Fostering Agricultural Development by Reducing Vulnerabilities

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Overview

- Introduction
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  - Vulnerability
- Vulnerability Framework
- Methodology
- Key Results
- Implications for Agricultural Development
- Conclusions

Introduction

- *Water-aCCISS Project* (Sustainable Water Management under Climate Change in Small Island States of the Caribbean), this aspect aimed to to construct sustainable livelihood indices to assess vulnerability and determine impact of climate change on water availability in the three (3) watersheds.
- For the purpose of this presentation, we will only analyze one site, the Nariva catchment.

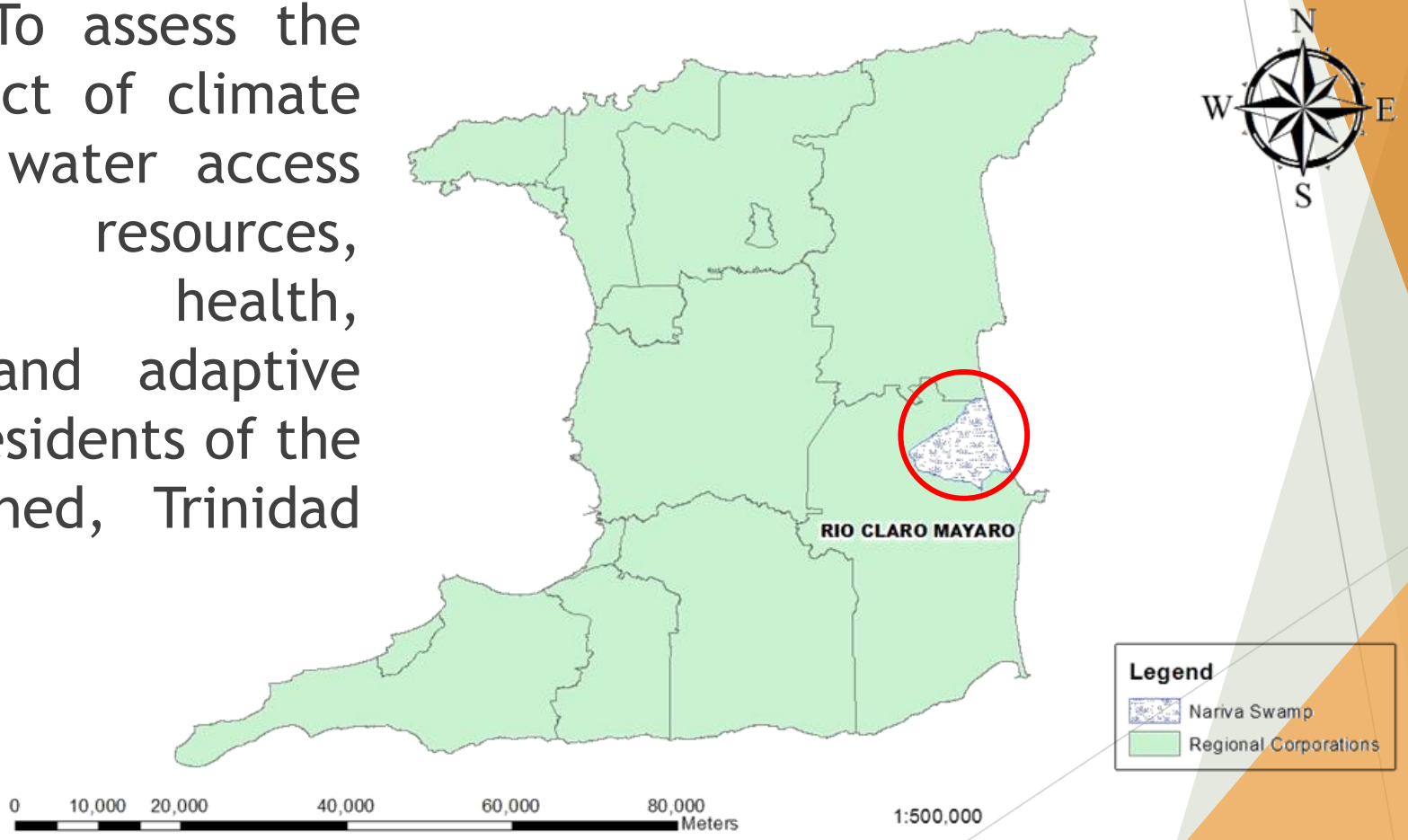
Introduction

"Vulnerability is the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes." (IPCC 2007)

- Vulnerability is defined by three (3) distinct factors;
  - 1. Exposure, 2. Sensitivity and 3. Adaptive Capacity
- High vulnerability => high exposure + high sensitivity + low adaptive capacity
- Low vulnerability => low exposure + low sensitivity + high adaptive capacity

Introduction

Overall Aim: To assess the potential impact of climate variability on water access via water resources, ecosystem health, vulnerability and adaptive capacity, for residents of the Nariva watershed, Trinidad and Tobago.



Introduction – Specific Objectives

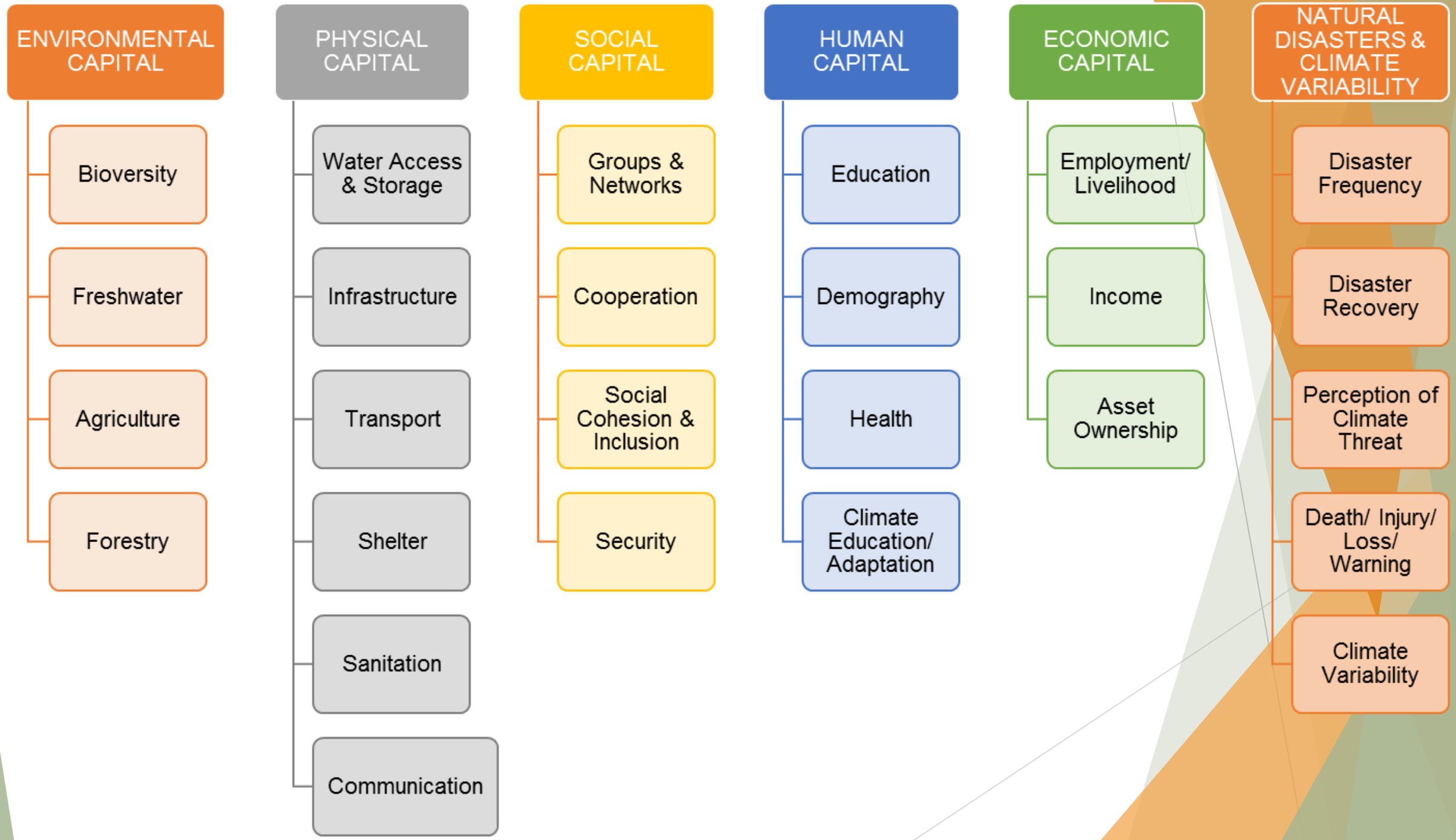
- To calculate vulnerability of householders through the calculation of a Livelihood Vulnerability Index (LVI)
- To identify the aspects of the community that contribute the most to vulnerability.
- To analyze the implications of the vulnerable pillars to agricultural sector development.

Methodology - Survey

- A survey of 343 householders from three communities in Nariva; Biche, Cascadoux/Kernahan and Plum Mitan.
- The data was collected using questionnaires administered with face to face interviews during the period August to October 2014.
- Data was collected in six (6) general areas:
- (1) General environment; (2) Change of climate; (3) Benefits from nature; (4) Access to water and quality of life; (5) Family and community ties; and (6) Socio-demographic information.

Vulnerability Framework

- Six (6) pillars were defined with a number of sub-components under each pillar.
- Indicators (questions) were selected to represent each sub-component.
  - **Agriculture:** Size of farm? Number and Type of animals reared?
  - **Water Access & Storage:** What kind of access to water do you have? How much water can you store?
  - **Freshwater:** Has there been any deterioration in the quantity / quality of water in rivers and streams in your community in the past 10 years?


ENVIRONMENTAL CAPITAL
Bioversity
Freshwater
Agriculture
Forestry
PHYSICAL CAPITAL
Water Access & Storage
Infrastructure
Transport
Shelter
Sanitation
Communication
SOCIAL CAPITAL
Groups & Networks
Cooperation
Social Cohesion & Inclusion
Security
HUMAN CAPITAL
Education
Demography
Health
Climate Education/ Adaptation
ECONOMIC CAPITAL
Employment/ Livelihood
Income
Asset Ownership
NATURAL DISASTERS & CLIMATE VARIABILITY
Disaster Frequency
Disaster Recovery
Perception of Climate Threat
Death/ Injury/ Loss/ Warning
Climate Variability

s_d

Methodology (cont'd)

- STEP 1: Relevant indicator questions from the questionnaire were selected and matched to each sub-component for each pillar. Some indicators such as "Do you own a vehicle?" had to be recoded as having a vehicle was assigned a higher vulnerability than not owning one.
- Normalize each indicator value so that they have the same range, 0 to 1 using the formula $\frac{s_d - s_{\min}}{s_{\max} - s_{\min}}$ where ;
  - where s_d is the observed value for the individual household; s_{min} (s_{max}) is the minimum (maximum) of all observations.
  - For some questions the formula was reversed; $\frac{s_{\max} - s_d}{s_{\max} - s_{\min}}$

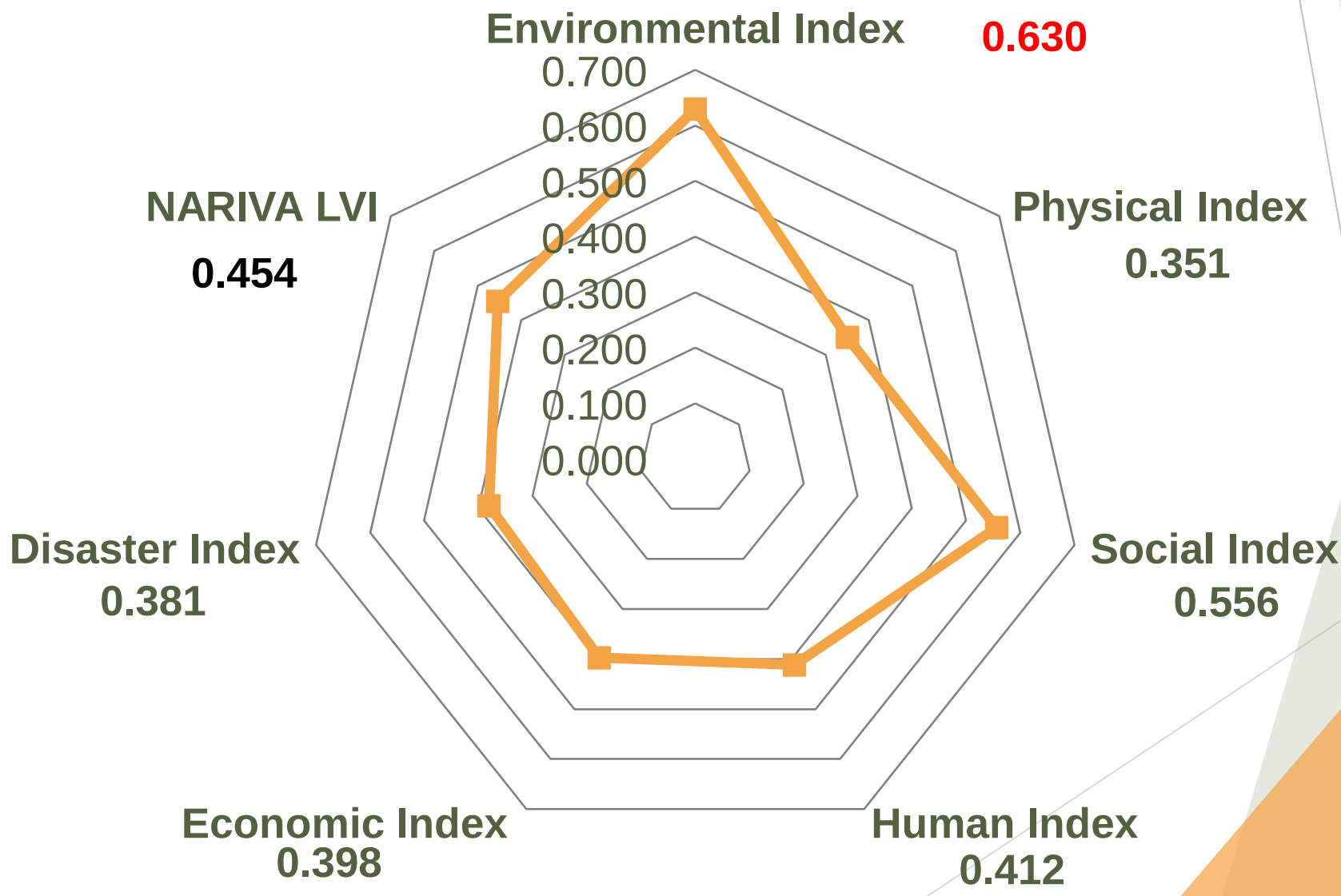
s_d

Methodology (cont'd)

- Step 2: Take the average of each sub-component for each household ➔ result is household vulnerability index
- Step 3: Take the average of household vulnerability for community➔ result is community vulnerability
- Step 4: Take the weighted average of community vulnerability ➔ result is overall Livelihood Vulnerability Index (LVI) for the Watershed.
- The LVI is scaled from 0 (very low vulnerability) to 1 (very high vulnerability)

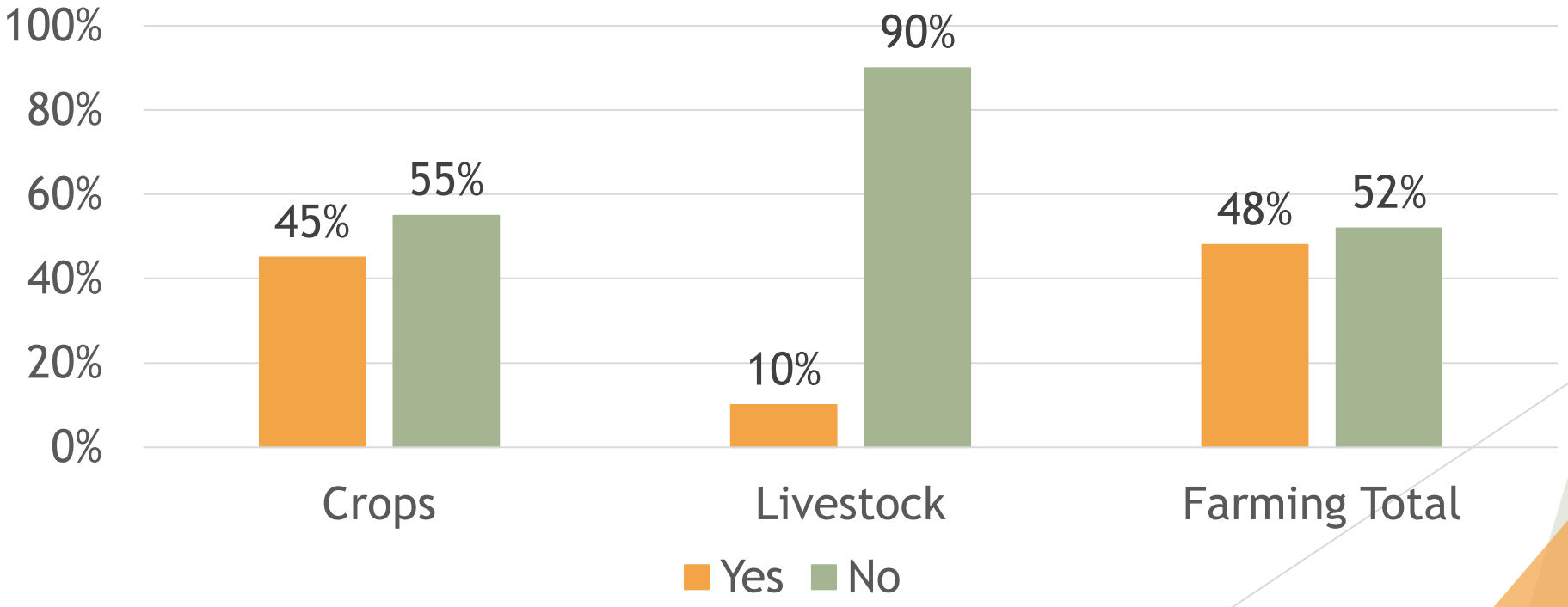
Very Low	Low	Medium Low	Medium	Medium High	High	Very High
0 - 0.14	0.15 - 0.28	0.29 - 0.42	0.43 - 0.56	0.57 - 0.70	0.71 - 0.84	0.85 - 1.00

Index Results by Pillar

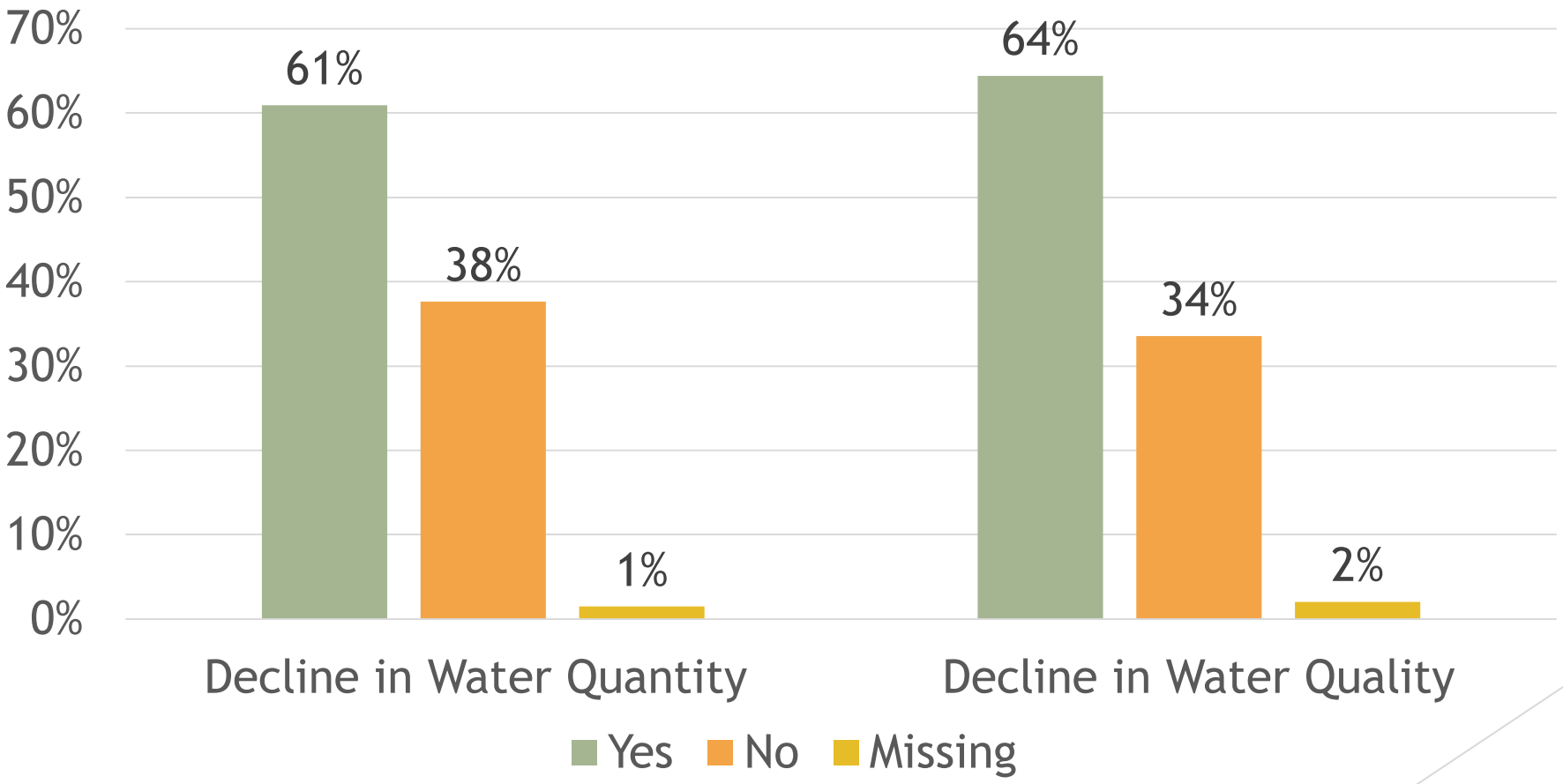


Farming

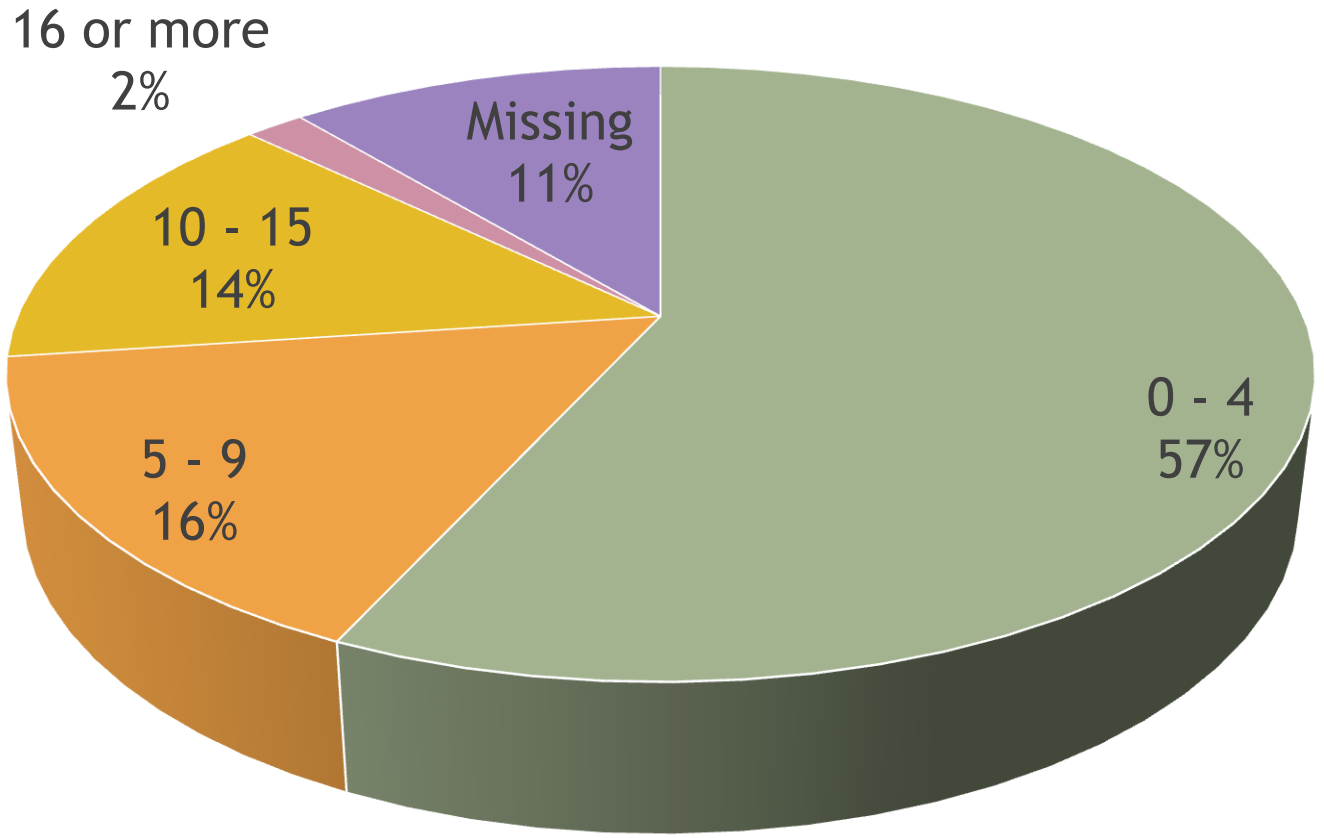
- Average Farm Size – 3.81 acres
- Largest – 25 acres Smallest – ¼ acre



Deterioration in the Quantity & Quality of Water in Waterways



Number of Disasters in the last 10 years
(storms, hurricane, droughts, floods and landslides)



Results

- Social pillar is subsequently the second most vulnerable pillar; LVI = 0.556, medium vulnerability.
- This vulnerability is attributed to the cooperation and groups & networks sub-components as reflected in the responses.
  - 38% indicated that they are an active member of a community group or organization.
  - 16% of those who responded indicated that they obtained information from community groups
  - 22.4% indicated strongly that they could obtain assistance from persons in their community if necessary.

Results

- Physical pillar accounts for least of the vulnerability; LVI = 0.351, medium low vulnerability.
  - While 18% of respondents selected the option of having *"WASA piped to dwelling"* more than half the respondents (58%) indicated that they can store 800 gallons or more of water.
  - Householders are not as vulnerable due to their ability to adapt through large water stores although they are vulnerable in terms of lack of direct water access to their dwellings.

Conclusions

- Nariva LVI = 0.454 indicating a medium level of vulnerability
- Most vulnerability:
  - Environmental capital pillar, LVI = 0.630 medium high vulnerability
  - Social capital pillar, LVI = 0.556, medium vulnerability
- Least vulnerability:
  - Physical capital pillar, LVI = 0.351 medium low
- Communities with strong social tend to be less vulnerable.
- While they are rural, their agricultural assets are low.

Conclusions

- A valuable method of identifying a community's vulnerability levels and more specifically the sources of said vulnerabilities.

- The LVI can be used to assess how effective a policy change such as improved water access to communities (physical capital). This improvement may be incorporated (new indicator values) to produce new LVI scores.

References

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Thank You!

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