Estimating the economic value of the disaster effect
Objectives of this session

- Estimate the economic value to disaster effects
- Understand how the disaster effect is aggregated and summarised in a typical PDNA report
- Test your understanding of the estimating costs of effects through a simple case study
The PDNA Process

- Context Analysis
- Disaster Effect
- Disaster Impact
- Recovery Needs
- Recovery Strategy

• Pre-Disaster context - baseline of social, economic, cultural, financial, political status
The economic valuation of the disaster effect consists of a gap analysis...

BEFORE - AFTER = GAP

CONTEXT ANALYSIS AND PRE DISASTER BASELINE DATA

EFFECTS OF THE EVENT PRESENTED IN POST DISASTER DATA SET

COMPARE PRE-AND POST DISASTER SCENARIOS

... that is conducted across all PDNA sectors and for each disaster-affected area.
There are two essential concepts needed to undertake the disaster effect assessment:

damage and loss
Damage

• Refers to the **total or partial destruction** of infrastructure and physical assets. Its cost is estimated at the replacing or repairing market prices prevailing just before the disaster.

• Damages are **valued first in physical terms** (number of houses of a specific typology, Km of roads or pipelines, size and types of schools or hospitals); and **then in terms of their monetary value**, using unit current market prices.
Economic loss refers to changes in economic flows arising from the disaster.

These changes in flows continue until the achievement of full economic recovery and reconstruction, in some cases lasting for several years.

Loss is expressed in current monetary values.
Estimating the Value of Effects

Value of **total/partial destruction** of infrastructure and physical assets

Value of **changes to social service delivery** and access to goods and services

Value of **changes to governance processes** derived from disruption to governance as result of the event

Value of **changes to risks and vulnerabilities** derived from the extent of the population exposure
Categorize the physical assets by size, capacity and construction materials (m³ of debris removal, m² of damaged schools or hospitals, km of damaged roads or water pipe lines).

Obtain current market price for repair and construction.

Calendar of time over which repair and reconstruction will take place.

Estimate the unit value (US$/m³ of debris removal, US$/m² of RC construction) and aggregate the total value.
Pre-disaster minus post-disaster estimates of losses due to:

- Forgone income opportunities
- Higher operating costs
- Unexpected expenses
Estimating Loss: examples

Value of changes to governance processes derived from disruption to governance

- Estimate increased costs of coordination needs over time such as temporary facilities and resources and restoration of government capacities.
- Estimate higher expenditure for service delivery over time.
- Estimate higher expenditure for temporary staff over time.
- Calculate current value and aggregate.
Estimating Loss

Value of changes to risks and vulnerabilities (loss)

- Estimate additional expenditures to address secondary risks over time
- Estimate higher costs for communications campaigns to prevent risks over time (to boil drinking water and digging a ditch in a temporary shelter)
- Calculate current value and aggregate
Examples of loss

1. Foregone income opportunities

Private:
- total loss of crops or reduction in farm output
- income reduction from businesses, rent, etc.

Public:
- Income loss/revenue from public facilities and firms like airports, ports, state-owned enterprises, etc.
Example of loss

2. Higher operating costs
   - additional expenses to produce same output of goods and/or services during the recovery phase
     - Cost of replanting new crops
     - Cost of temporary power and/or water supply;
     - rent of temporary offices firms

3. Unexpected expenses
   - cleaning up of debris
   - unexpected expenses on temporary shelters, water supply, medicines, food supply, etc. for the government.
Importance of costing the loss

- In the past, the cost of disasters was identified only in terms of damage due to urgency in reconstruction financing.
- It is difficult to estimate losses.
- Total effects of disasters could be largely underestimated if losses are not accounted for.
- Many social needs may not be addressed.
## Odisha PDNA: Damage and Loss

<table>
<thead>
<tr>
<th>Sector/Themes</th>
<th>Damage (INR Cr)</th>
<th>Damage ($ mil.)</th>
<th>Losses (INR Cr)</th>
<th>Losses ($ mil.)</th>
<th>Needs (INR Cr)</th>
<th>Needs ($ mil.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>3,075</td>
<td>439</td>
<td>-</td>
<td>-</td>
<td>8,996</td>
<td>1,285</td>
</tr>
<tr>
<td>Education and child protection</td>
<td>814</td>
<td>116</td>
<td>-</td>
<td>-</td>
<td>503</td>
<td>72</td>
</tr>
<tr>
<td>Health and nutrition</td>
<td>128</td>
<td>18</td>
<td>262</td>
<td>37</td>
<td>451</td>
<td>64</td>
</tr>
<tr>
<td>Cultural heritage and tourism</td>
<td>560</td>
<td>80</td>
<td>1,334</td>
<td>191</td>
<td>526</td>
<td>75</td>
</tr>
<tr>
<td>Agriculture, fisheries and livestock</td>
<td>1,576</td>
<td>225</td>
<td>1,454</td>
<td>208</td>
<td>2,347</td>
<td>335</td>
</tr>
<tr>
<td>Employment and livelihoods</td>
<td>772</td>
<td>110</td>
<td>4,105</td>
<td>586</td>
<td>3,069</td>
<td>438</td>
</tr>
<tr>
<td>Roads</td>
<td>326</td>
<td>47</td>
<td>21</td>
<td>3</td>
<td>425</td>
<td>61</td>
</tr>
<tr>
<td>Energy</td>
<td>8,139</td>
<td>1,163</td>
<td>254</td>
<td>36</td>
<td>9,748</td>
<td>1,393</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>447</td>
<td>64</td>
<td>-</td>
<td>-</td>
<td>482</td>
<td>69</td>
</tr>
<tr>
<td>Public buildings</td>
<td>539</td>
<td>77</td>
<td>54</td>
<td>8</td>
<td>647</td>
<td>92</td>
</tr>
<tr>
<td>Water resources and coastal</td>
<td>5</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>86</td>
<td>12</td>
</tr>
<tr>
<td>Water and sanitation</td>
<td>266</td>
<td>38</td>
<td>158</td>
<td>23</td>
<td>819</td>
<td>117</td>
</tr>
<tr>
<td>Environment</td>
<td>77</td>
<td>11</td>
<td>253</td>
<td>36</td>
<td>465</td>
<td>66</td>
</tr>
<tr>
<td>Disaster risk reduction</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>278</td>
<td>40</td>
</tr>
<tr>
<td>Gender and social inclusion</td>
<td>24</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>27</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16,754</strong></td>
<td><strong>2,393</strong></td>
<td><strong>7,897</strong></td>
<td><strong>1,128</strong></td>
<td><strong>28,869</strong></td>
<td><strong>4,124</strong></td>
</tr>
</tbody>
</table>
Seema is the owner of a roadside street cart selling fresh fruit juice and fresh fruits in Somecity. After five days of heavy rainfall, a river broke through its dam and flooded houses and shops close-by, including the street cart. Seema has not been able to evacuate the area and are not able to access her street cart for five days.

On the sixth day, Seema goes back to retrieve her cart and all the equipment in the cart with a friend to assess the disaster effects on her street cart for her fruit juice business.
Here is what Seema and her friend find:

- The street cart was partially destroyed:
  - Dirt and debris around the Street cart needs to be removed
  - The four wheels of the cart needs to be replaced.
  - All the equipment which include a juicer, a set of 10 glasses, jug, and other equipment all swept away in water
- Seema’s business license was washed away

With the cart damaged and all equipment fully destroyed, Seema has no source of income. But since she lives on her income from the fruit juice stall, she rents a street cart for 15 days from her friend to resume her business.

Seema’s friend rents the cart for US$ 10 dollars per day for 15 days. A local NGO is processing a grant of US$ 500 dollars to repair the cart, buy new equipment and also purchase fresh fruits.
Relevant post disaster data:

• Before the flood Seema had a monthly revenue of 1000 USD. She lost her income for 7 days

• Seema bought her street cart and Juicer and equipment about three years ago for 500 USD. It was already old and in disrepair and almost broken down.

• Cost of debris removal: 4 hours labor costs @ 2 US$ per hour

• Cost of repair of cart: 100 US$

• Cost of buying Juicer and equipment : US$ 400

• Costs of renewing business license at local municipality: 10 USD

• Costs of rent for cart @ USD 10 per day
Activity 1

- At your table, familiarise yourself with the case study
- Identify the different dimensions of the disaster effect
- Estimate the economic value of the disaster effect, using the following table:

<table>
<thead>
<tr>
<th>Disaster effect</th>
<th>Damage</th>
<th>Loss/change in economic flows</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
</tr>
<tr>
<td>Disaster effect</td>
<td>Damage (USD)</td>
<td>Losses (USD)</td>
</tr>
<tr>
<td>-----------------------------------------------------</td>
<td>--------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Partially destroyed cart</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Totally destroyed Juicer and other equipment</td>
<td>400</td>
<td></td>
</tr>
<tr>
<td>Cost of replacement of business license</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Labour costs of debris removal @ of US$ 2 each hour</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Loss of revenue for 7 days @ of US$ 33 per day</td>
<td></td>
<td>233</td>
</tr>
<tr>
<td>Rent cost of US$ 10 per day for 15 days</td>
<td></td>
<td>150</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>500</strong></td>
<td><strong>401</strong></td>
</tr>
<tr>
<td>Total effects : 901</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Key take-aways

- The economic valuation of the disaster effect consists of a gap analysis that is conducted across all PDNA sectors and in each disaster affected area.

- Damage refers to the total or partial destruction of infrastructure and physical assets and are valued first in physical terms and then in terms of their monetary value, using unit current market prices.

- Economic loss refers to changes in economic flows arising from the disaster and may continue until full economic recovery and reconstruction is achieved. Loss is expressed in current monetary values.
Questions?