MASTER PLANNING FOR INCLUSION DIVERSITY EXCELLENCE AND ADVANCEMENT (IDEA) IN INFRASTRUCTURE USING VETIVER GRASS

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LAND ACKNOWLEDGEMENT

RIPPOWAM “CLIFF OF ROCKS”

MUNSEE LENAPE “PEOPLE OF THE STONY COUNTRY”

CURRENTLY INDIGENOUS ARE <4% OF STAMFORD POPULATION

RAMAPO “RAA-MAA-POE” MUNSEE LENAPE STILL VERY ACTIVE IN AREA

Ancestors Rising: Ramapo Munsee Cultural Diplomacy Festival
(Ramapo Munsee Lenape Network, 2024)

Map of Tribal Nations of Connecticut
(Indigenous Peoples Resources, 2024)
PROBLEM & SIGNIFICANCE

THE HYDROLOGIC CYCLE ENCOMPASSES MUCH MORE THAN PRECIPITATION, CONDENSATION, AND EVAPORATION

WET-AND-DRY CYCLES IN YAZOO CLAY IN MISSISSIPPI

SHRINKAGE CRACKS IN DRIED YAZOO CLAY

(Khan et al., 2021)
SOLUTION

@ Depth of Sensor

CONSIDER THE USE OF VETIVER (CHRYSOPOGON ZIZANIOIDES) (Spears, 2024)

LAB-SCALE LYSIMETER TESTING OF SLOPES REINFORCED WITH VETIVER (Spears, 2024)

ACCOUNT FOR BENEFITS THAT INCREASE/RECOVER FACTOR OF SAFETY (FOS) (The International Information Center for Geotechnical Engineers, 2023)
JERE Overview with Stage 1 Steps (Adapted from Arkhurst, 2024)

**Spatial Justice Assessment**: Focuses on the geographical distribution of benefits and burdens associated with the team’s project

**Structural Justice Assessment**: Maps benefits and burdens to 15 demographic characteristics (e.g., ethnicity, wealth, gender, and climate vulnerability)

**Gap Consolidation**: Consolidation of gaps identified in this first stage of JERE

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**JERE STAGE 1**

Initial Assessment

1. Spatial Justice Assessment
2. Structural Justice Assessment
3. Gap Consolidation

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**JERE STAGE 2**

Process Planning and Pursuit

- Embed equity into processes such as information gathering and public engagement to inform all other stages

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**JERE STAGE 3**

Distribution-Based Assessment

- Fill gaps from Stage 1 and identify the potential implications of technology from applying Stage 2

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**JERE STAGE 4**

Requirements Translation

- Convert considerations and priorities identified in prior JERE Stages to system requirements & specifications

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Iterate through prior stages until appropriate system requirements are reached.

(Same assessment used in JERE Stages 1 and 3)
IMPLEMENTATION OF LIFE CYCLE ANALYSIS

PLAN FOR FIELD-SCALE STUDY (STAGE 2)
- Consider all resources
- Consider all stakeholders
- Determine expenses
- Determine timeframe
- Obtain equipment and instrumentation

DOCUMENT INFORMATION FROM FARM TO SITE (STAGE 3)
- Record the impact
  - Costs to farmer
  - Land use
  - Carbon captured
  - Carbon emitted
  - Delivery/Shipment types and durations
  - Benefit of business to farmer’s community,
  - Etc.

QUANTIFY BENEFITS AND BURDENS (STAGE 3)
- Quantify effects:
  - Social
  - Environmental
  - Economic
- For example: How much carbon is produced during shipment/delivery to the site?

TALK TO EXPERTS (STAGE 4)
- Involve professionals and stakeholders
- Verify methodologies and conclusions
- Develop plans
  - to reduce negative impacts
  - to increase positive impacts
- Transfer technology to practice
SUMMARY

1. Climate-change is increasing precipitation in MS, thereby increasing chances of rain-induced landslides in expansive Yazoo clay.

2. Understanding the hydrologic balance of an earthen embankment or levee—using sensors and remote data—can better surmise the stability of the slope.

3. The Justice-Embedded Requirements Engineering (JERE) process empowers Civil Engineers to expand sustainability beyond design and construction.

4. Utilizing field-scale pilot studies provide a better estimate of the life cycle application of the technology.

5. For holistic solutions, all stakeholders must be involved.
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