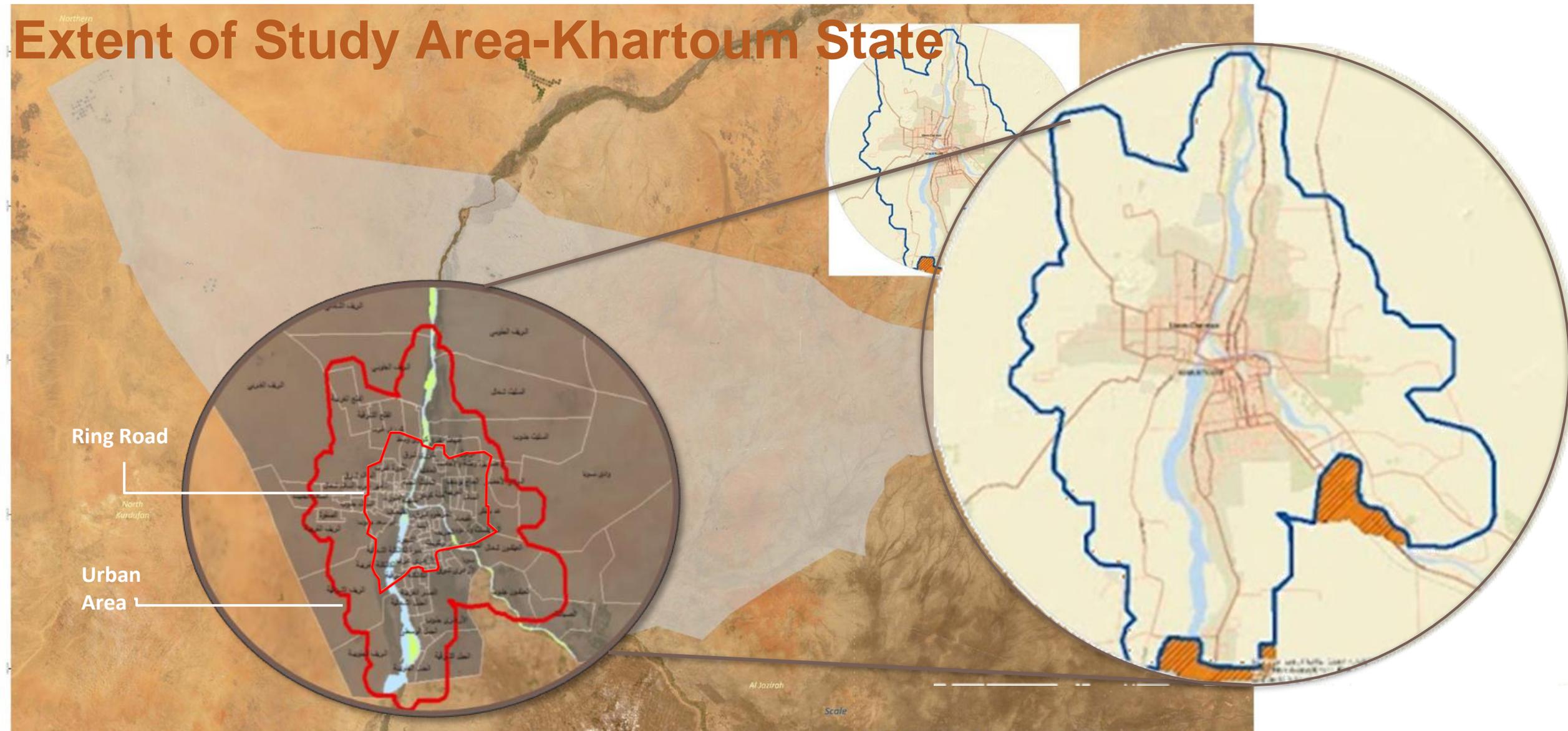
*Conducting two Expert workshops to identify the Domains and Indicators – including data availabilities in 2021*



According to availability of data , the first model of deprivation is developed based on 6 Domains:



# Extent of Study Area-Khartoum State

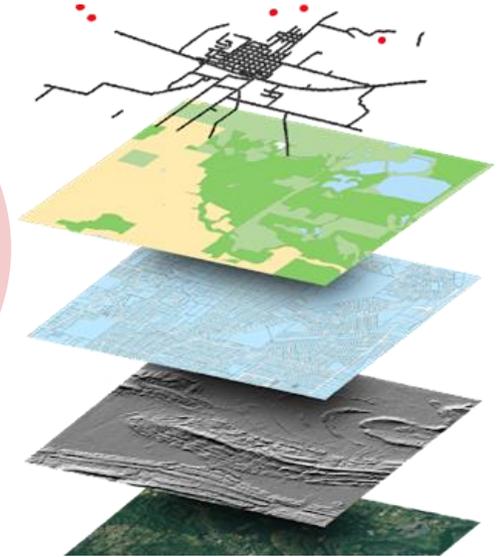


**The study area was identified to cover the urban areas within Khartoum State**

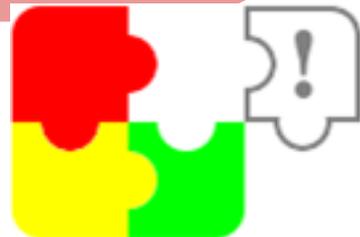
Delay in getting data from most of targeted local data sources



Planning scheme maps does not match existing situation



Working with incomplete data affects the accuracy of the classification of deprived area



Working with free open source data (eg. OSM) consume more time for pre processing and link to local indicators



# Khartoum Deprivation Model - List of Indicators

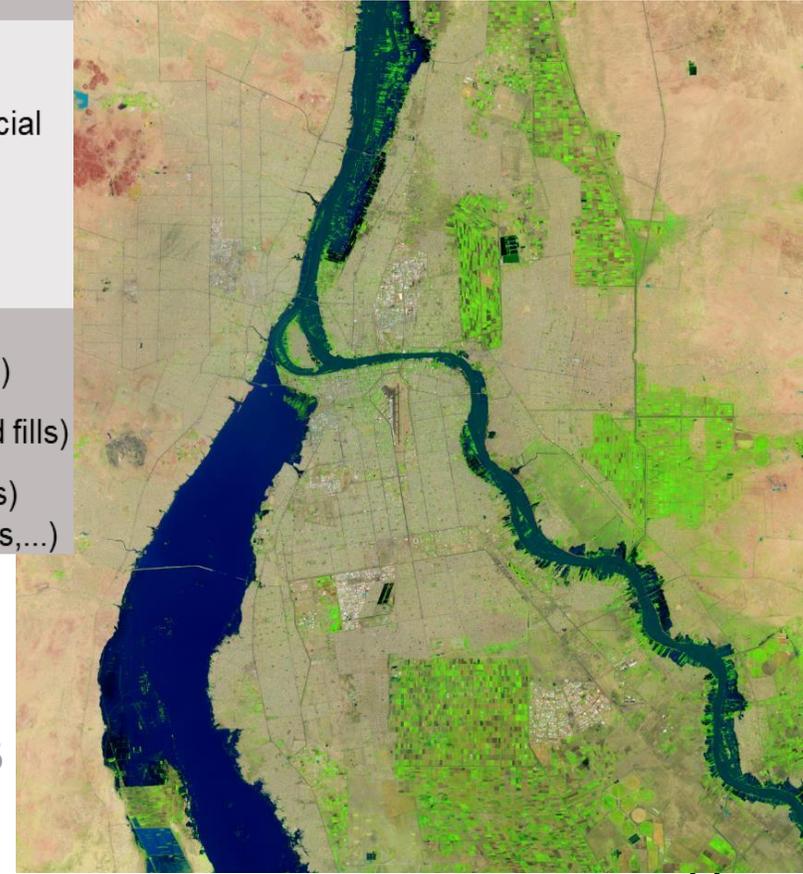
UNPLANNED URBANISATION	Unplanned Urbanization	Building density	Building density
		Building Size/Area	Building Size/Area
		morphological indicators (12)	
FACILITIES & SERVICES	Services	Education	Distance to Schools
		Health	Distance to health services
		Recreation/culture	Distance to culture and recreation (clubs, parks,...)
		Commercial	Distance to commercial areas.
		Finances	Distance to financial services (banks, ATMs, ...)
INFRA-STRUCTURE	Infrastructure	Main roads	Distance to main roads
		Transportation & Traffic	Distance to transport stations
		Water	Water network coverage
			Distance to public water sources (water pumbs, wells,..)
		Electricity	Electricity network coverage
		Communication	Mobile phone network coverage



Map Hybrid

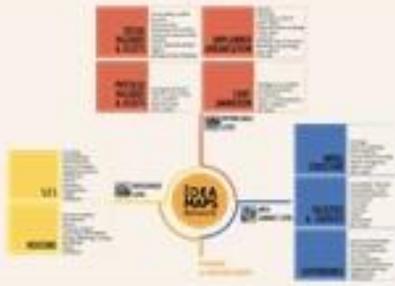
# Khartoum Deprivation Model - List of Indicators

PHYSICAL HAZARDS & ASSETS	Physical Hazard & Assets	Natural Hazards - Flooded Areas	Distance to flood areas
		Natural Hazards - Flash Flood	Flash flood water accumulation areas
		Natural assets - Vegetation Cover	Absence of vegetation cover
SOCIAL HAZARDS & ASSETS	Social Hazards & Assets	Security	- Distance to police station - Availability of Street Lights
		Livelihood opportunities	- Distance to employment opportunities (commercial centres, Factories,..)
		Food security, distribution & nutrition	Distance to markets/ supermarkets
		Mobility/Displacement	Percentage of displaced people
CONTAMINATION	Contamination	Air pollution	Air pollution
		Indust. Pollution	Industrial Pollution (Distance to industrial areas)
		Smell pollution	Smell pollution (Distance to sewage plants and land fills)
		Garbage accumulation	Garbage accumulation (Distance to the land fills)
		Noise pollution	Noise pollution (distance to city centres, main roads,...)



September 23, 2016  
September 2, 2020

## Deprivation Framework and Indicators

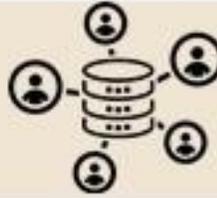


- Ideamap Frame work
- Experts consultation workshop

Understanding of what defines deprivation  
Users need assessment in the experts consultation



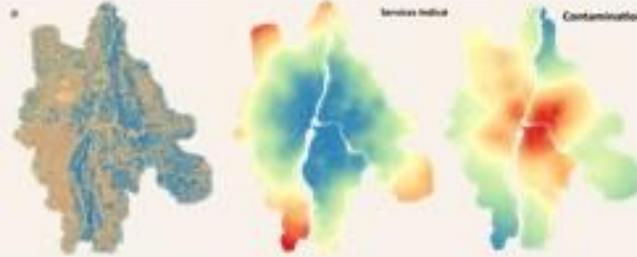
## Data Collection



- Existing data collection challenges and gaps
- Open data sources (OSM, EO,...)
- Filling data gaps by combining digital innovations with local knowledge

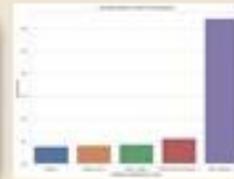


## Developing of Indicators Maps



- Indicators maps Analysis

## Weighting of indicators



- Statistical analysis and Experts feedback

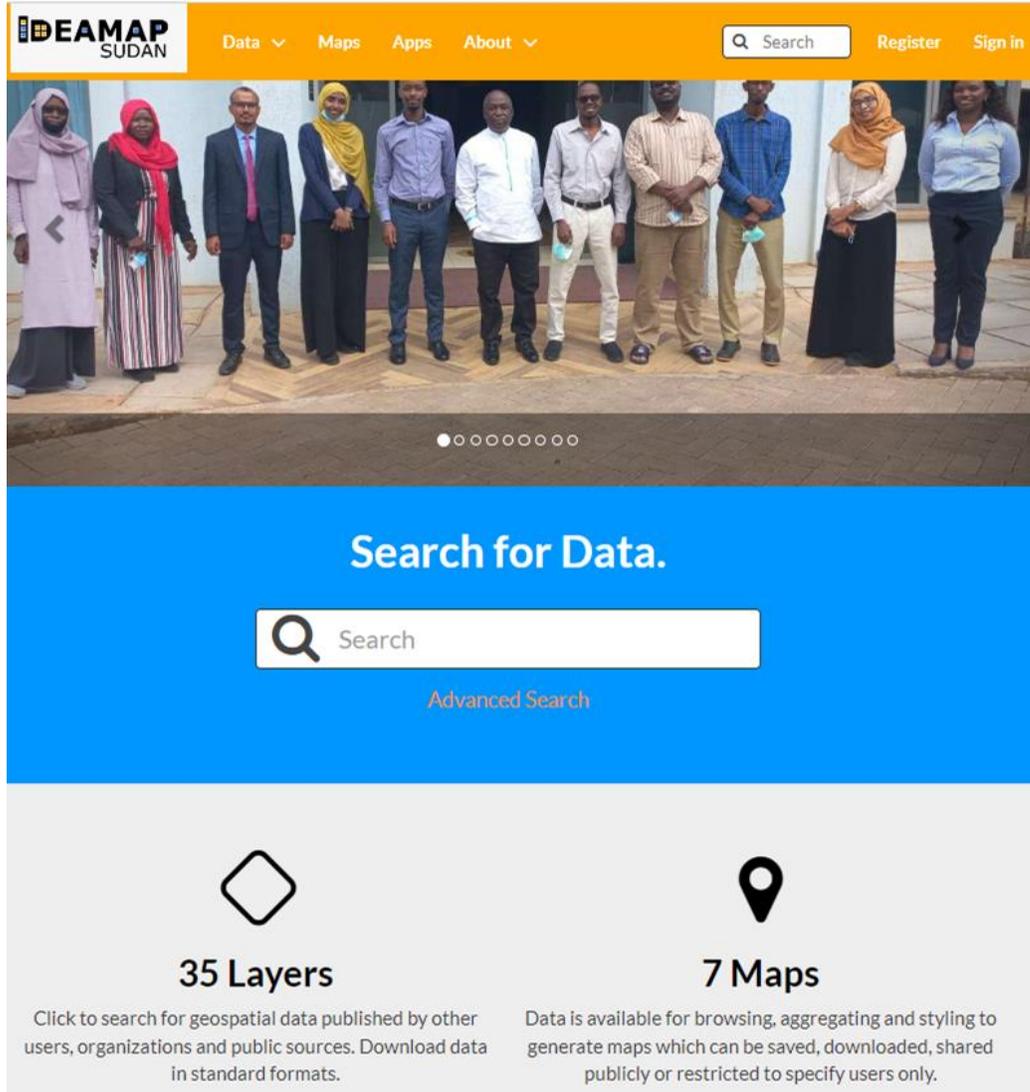
تطوير نموذج تخريط الحرمان بولاية الخرطوم

# Khartoum Deprivation Modelling The Approach

## Model Development/ Combined Deprivation Map



<http://geonode.idea-maps.net>



The screenshot shows the homepage of IDEAMAP SUDAN. At the top, there is a navigation bar with 'Data', 'Maps', 'Apps', and 'About' menus, along with a search bar and 'Register' and 'Sign in' buttons. Below the navigation is a group photo of ten people. A large blue banner contains the text 'Search for Data.' and a search input field with a magnifying glass icon and the word 'Search'. Below the banner, there are two main sections: '35 Layers' with a diamond icon and '7 Maps' with a location pin icon. Each section has a brief description of its functionality.

**Search for Data.**

Search

[Advanced Search](#)

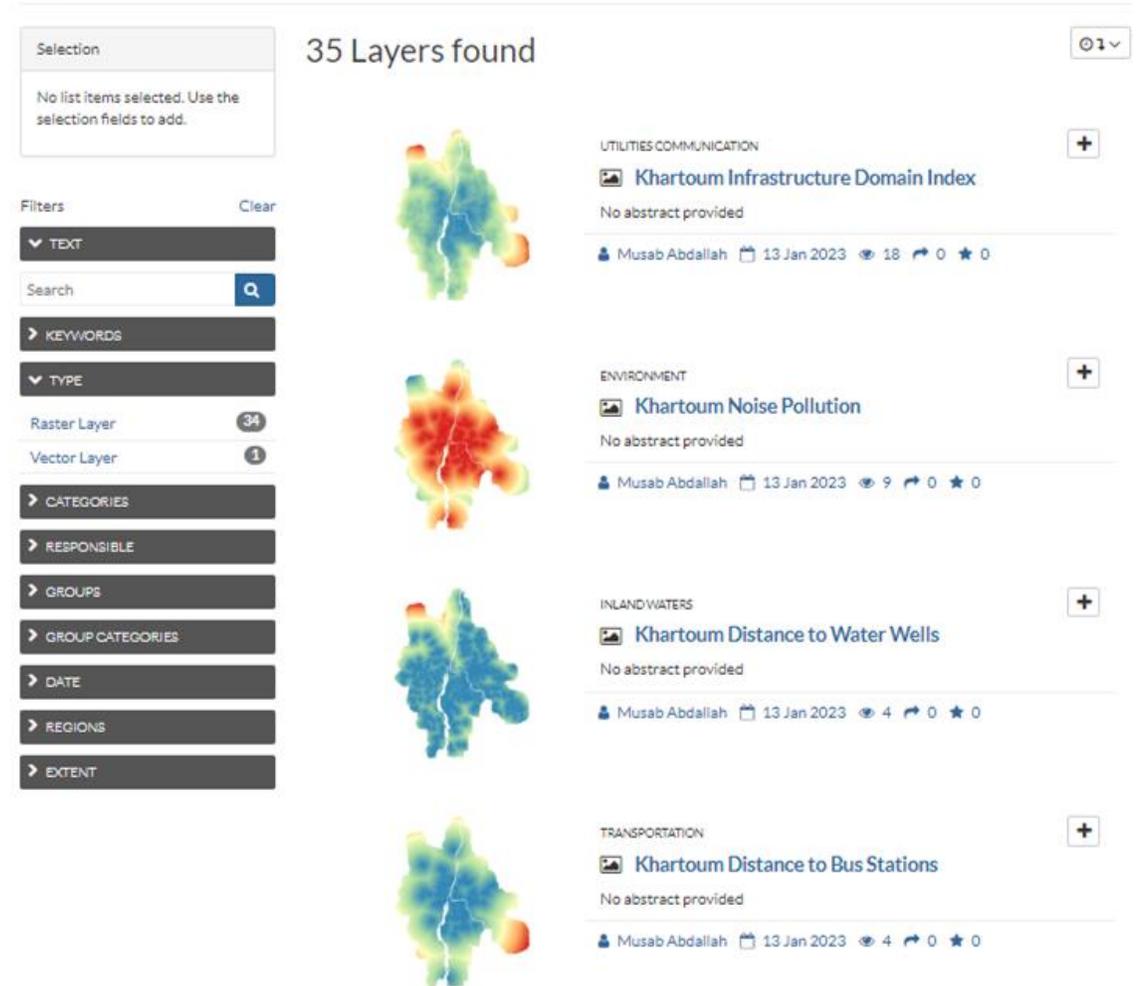
**35 Layers**

Click to search for geospatial data published by other users, organizations and public sources. Download data in standard formats.

**7 Maps**

Data is available for browsing, aggregating and styling to generate maps which can be saved, downloaded, shared publicly or restricted to specify users only.

## Explore Layers



The screenshot shows the 'Explore Layers' interface. On the left, there is a 'Selection' box with the text 'No list items selected. Use the selection fields to add.' Below it are 'Filters' with a 'Clear' button. The filters include 'TEXT', 'KEYWORDS', 'TYPE', 'CATEGORIES', 'RESPONSIBLE', 'GROUPS', 'GROUP CATEGORIES', 'DATE', 'REGIONS', and 'EXTENT'. The 'TYPE' filter is expanded, showing 'Raster Layer' (34) and 'Vector Layer' (1). In the center, there are four map thumbnails showing different data layers. On the right, there is a list of layers with their details:

**35 Layers found**

**UTILITIES COMMUNICATION**

**Khartoum Infrastructure Domain Index**

No abstract provided

Musab Abdallah 13 Jan 2023 18 0 0

**ENVIRONMENT**

**Khartoum Noise Pollution**

No abstract provided

Musab Abdallah 13 Jan 2023 9 0 0

**INLAND WATERS**

**Khartoum Distance to Water Wells**

No abstract provided

Musab Abdallah 13 Jan 2023 4 0 0

**TRANSPORTATION**

**Khartoum Distance to Bus Stations**

No abstract provided

Musab Abdallah 13 Jan 2023 4 0 0

# ToTs organizing training

Open Access Training Materials for GIS Experts: <https://www.idea-maps.net/workshops/>

GIS-Specialist Training workshop: 3 - 6 October 2022

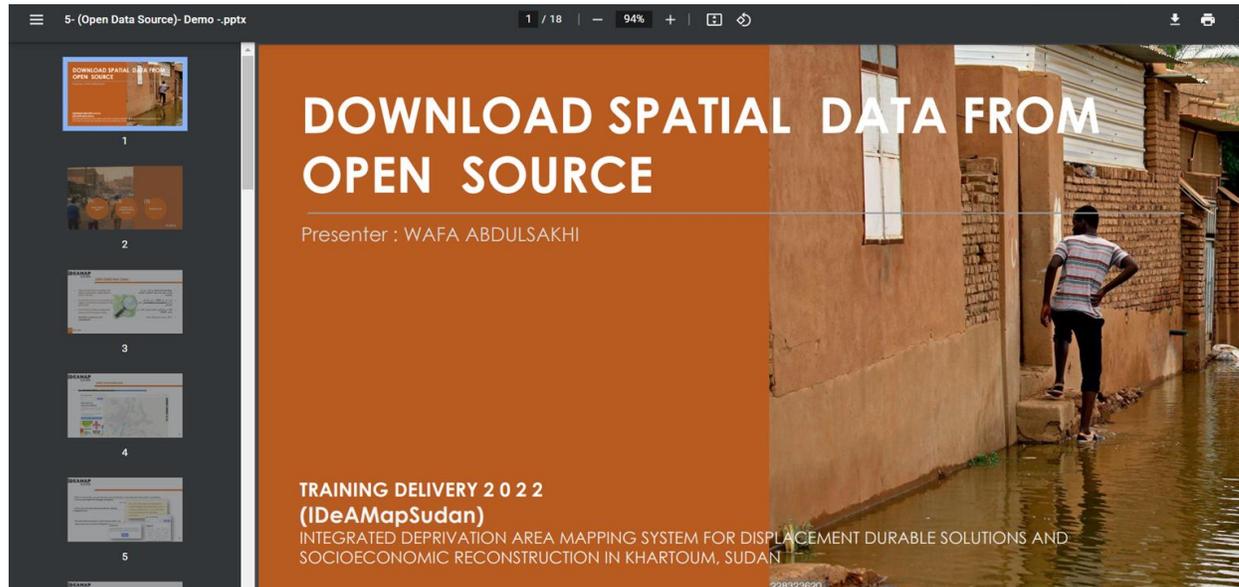
## GIS and Earth Observation - Information sources and analysis to support decision-making

- Day 1 - Introduction to Spatial Data and QGIS
- Day 2 - Spatial Data Collection & Analysis
- Day 3 - Earth Observation
- Day 4 - Modern Geospatial Methods

## Day 1 - Introduction to Spatial data and QGIS

### [Facilitator guide day 1](#)

- 1) [Welcome and Introduction to IdeaMapSudan](#)
- 2) [Introduction to GIS modelling](#)
- 3) [Using secondary data](#)
- 4) [Introduction to OGC Web Services](#)
- 5) [Downloading open-source data](#)
- 6) [Data quality and validation](#)
- 7) [Using primary data](#)
- 8) [Exercise - Introduction to QGIS](#)



# ToTs organizing training

Open Access Training Materials for Non GIS: <https://www.idea-maps.net/workshops/>

## Non GIS-Specialist training workshop: 19 - 21 September 2022

The basics of GIS and their importance in planning and supporting decision-making

- Day 1 - Introduction to GIS and Spatial Data & Methods
- Day 2 - Data collection methods
- Day 3 - Spatial Data Analysis for Decision-making Support

## Day 1 - Introduction to GIS and Spatial Data & Methods

[Facilitator guide day 1](#)

- 1) [Introduction to IdeaMapSudan](#)
- 2) [Introduction to data and its' importance](#)
- 3) [Introduction to GIS and spatial data](#)
- 4) [Why location matters](#)
- 5) [Using secondary data](#)
- 6) [Open-source spatial applications - Google Earth and OpenStreetMap](#)



# ToTs organizing training

Open Access Training Materials for CBOs: <https://www.idea-maps.net/workshops/>

## Community workshop: 19 - 20 November 2022

### Data: The Role of Community in Data Collection and Use for Community Benefit

- Day 1 - The importance of data and its use
- Day 2 - Exploring spatial data, and spatial data collection using Kobo Toolbox

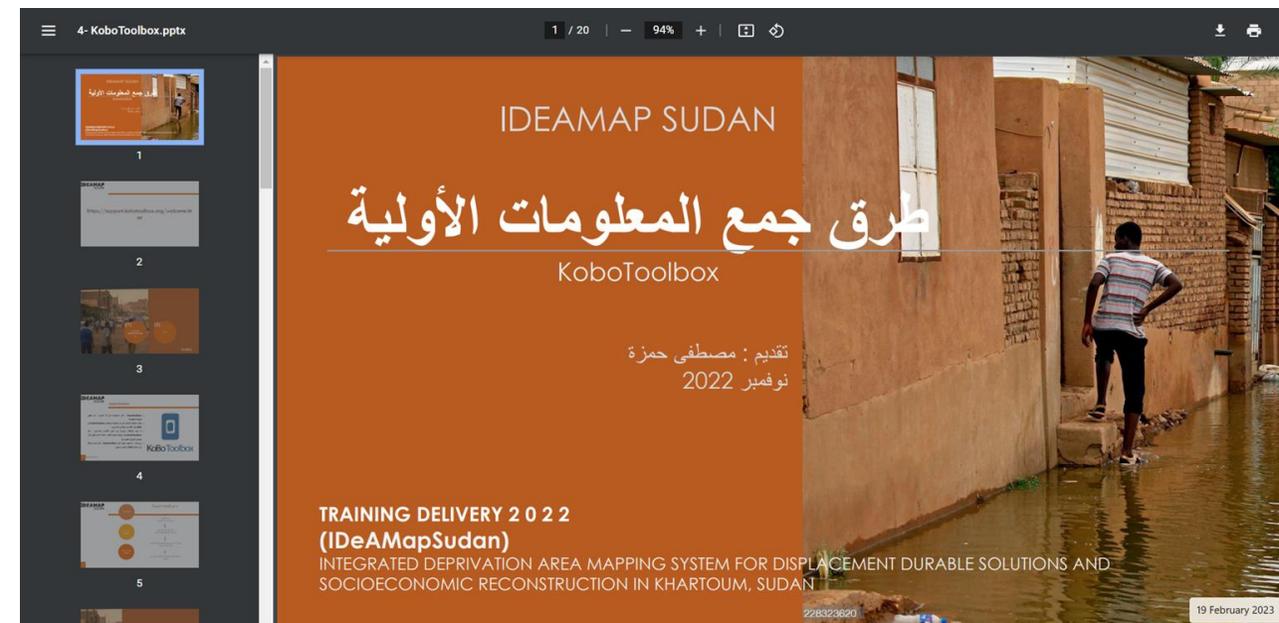


### Day 1 - The importance of data and its use

### Day 2 - Exploring spatial data and spatial data collection using Kobo Toolbox

#### [Facilitator guide day 2](#)

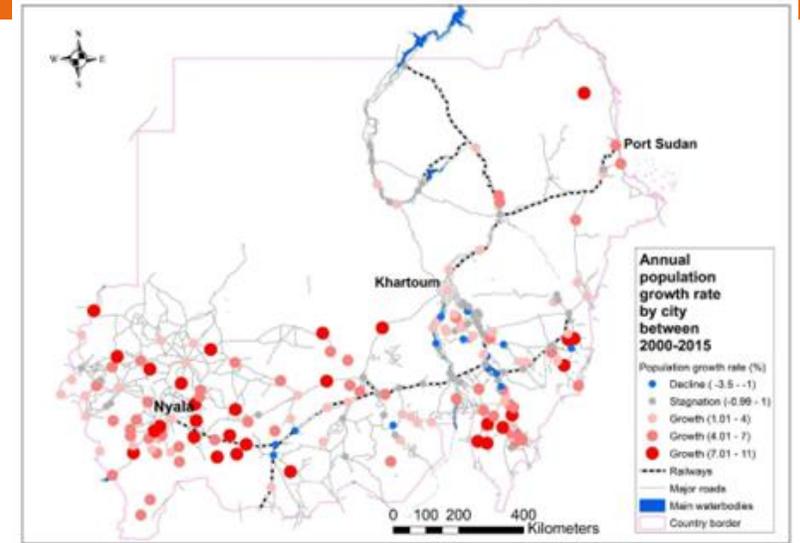
- 1) [What is secondary data ?](#)
- 2) [Accessing existing open-source spatial applications - Google Earth and OpenStreetMap](#)
- 3) [What is primary data ?](#)
- 4) [Data collection using KoboToolbox](#)



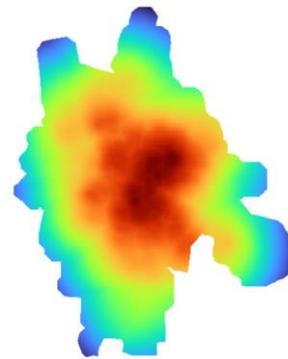
# Future Plans and Dissemination

Training Materials and Data Portal

## City Exchange + Transferring Knowledge



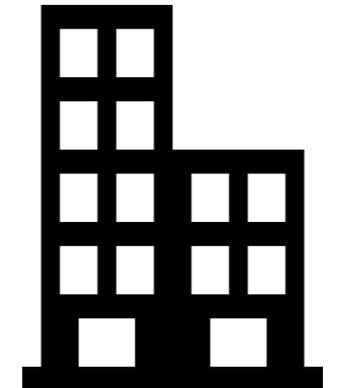
Users



Open Data



Transferring knowledge



Policy & decision makers



*Thank you ..  
IDeAMapSudan Team ..*