Vulnerability to Disasters: A Gendered Analysis on Water Availability and Livelihoods in Nadu Colony, Kovalam, Chennai, India

Group No: 02

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Introduction

• What is Disaster vulnerability?

“Vulnerability is the inability to resist a hazard or to respond when a disaster has occurred” (www.unisdr.org)

• Gender and Disaster vulnerability

“Both women and men are part of the same society. However, they do not have the same rights, education and options to manage, when a disaster strikes.”

(UNISDR Secretariat, 2003)

• Livelihoods and Disasters

“The concept of livelihood reflects the ability of people to sustain their daily needs on a combination of resources which are natural, physical, human, social, financial, and political in nature. These resources strongly interplay with the ability of people to face the threat of and recover from the impact of natural hazards” (https://link.springer.com)
General Research Question

- How natural disasters and climate variability contribute to vulnerability of men and women in the context of water availability and use in Nadu Colony, Kovalam?
Research Sub Questions

• How are the climate extremes linked to people’s livelihoods?
• How changes triggered by climate variability are affecting local people in the Nadu Colony?
• How class, caste, religion and gender interplay in accessing water?
Objectives

Primary Objective
• To explore the social, economical and environmental vulnerability of the Nadu Colony in Chennai to natural and human induced disasters.

Secondary Objectives
• To identify what kinds of natural disasters occurring in the area and their impacts on water resources
• To assess the vulnerability of men and women to such disasters.
Conceptual Framework
Vulnerability

- Social (Class, Caste, Religion, Gender)
- Livelihood
- Environment

Floods
- Inundation
- Damages to houses
- Impact on fishing
- Interruptions to services

Droughts
- Water Quality and Quantity Deterioration
- Non availability of fish

Cyclones
- Damages to houses
- Impact on fishing

Tsunami
- Damage to houses
- Relief and Rehabilitation programs

Tourism
- Alcohol Consumption
- Increasing the land value

Water Scarcity
- Damage to houses
- Impact on fishing
The Study Area

Source: Google Earth Imagery, 2019
Climatic Characteristics of Study Area

- A Tropical Climate.
- Major rainfall season is from October to December.
- Dry season is from February to April.
- Unimodal pattern of rainfall.
- Average annual temperature is 28.6 °C.
- Average annual rainfall is 1197 mm.

Source: en.climate-data.org
Vulnerability to Disasters....
Frequency of Cyclone occurrence from 1891-2018

Source: IMD Cyclone Atlas
Impact of Tsunami - 2004

- Along India’s southeastern coast, several villages were swept away, and thousands of fishermen at sea were missing.
- India’s mainland, hardest hit was the state of Tamil Nadu. The southern peninsular region comprising Kerala and part of Tamil Nadu on the west coast and the rest of Tamil Nadu.
- The 9.0 magnitude (for 5 minutes) quake created a series of tsunamis that caused great destruction and loss of life throughout the Indian Ocean basin, within several hours of the initial event.

The study area which is located south of Chennai has hardly hit by Tsunami in 2004
Impact of Floods

https://www.thehindu.com
Methodology
Methodology

1. Study Area Selection
2. Primary Data Collection
   - Quantitative Data
     - Questionnaire Survey (14 Households)
     - Time Use Survey for Peak and Lean Season
   - Qualitative Data
     - KPI (03)
     - IDI (03)
     - Resource Mapping with Men and Women
     - Field Observations
3. Data Analysis and Interpretations
4. Impacts of Disasters on Men and Women and their livelihoods
Types of Activities

Economic Activities

- SNA Works
  - Livelihood Activity
    - Prawn Catching
    - Labor Works
      - Carpentering
      - Garden Keeper
      - Welders
      - Painters
    - Water
      - Selling of canned water
    • Pump Operator
  - Non- SNA Works
    - Child Care
      - Preparing Child
      - Feeding child
      - Lifting Child to School
      - Gossiping with children
    - Domestic Activities
      - Cooking
      - Washing Houses
      • Washing Clothes
  - Water
    • Collecting Water

Non-Economic Activities

- Free Time
  - Chatting with neighbors
  • Relaxing
- Recreation
  • Watching TV
- Social & Cultural Activities
  • Religious Festivals
  • Praying

Personal Care

- Waking-up
- Sleeping
- Having Food
- Bathing
Results and Discussion

General characteristics and water sources of the study area
Resource maps clearly show the differences in perception of males and females on resources around them.
### Housing Type

- Pucca: 64%
- Semi Pucca: 15%
- Kutcha: 21%

### Ownership of House

- Owned: 64%
- Rented: 22%
- Other: 14%

### House Hold Type & House Hold Ownership Crosstabulation

<table>
<thead>
<tr>
<th>House Hold Type</th>
<th>House Hold Ownership</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>owned</td>
<td>rented</td>
</tr>
<tr>
<td>Kutcha</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Semi Pucca</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Pucca</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>3</td>
</tr>
</tbody>
</table>
Family Type

- Man-headed: 71%
- Women-headed: 29%
How Disaster Impacts the Area

• The locality is near to the backwater of the sea.
• Over time period, it is getting polluted day by day.
• Again disconnection with the sea during drought & dry period has made the water totally saline.
• So people are shifted from their occupation, fishing.

• Again with the exploitation of groundwater rather than recharge, the waterbodies in the area got dried and became saline.
• For this they have to face two climatic extremities
  Peak period(highest rainfall period)
  Lean period(Driest Period)
Primary sources of water

Primary Sources of Drinking Water

- Can Water: 57%
- Public well: 21%
- Rain water: 15%
- Tap water: 14%

Lean Period: 93%
Peak Period: 57%

Primary Sources of Domestic Water

- Tap water: 50%
- Tank water: 22%
- Pond water: 14%
- Private wells: 14%
- Public well: 7%
- Rain water: 7%

Lean Period: 50%
Peak Period: 29%
Can Water

Tank Water

Well Water

Tap Water
Time Use Survey
Gender Division of Labour

Seasonal Variation of Male Activities

- SNA Activities (Male lean)
- Non-SNA Activities (Male lean)
- SNA Activities (Male peak)
- Non-SNA Activities (Male peak)

Seasonal Variation of Female Activities

- SNA Activities (Female lean)
- Non-SNA Activities (Female lean)
- SNA Activities (Female peak)
- Non-SNA Activities (Female peak)
Lean

Non SNA Activity of Male

Non SNA Activity of Female

Peak
Ranking of households based on Economic Index derived on ownership and type of houses

<table>
<thead>
<tr>
<th>Type of House</th>
<th>Stories of building</th>
<th>Ownership of house</th>
<th>weightage</th>
<th>Category</th>
<th>Ranking</th>
<th>Richest</th>
<th>Poorest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pucca</td>
<td>1</td>
<td>Owned</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semi pucca</td>
<td>2</td>
<td>Owned</td>
<td>2</td>
<td>Higher Class</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semi pucca</td>
<td>1</td>
<td>Owned</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pucca</td>
<td>2</td>
<td>Rented</td>
<td>4</td>
<td></td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pucca</td>
<td>1</td>
<td>Owned</td>
<td>4</td>
<td>Middle Class</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semi pucca</td>
<td>1</td>
<td>Rented</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semi pucca</td>
<td>1</td>
<td>Donated</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kutcha</td>
<td>1</td>
<td>Owned</td>
<td>7</td>
<td>Lower Class</td>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Relationship of Water Sources & Economic Index (Drinking water)

### Source of drinking water for Lean period * economic index

Cross tabulation

<table>
<thead>
<tr>
<th>Type of source</th>
<th>Source</th>
<th>Higher Class</th>
<th>Middle Class</th>
<th>Lower Class</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary</strong></td>
<td>Can Water</td>
<td>7</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Tap water</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Secondary</strong></td>
<td>Public Well</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

### Source of drinking water for Peak period * economic index

Cross tabulation

<table>
<thead>
<tr>
<th>Type of source</th>
<th>Source</th>
<th>Higher Class</th>
<th>Middle Class</th>
<th>Lower Class</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary</strong></td>
<td>Can Water</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Tap water</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Public Well</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>rain water</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td><strong>Secondary</strong></td>
<td>ponds</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>rain water</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
# Relationship of Water Sources & Economic Index

(Domestic water)

<table>
<thead>
<tr>
<th>Primary source of domestic water for peak period</th>
<th>eco_index_1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.00</td>
</tr>
<tr>
<td>Tap water</td>
<td>0</td>
</tr>
<tr>
<td>tank water</td>
<td>0</td>
</tr>
<tr>
<td>public well</td>
<td>3</td>
</tr>
<tr>
<td>rain water</td>
<td>2</td>
</tr>
<tr>
<td>ponds</td>
<td>0</td>
</tr>
<tr>
<td>private wells</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>7</strong></td>
</tr>
</tbody>
</table>

Secondary source of domestic water for peak period & eco_index_1 Crosstabulation

<table>
<thead>
<tr>
<th>Secondary source of domestic water for peak period</th>
<th>eco_index_1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.00</td>
</tr>
<tr>
<td>Tap water</td>
<td>2</td>
</tr>
<tr>
<td>tank water</td>
<td>2</td>
</tr>
<tr>
<td>rain water</td>
<td>1</td>
</tr>
<tr>
<td>ponds</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>6</strong></td>
</tr>
</tbody>
</table>
## Relationship of Affordability & Water source

<table>
<thead>
<tr>
<th></th>
<th>Drinking Water in Lean</th>
<th></th>
<th>Drinking water in Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Higher Class</td>
<td>Middle Class</td>
<td>Lower class</td>
</tr>
<tr>
<td>Paid Water</td>
<td>7</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Unpaid Water</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Paid water – can and supplied water
Unpaid water – Public wells, pond, rainwater
## Primary source of domestic water for lean period * Religion Crosstabulation

<table>
<thead>
<tr>
<th>Count</th>
<th>Hindu</th>
<th>muslim</th>
<th>christian</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary source of domestic water for lean period</td>
<td>tank water</td>
<td>5</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>public well</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>ponds</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>private wells</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>1</td>
<td>5</td>
<td>14</td>
</tr>
</tbody>
</table>
Findings – Qualitative Analysis (KPI and IDI)
## Impact of disasters and the vulnerability of community

<table>
<thead>
<tr>
<th>S NO</th>
<th>INTERVIEWEE</th>
<th>WATER AVAILABILITY</th>
<th>LIVELIHOODS</th>
<th>OCCUPATION</th>
<th>ADAPTATION &amp; MANAGEMENT RISKS</th>
</tr>
</thead>
</table>
| 1    | KALIAMMAL AGE: 47 NADU COLONY | Vulnerable to access the natural water sources and panchayat water | • People never used to do sea fishing  
  • Spending their money to access good quality of water | • Women and Men do prawn catching  
  • Men work in salt production | • They practiced to collect rain water for domestic purpose  
  • Adapted to the flood condition |
| 2    | BUVANESHWARI & JAYAKUMAR NADU COLONY | Vulnerable to access good quality of water from common resources | • In dry season, sometimes he will take leave for 10 days to fetch water from 6 AM- 9:30 AM  
  • Travel 2 km to fetch water and it will take 15 minutes | • He is not doing his traditional work. Because of domestic waste discharge into the Back water. | • Collect rain water during rainy season  
  • Adapted to the seasonal pattern changes |
<table>
<thead>
<tr>
<th>S NO</th>
<th>INTERVIEWEE</th>
<th>WATER AVAILABILITY</th>
<th>LIVELIHOODS</th>
<th>OCCUPATION</th>
<th>ADAPTATION &amp; MANAGEMENT RISKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>DHAKSANA MOORTHI</td>
<td>Vulnerable to access good quality of water after 2015 flood event</td>
<td>• Dry season: Car Driver</td>
<td>• Skin problems and pain in legs after work</td>
<td>• No proper distribution network for drinking water</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Peak season: Salt production and this also get worsen because of less income</td>
<td></td>
<td>• In public meetings, peoples voice are voiceless</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>ETHTHU RAJAM</td>
<td>• Difficulty in fetching good quality of water (public water sources)</td>
<td>• Earlier villagers practiced paddy vegetables cultivation</td>
<td></td>
<td>• Adaptation to the flooding which takes place often</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Access to private wells quality getting worse day by day. There may be a cause like multiple well for one aquifer.</td>
<td></td>
<td></td>
<td>• Schemes were not implemented in a correct way(Desalination plant)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Distribution is not functioning well</td>
</tr>
<tr>
<td>S NO</td>
<td>INTERVIEWEE</td>
<td>WATER AVAILABILITY</td>
<td>LIVELIHOODS</td>
<td>ADAPTATION &amp; MANAGEMENT RISKS</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>-------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
<td>-----------------------------</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>AMZED AHMED, NADU COLONY</td>
<td>Initially depend on tap water due to uncertainty they used to take well water. Increased use and sea water intrusion reduced the availability of water. Now they are preferring for can water.</td>
<td>Some times their less income push them to use saline water for cooking purpose</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>THIRUNAKAR, NADU COLONY</td>
<td>Initially the rainfall pattern is certain one and now the intensity gets increased and inundation of houses occurring. High income satisfies their water needs.</td>
<td>lack of proper maintenance and dumping of garbage on lake the water on pond was worst</td>
<td>lack of proper maintenance and dumping of garbage on lake the water on pond was worst</td>
<td></td>
</tr>
</tbody>
</table>
Conclusions

• The area is naturally vulnerable due to its location near to the bar mouth. Rise and fall of salinity affects both surface and sub surface water.

• Natural hazards, man made changes and the natural water scarcity in the area have made people more vulnerable.

• These changes affects both Men and Women in a different perspectives.

• Proper management and awareness would bring more sustainable solutions.
Thank You...!