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Theme: GIS and Data for Planning and Disaster Preparedness
DISCUSSION POINTS

❖ BACKGROUND
❑ Water-related disasters and the SDGs
❑ Background study in 2013

❖ THE PROBLEM

❖ OBJECTIVES

❖ REVIEW OF PRACTICAL CASES
❑ The non-linear space-time challenge
❑ Why the participatory knowledge-centric approach using spatial techniques?

❖ WAY FORWARD: CONCEPT FOR ACTION
“New York faces a 100 percent chance that the combination of sea-level rise and weather conditions will result in a flood of at least 4 feet before the turn of the century.

Here's how some of the city's current infrastructure would be affected:

16,457 of 976,551 Property Value (mil $)
39,795 of 3,386,000 Homes
5 of 258 Hospitals
34 of 2,709 Schools
173 of 6,724 Miles of Roads.”
Background (1/3)

✓ Significant reduction of water-related disasters is among the key targets of the UN’s 11th Sustainable Development Goal (SDG), on making cities and human settlements inclusive, safe, resilient and sustainable.

☐ 15th SDG on sustainable use of terrestrial ecosystems, identifies floods among the key causes of land and soil degradation that must be combated to achieve a “land-degradation neutral world” (Osborn, Cutter, & Ullah, 2015).
Development planning for any region needs to ensure adequate long-term measures for effective disaster management and environmental sustainability.

Background study in Voi, 2013:

- Water-related problems in Voi should be solved at different political levels by multidisciplinary teams, with a focus on long-term community benefits.
Background study in Voi, 2013:

- Unclear understanding of the region’s hydrological and morphological processes, and the lack of adequate urban drainage plans or flood risk management strategies for the region.

- Taita Taveta University College to be at the forefront in active contribution through knowledge creation and innovation towards realising a master plan for developing Voi town.
The Problem

✓ Non-participatory planning and inadequate spatial data hinder the achievement of any effective disaster risk management strategy. A change of strategy in the way governments engage the public and spatial data in addressing similar environmental hazards is necessary.

☐ The consequences have always been severe, resulting in reactive interventions that focus on the immediate problem without addressing the perennial causes from a systemic perspective.
Objectives

✔ Develop a transferrable data-and-people-driven concept that allows active contribution from different actors, roles, and disciplines to effectively deliver on flood risk management strategy.

❑ Identify the requisite spatial datasets and their intrinsic qualities.

❑ Recommend economical GIS and RS techniques for the strategy.

❑ Propose a participatory concept integrating data and human actors.
Regional Analysis: Coastal Counties

- Demographics to be transformed into geo-demographics using GIS techniques for effective spatial planning.

- Trends and patterns through well-informed baseline data and projections

- Scale considerations (900 m grids).
High-resolution imagery and spatial contexts

- Background
- The Problem
- Objectives
- Review of Practical Cases
- Way Forward
Growth Structure: Similar topography, different responses to planning

Background

The Problem

Objectives

Review of Practical Cases

Way Forward

Voi: Low-lying at 580 m asl surrounded by high areas up to 810 m asl. Voi River and SGR

Stuttgart: Low-lying at 170 m asl near Neckar River surrounded by high areas up to 835 m asl. “Stuttgart 21” includes railway plan.
RALLYING CALL: Why is the well-known recurrent flood problem not being solved?

SOLVING WATER PROBLEMS

Stakeholder views
Geocoding using GNSS GIS, RS data
CONCEPT MAPS

Past, Present, Future
BOT Graphs/ Hydrographs
PATTERNS

FUNDAMENTAL as opposed to SYMPTOMATIC solutions:
Systems Thinking

DATA MODELS:
Resolution: RS imagery, control frame, orthophotos, laser scans, correct reference systems, correct formats

Delve Deeper into issues:
Inclusive decision making incorporating communities

MINDSET CHANGE
Development Control
Sustainability Plans
Design and Test the Model

LEARNING CYCLE:
Action – Results - Review

STORYTELLING

INTERVENTION PLAN

TREND ANALYSIS

STRUCTURAL MODEL
MULTI-STAKEHOLDER, MULTI-DISCIPLINARY CHALLENGE
Way Forward (1/2)

✓ Data quality and quantity: Use modern sensors and geotechnologies: Mobile Alerts (for crowdsourcing); RapidEye imagery for change detection; high-resolution (0.5 m resolution, e.g. from GeoEye); LiDAR/photogrammetry/UAVs for detailed land use analysis.

✓ Use local reference systems (Arc 1960 datum based on Clarke 1880 ellipsoid) and observe scale limitations. Indigenous knowledge to inform image classification.
Way Forward (2/2)

✓ Densify controls for accurate georeferencing, especially orthometric **Vertical Control** points for slope analysis and drainage plans (TTUC example).

✓ Focus on the **big picture**: catchment scale and human-environment interactions beyond the immediate vicinity of Voi.
"In my opinion, the SDGs are largely derivatives of the MDGs, expounded to emphasise global hot topics such as gender, environment and climate change, then extended to the next 15 years. The participatory nature in which the SDGs were crafted is a plus to citizens, unlike the MDGs. The highly poverty-related focus of the MDGs gives way to the broader worldview of the SDGs. The demand these goals place on collaborative local action will remain a major challenge to policymakers and technical persons alike. World leaders need to muster the courage to politically and financially support participatory and collaborative research on all the cross-cutting issues of sustainability, as reflected in most of the SDGs. To structure this discussion better, let's ask ourselves the new vigour and insights the SDGs are bringing into the discussion. The paradigm shift in approach is also key, including adaptive management and systems thinking,” commented Nashon J. Adero
Thanks for Listening

Discussion