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# Exploring Gender Vulnerability and Adaptive Capacity to Climate Change Associated Extremes

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#### Bangladesh: The context

- Bangladesh is the *most* vulnerable country in the world to tropical cyclones and the *sixth* most vulnerable country to floods (UNDP, 2004).
- Bangladesh has been ranked as the *3rd* most vulnerable in the world to sea level rise in terms of the number of people (McGranahan et al, 2006)
- Bangladesh as the country most vulnerable to extreme weather events and the one most affected in the period of 1990-2009 (GermanWatch, CRI, 2011).
- During 1991-2000 3 large scale natural disaster 50 Total kill 0.2 million people and property loss 50 billion dollar (only considering agricultural and infrastructure sector).
- ☐ If minimum death tolls over 5000 are considered, Bangladesh stands as the worst sufferer of all cyclonic casualties in the world, with a death toll of about 53% of the global total(Ali, 1991).
- Bangladesh is one of the country *most* susceptible to negative impacts of climate change (IPCC).

#### The Problem statement

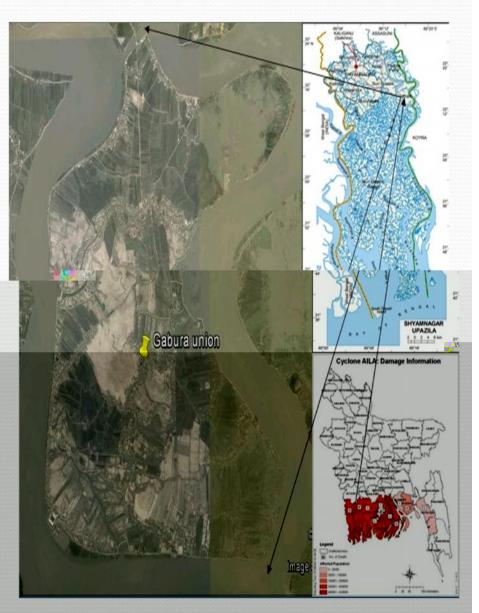
- ☐ Climate change, associated impact and vulnerability is gender neutral and men and women experience climate variability and change differently.
- Women historically having less access to the education, employment, property, food, health care, etc. will likely to suffer more than men from poverty, hunger, malnutrition, economic crisis, environmental degradation, health related problems, insecurity and became victim of violence and political crisis in the backdrop of climate change.
- □ Climate change will magnify existing inequalities, reinforcing the disparity between women and men in their vulnerability to and capability to cope with climate change (UNDP, 2007).
- □ The traditional approach in vulnerability assessment have its own limitation to capture the impact and associated vulnerability of climate change considering the overall gender dimension which might hamper formulation of 'Equitable' adaptation and mitigation policy. Failure to acknowledge the gender dimension of climate change induced vulnerability will increase negligence and reduced participation in climate change adaptation that could collapse the basic structure of society where the impact would spread out nationally and globally.

#### Objective of the study

- This study is an initiative to access the gender dimension of climate change associated vulnerability and adaptive capacity~considering women not only the victim in change but rather and agent of change.
- Vulnerability had been accessed from two different dimension:
- 1. Vulnerability of natural resource (from user perspective)
- 2. Vulnerability of targeted community women
- Explore adaptation and mitigation option from gender dimension.
- Provide suggestion in line to gender just climate change adaptation and mitigation strategy and policy formulation.

#### Objective and Methodology

- Gabura union of Shyamnagar Subdistrict of Satkhira District had been used as study area. The most severely affected cyclone Aila union is highly vulnerable to sea level rise, cyclone and storm surge and tidal surge along with increased salinity ingestion and prolonged water logging events.
- Questionnaire survey, Focus Group Discussion (FGD) and Key Informant Interview (KII) had been used for data collection.
- ☐ Vulnerability Assessment through developed Matrix framework.
- Statistical downscaling for scenario generation and future need assessment.



#### Perception regarding climate change

- ☐ All of the survey respondents confirmed "noticed change in climate". The changes notices are:
- ☐ Increased temperature in summer
- Increased intensity and frequency of cyclone and storm surge
- Increasing trend in salinity intrusion
- Increased height of tidal wave due Sea level rise
- Erratic nature of rainfall
- Increased river bank erosion
- ☐ More water logged areas
- Long duration summer
- Monson with heavier rainfall
- No rainfall in Dry season
- ☐ Short duration monsoon
- □ No/less rainfall in Pre-Post monsoon
- ☐ More areas become prone to drought

#### Climate change and water resource

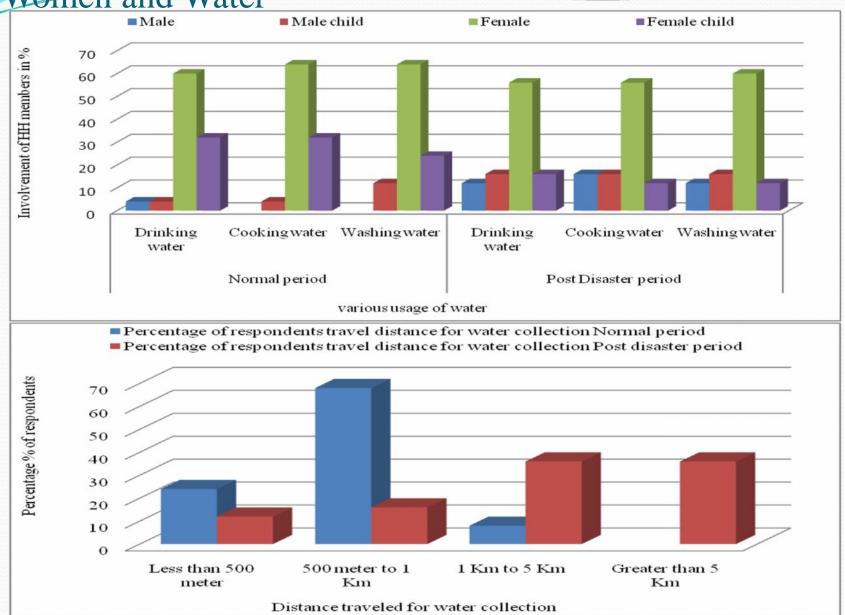
Direct impact of climate change on water resource

- ☐ Change in rainfall pattern
- ☐ Salinity intrusion
- Change in water availability

Major sectors/ activity most sensitive to water stress related vulnerability

- ☐ Impact on water dependent ecosystem
- Impact on drinking water supply
- Cultivation
- Women's home stead vegetable gardening
- Rearing of livestock and poultry
- ☐ Shrimp culture
- Impact on water quality
- Fishing
- ☐ Impact on Domestic water use
- Standard of living
- Impact on underground water recharge
- ☐ Impact on In stream water demand
- Navigation

#### Women and Water



Major Coping strategy/ activity due to the impact of climate change on water resources

- □ Rain water harvesting & utilization as alternative source
- ■Pond-river water is used for bathing purpose in lieu of salinity
- □Pond water is used for cleaning utensils and washing purpose
- More distance need to be travelled for water collection
- □ Stopped homestead vegetable gardening
- ☐ Young children sent for water collection, hampers school going
- Purchase drinking water
- ☐ Water collection requires more visit
- Decrease water use in sanitation purpose
- ☐ Change of occupation

Possible Adaptation measure to reduce impact of climate change on water resources

- ☐ Increase the height of embankment
- □Plantation of saline tolerant tree species
- □RWH and utilization in domestic activity
- Reduce shrimp cultivation
- □Digging of protected pond and PSF installation
- □Improved drainage system installation
- □ Change in traditional irrigation practice

# Impact of climate change on Productive role (livelihood activity)

- Agriculture
- Agricultural labor
- Non-agric daily labor
- Homestead vegetable gardening
- Shopkeeper/ selling in bazaar
- Cattle rearing and selling milk
- Fishing
- Poultry rearing
- Sewing
- Forest resource extraction
- Labor in shrimp farm/fish culture
- Shrimp fry collection

### Impact of climate change on Re-productive role and Community management role

#### Impact on Re-productive role

- Water collection
- ☐ Fuel wood collection
- Cooking food
- Washing and cleaning
- Control of water use
- ☐ Caring of HH members
- Cattle rearing
- ☐ Homestead vegetable gardening
- ☐ Fishing

### Impact on community management role

- ☐ Attend funeral, wedding, cultural events
- Participation in VDC and WMC meeting
- Participation in training related to water and sanitation management
- Participation in NGO/ development related activity

### Impact of climate change on access and control over resources and benefit

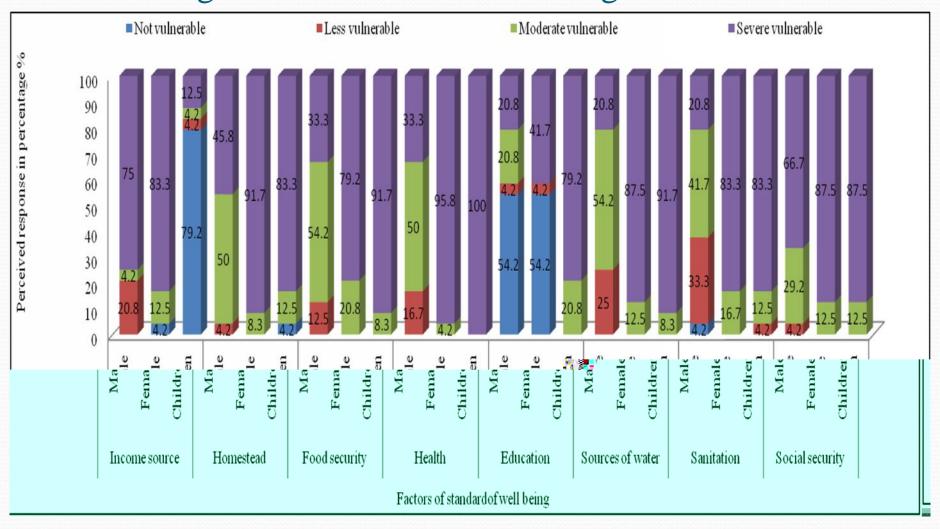
| Impact on access | and | control | over |
|------------------|-----|---------|------|
| resources        |     |         |      |

- Residential land tenure
- Housing tenure
- Agricultural land tenure
- Productivity of agricultural land
- Improved sanitation facility
- Livestock related infrastructure
- Crop production related facility & infrastructure
- Labor
- Capital
- Education and training
- Health services
- Embankment
- Irrigation facility
- Cyclone shelter
- Cyclone warning system
- Communication network
- MFI Organizations
- □ NGOs
- ☐ Forest resources

Impact on access and control over benefit

- ☐ Improved status of living
- Asset ownership
- ☐ Financial development
- Development initiative

## Vulnerability to climate change associated events and extremes against Standard of well being



#### Vulnerability of Water resources (from user perspective)

|  | im                         | posur<br>pact o<br>esour     | nwa                | ter              | Sensitivity (effect due to direct impact) [S]  effect on Bio-physical regime effect on Socio-economic regime |                                  |                         |  |                                 |                              |                    |             |            |                |         |                     |                            | otive cap<br>ange in w<br>practic                              | ater                      | -                                |                               |  |
|--|----------------------------|------------------------------|--------------------|------------------|--|----------------------------------|-------------------------|--|---------------------------------|------------------------------|--------------------|-------------|------------|----------------|---------|---------------------|----------------------------|--|---------------------------|----------------------------------|-------------------------------|--|
|  | Ь,                         |                              |                    |                  | effect   | on Bio-p                         | hysica                  | al regime                              | ef                              | fect or                      | Soci               | o-eco       | nomi       | c regi         | me      |                     |                            |  |                           | 1 25                             | ≰                             |  |
| Context  | Change in rainfall pattern | Change in water availability | Salinity intrusion | Overall Exposure | Impact on water recharge   | Impact on in stream water demand | Impact on water quality | Impact on water dependent<br>ecosystem | Impact on drinking water supply | Impact on Domestic water use | Standard of living | Cultivation | Navigation | Shrimp culture | Fishing | Overall Sensitivity | Coping mechanism in nature | Alternative use of water in human society+development activity | Overall Adaptive Capacity | Specific Vulnerability (E x S)/A | Total Vulnerability (E x S)/A |  |
| Long duration summer                                   | 2                          | 2                            | 3                  |                  | 3  | 2                                | 3                       | 2                                      | 3                               | 2                            | 3                  | 2           | 0          | 2              | 2       |                     | 2                          | 3  |                           |                                  |                               |  |
| Increased temperature in summer                        | 0                          | 2                            | 2                  |                  | 3  | 2                                | 3                       | 2                                      | 2                               | 2                            | 2                  | 0           | 0          | 2              | 2       |                     | 1                          | 3  | 3                         |                                  |                               |  |
| Short duration monsoon                                 | 3                          | 2                            | 2                  | 2 2.2            | 2 2.2  | 2                                | 2                       | 2                                      | 3                               | 2                            | 2                  | 1           | 1          | 1              | 1       | 1                   | 1.67                       | 2  | 3                         | 1.92                             | 1.88                          |  |
| Monson with heavier rainfall                           | 3                          | 1                            | 1                  |                  |  | 1                                | 1                       | 2                                      | 2                               | 2                            | 2                  | 2           | 2          | 0              | 2       | 2                   |                            | 2  | 2                         | 1.02                             |                               |  |
| Nol less rainfall in Prelpost monsoon                  | 3                          | 2                            | 3                  |                  | 2  | 1                                | 2                       | 2                                      | 2                               | 2                            | 2                  | 3           | 0          | 1              | 1       | 1                   | 1                          | 1  | 1                         |                                  |                               |  |
| Erratic rainfall                                       | 3                          | 2                            | 3                  |                  | 0  | 0                                | 1                       | 1                                      | 1                               | 1                            | 2                  | 2           | 0          | 2              | 2       |                     | 1                          | 2  |                           |                                  |                               |  |
| Average seasonal change                                |                            |                              |                    |                  |  |                                  |                         |  |                                 |                              |                    |             |            |                |         |                     |                            |  |                           |                                  | 1.90                          |  |
| Increase in cyclone storm surge<br>frequency-intensity | 0                          | 3                            | 3                  |                  | 0  | 0                                | 3                       | 2                                      | 3                               | 3                            | 3                  | 2           | 0          | 3              | 2       |                     | 1                          | 1  | 1<br>2 1.50               |                                  |                               |  |
| Increase in tidal surge height                         | 0                          | 2                            | 3                  | 1.67             | 0  | 0                                | 3                       | 2                                      | 1                               | 2                            | 2                  | 2           | 0          | 2              | 2       | 1.73                | 1                          | 2  |                           | 1.92                             |                               |  |
| Water logging  | 0                          | 3                            | 3                  |                  | 3  | 0                                | 3                       | 3                                      | 3                               | 3                            | 3                  | 3           | 0          | 3              | 1       |                     | 3                          | 3  |                           |                                  |                               |  |
| River erosion  | 0                          | 0                            | 3                  |                  | 0  | 0                                | 1                       | 0                                      | 2                               | 3                            | 3                  | 3           | 0          | 2              | 0       |                     | 0                          | 1  |                           |                                  |                               |  |
| Average extreme events                                 |                            |                              |                    |                  |  |                                  |                         |  |                                 |                              |                    |             |            |                |         |                     |                            |  |                           |                                  |                               |  |

#### Vulnerability of targeted community – Women

|   | Ex              | posu          |                  | pact o<br>oital) [ | on livel<br>E] | ihood            |   | Sensitivity (              | effecct associate   | [S]       | Adaptive capacity (A) |                     |  |   |            |                                   |                         |                 |                           |  |                             |
|---|-----------------|---------------|------------------|--------------------|----------------|------------------|---|----------------------------|---|-----------|-----------------------|---------------------|--|---|------------|-----------------------------------|-------------------------|-----------------|---------------------------|--|-----------------------------|
|   |                 |               |                  |                    |                |                  |   | Activity F                 |   |           |                       |                     |  |   |            | _                                 |                         |                 |                           |  |                             |
|   |                 |               |                  |                    |                |                  | Produ Reprodu<br>ctive ctive<br>role role | 609/2003/60                | Community<br>management<br>activity                               |           |                       |                     | Major coping strategy                                |   |            | y Major<br>adaptation<br>strategy |                         |                 | ity                       | ity (ExS) / /  | ity (E*S)#A                 |
| Context   | Natural capital | Human capital | Physical capital | Financial capital  | Social capital | Overall Exposure | Paid employment                           | Activity (without payment) | Activity (No payment-<br>recreation, motivational,<br>empowering) | Resources | Benefit               | Overall Sensitivity | Experience of survival against oyclone & storm surge | Income generation through informal activity (Ex: crab catching, fishing, daily labor, | Embankment | External Migration                | Raised house & tubewell | Cyclone shelter | Overall Adaptive capacity | Overall Adaptive capacity Specific Vulnerability (E x S) / A | Total Vulnerability (E*S)/A |
| Long duration summer                                    | 3               | 3             | 1                | 2 2                | 2              |                  | 2   | 2                          | 0   | 2         | 0                     |                     | 0  | 2   | 0          | 2                                 |                         | 0               |                           |  |                             |
| Increased temperature in summer                         | 2               |               |                  | 0                  | 1              |                  | 2   | 2                          | 1   | 0         | 0                     |                     | 0  | 2   | 0          | 2                                 |                         | 0               |                           |  | 2.83                        |
| Short duration monsoon                                  | 3               | 2             |                  | 1 1                | 1              |                  | 2   | 1                          | 0   | 2         | 2                     |                     | 0  | 2   | 0          | 2                                 |                         | 0               |                           |  |                             |
| Monson with heavier rainfall                            | 3               | 3             | :                | 3 3                | 3              | 1.86             | 2   | 3                          | 1   | 1         | 0                     | 1.37                | 2  | 2   | 2 2        |                                   | 1 2                     | 0               | 0.86                      | 2.97   |                             |
| Nolless rainfall in Pre-Post monson                     | 2               |               |                  | 1                  | 0              |                  |   | 0                          | 0   | 0         | 0                     |                     | 0  | 2   | 0          | 2                                 |                         | 0               |                           |  |                             |
| Erratic rainfall  | 3               | 1             |                  | 1 2                | 1              |                  | 2   | 2                          | 1   | 2         | 1                     |                     | 0  | 2   | 0          | 2                                 |                         | 0               |                           |  |                             |
| Salinity intrusion                                      | 3               | 3             | :                | 3 3                | 3              |                  | 3   | 3                          | 3   | 3         | 2                     |                     | 1  |   | 1 2        | 2                                 |                         | 1 0             |                           |  |                             |
| Average seasonal change                                 |                 |               |                  |                    |                |                  |   |                            |   |           |                       |                     |  |   |            |                                   |                         |                 |                           |  |                             |
| Increase in cyclone storm surge frequency-<br>intensity | 3               | 3             |                  | 2 3                | 2              |                  | 3   | 3                          | 1   | 2         | 2                     |                     | 2  | 2   | 2 2        | 2                                 |                         | 1 2             |                           | 2.87   |                             |
| Increase in tidal surge height                          | 3               | 2             | :                | 2 2                | 2              | 2.45             | 2   | 2                          | 1   | 2         | 2                     | 2.05                | 2  |   | 1 3        | 2                                 | 2                       | 1               | 1.75                      |  |                             |
| Water logging   | 3               | 3             | 1                | 2 3                | 2              |                  | 3   | 3                          | 1   | 3         | 2                     |                     | 2  | 2   | 3          | 2                                 | 2                       | 2               |                           |  |                             |
| River erosion   | 3               | 2             | : :              | 3 2                | 2              |                  | 2   | 2                          | 1   | 2         | 2                     |                     | 1  | 2   | 1          | 2                                 |                         | 1               |                           |  |                             |
| Average extreme events                                  |                 |               |                  |                    |                |                  |   |                            |   |           |                       |                     |  |   |            |                                   |                         |                 |                           |  |                             |

#### Summarized findings from Vulnerability Assessment

- The vulnerability of the most precious natural resource- water is 1.90. The context specific vulnerability and total vulnerability is almost same. However, considering specific vulnerability it could be seen that, water resource is more vulnerable to climate change associated natural disasters or climate extremes. The resource itself as well as user community lack proper adaptation option or capacity to withstand the negative impact of climate change extremes.
- The vulnerability of gender community is 2.83. however, significant gap exists between context specific vulnerability and total vulnerability. It could be seen that, women community are much vulnerable to climate change associated gradual changes. Due to the adaptive capacity, community became quit resilient to withstand climate change associated extreme events. But, there is very low adaptive option available to the gradually changing climate or climate change events.
- ☐ In the existing context, if any natural disaster occur, the resultant impact will be catastrophic.

#### Need assessment in predicted future generated scenario.

- Future scenario was generated for the period of 2040-2069 and 2070-2099 for A2 and A1B SRES scenario. However, though the trend is similar among both the scenario, but the magnitude of change is more severe for A2 scenario.
- ☐Generated scenario show increasing trend in temperature and decreasing trend in rainfall over the study area.
- □ In the context of generated future scenario, large scale migration could become the only alternative if not planned and timely adaptation activity carried out in the impacted area as perceived by local community.
- Large scale migration could also be resulted into increase in conflict which ultimately disrupt the overall equilibrium state in the country.

#### Major coping strategy found effective

- □ Plinth raising of homestead/ homestead should be constructed on raised ground
- ☐ Tree plantation around homestead. Courtyard
- □ Income generation through diversified sources/ earning from rehabilitation work/ all capable member active in income generation
- ☐ Keep up savings/ loan taking
- Seasonal migration for income generation/ temporary migration to relatives /permanent migration to urban areas
- ☐ Awareness build-up program/ training on DRR
- Preserve dry food, water and candle
- ☐ Makeshift housing one embankment
- ☐ Homestead vegetable gardening/ poultry rearing
- ☐ Rain water harvesting

#### Major adaptation/ mitigation strategy/activity perceived effective plantation of saline tolerant tree species/ preserve and increase forest resource/ inauguration of rice cultivation ☐ Increase the height of embankment/ construction of new embankment with increased height/ proper maintenance/ protection with CC block/ tree plantation on both sides of embankment ☐ Increase the height of road network/ construct paved raised road ■ More shelters need to be constructed/ at least one per village/ □Stop shrimp farming □ Stop saline water intrusion and utilization/ drain out saline water/ construct drainage network ☐ Install more water points and rain water harvesting system Create job opportunity in locality

| Major suggestion to address implications experienced by women only   |
|--|
| in during and post disaster period   |
| ☐ Emergency doctor and medicine facility/ provision of midwife and treatment for pregnant in shelters        |
| ☐ Emergency supply of food, water, dry cloth, etc  |
| ☐ Supply hygiene product with relief package/ supply locally practiced materials used for hygiene management |
| ☐ Emergency restoration of water points and sanitation facility  |
| ☐ Emergency restoration of road and communication network and repairing of embankments                       |
| Operationalize satellite clinic immediately with medicine support  |
| ☐ Credit support with no/ less interest  |
| Provide income generation through rehabilitation activity  |
| ☐ Emergency restoration of peace and security in affected area especially for women and children             |
| ☐ Proper burying of dead, dumping of dead animal   |
| ☐ Provide support to mentally stressed patients in the affected area   |

# Suggestion to mobility related problem of women during cyclone and storm surge Construct more cyclone shelter in close vicinity/ separate room.

- ☐ Construct more cyclone shelter in close vicinity/ separate room for women in shelter/ ensure security of women in shelter
- ☐ Signal/ search light facility from shelter and road marking to denote way to shelter
- ☐ Construction of improved raised paved road network
- ☐ Provision of boat to shift women, sick, disable/inbuilt provision in community to move women and children
- ☐ Teach swimming & tree climbing to women
- Women should wear salwar kamiz as emergency dress/ provide life jacket to women
- ☐ Warning should be given early for evacuation/
- Men should assist women in preparedness work/ men should assist women to move to safety

### Suggestion to implications experienced by women only in due to water logging

Provision of cooking in shelters/ construction of more shelters at least one per village Emergency relief distribution Emergency draining of stagnant water/ construction of drainage network Increase the height of embankment Installation of more tubewells with raised platform Construct house in raised ground/ raise overall ground of the area Arrangement of boat for moving Provision creation for income generation/ Industrialization/ establish income generation option for women even remain home Provision to provide doctor and healthcare facility to HH even in water logged condition Provide support for skin & gynological problem

□ Awareness creation on violence, insecurity against women/ strengthen

security in areas especially for women

### Suggestion to implications experienced by women only in due to salinity intrusion

- □Raise the height of embankment
- □Construct drainage network
- □Stop saline water intrusion & usage
- ■Stop shrimp farming
- □Plantation of saline tolerant tree species
- ☐ Installation of more water points
- ☐ Installation of rain water harvesting system and Pond Sand Filter
- □ Provide free treatment to skin problem victim

### Suggestion for the improvement of existing cyclone warning system

- Extensive miking from mosque by imam will be more effective
- Warning issued by authority sent to individual by mobile call or message
- ☐ Miking/ siren from shelter
- ☐ Volunteer team formed & managed in each village
- ☐ Union Council managing warning distribution
- ☐ Training to interpret warning & respective response
- ☐ Warning should give surge height, duration, inundation length, etc
- ☐ Given to all areas, not just around shelter
- ☐ Warning should be given early for effective evacuation
- Cyclone warning should be accurate

### Suggestion for the improvement of existing cyclone shelter design

- ☐ Provision for emergency treatment & medicine facility
- ☐ Provision of water, food & cooking facility
- ☐ Separate room & latrine facility for male & female
- ☐ Strengthen security, provision of electricity & light in each room
- ☐ Wide & raised pakka approach road with road marking
- ☐ Media campaign on importance & training on usage
- □ Room for pregnant & child with emergency healthcare facility
- Must have capacity to accommodate target community
- ☐ Provision of cattle home in ground floor
- ☐ Positioning is important to be readily accessible
- ☐ Red warning & search light on shelter roof
- ☐ Provision to convert into makeshift residency for long duration

#### Gender inclusion in national adaptation policy

- □ Currently Bangladesh is carrying its adaptation program based on Bangladesh Climate Change Strategy and Action Plan (BCCSAP 2009) and National Adaptation Programme of Action (NAPA 2009).
- □ NAPA and BCCSAP mentioned about the increased vulnerability of women and children however, the straightforward statement doesn't describe precisely the gender implication of climate change variability and extremes.
- □ BCCSAP provide instruction on research on gender implication of climate change and how gender mainstreaming can be achieved in all action under BCCSAP along with developing criteria and approach for gender inclusion in all intervention in line to climate change adaptation—which is quite well coming. However, it also pose a threat that, the gender exclusive adaptation policies are under implementation and with ongoing no to low level of participation and gender exclusive programme implementation might increase the existing gender disparity which could finally resulted into failure of overall intervened activity.
- □ NAPA policy is totally gender exclusive which might further reduce the effectiveness of implemented development activity in long run.

#### Conclusion

- Women are critical actor of change and up-bringer of future generation.
- Women's possess indigenous knowledge of adaptation and mitigation based on locally available resource base through combined effort and environmental management.
- ■Women triple activity is very important in/ for the society which need to be acknowledged and reflected in adaptation policy.
- □ The success of climate change adaptation will only then become justifiable when gender just formulated policy will lead way for equitable development intervention.

### Thanks