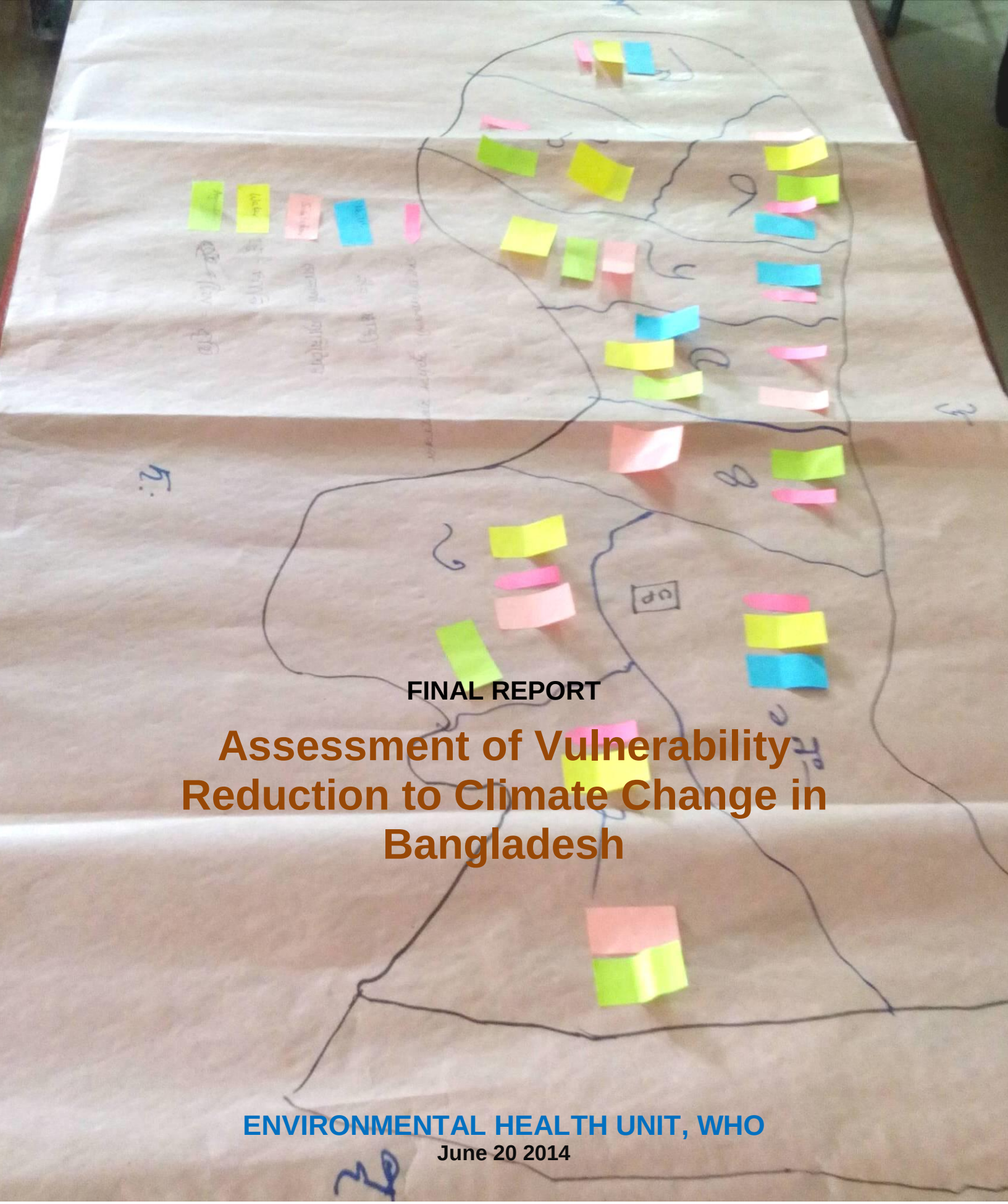

FINAL REPORT

Assessment of Vulnerability Reduction to Climate Change in Bangladesh

ENVIRONMENTAL HEALTH UNIT, WHO

June 20 2014

World Health Organization
Country Office for Bangladesh

Study Management and Technical Inputs
Shamsul Gafur Mahmood, NPO, WHO
AKM Ibrahim, SE Ground Water Circle, DPHE
Ahammadul Kabir, National Consultant, Climate Change, WHO

Study Conducted:
Dr Shannon Rutherford
Dr Zahirul Islam
Professor Cordia Chu of Centre for Environment and Population Health
Griffith University, Australia

Executive Summary

There is a little global argument that Bangladesh is extremely vulnerable to the impact of climate change. One of the most critical impacts of climate change is related with water. The evidence has been growing that both quantity and quality of water are already being affected across the diverse geographical areas of Bangladesh. The impacts of reduced quantity and poor quality of drinking and cooking water on health are reported in many areas of the country. They include direct health related impacts such as diarrhoea and adverse pregnancy outcomes, impacts on livelihood and less direct impacts related to changing food preparation and practices, hygiene, sanitation and social changes associated with migration.

In response to these current impacts of climate change on water quality and quantity and the recognition that climate change will enhance these impacts in the future, numerous WASH focussed projects have been implemented by the government and NGOs in Bangladesh. The extent to which the diversity of WASH projects has reduced vulnerability to climate change is largely unknown. This report provides the findings of a quantitative assessment of a tool that has been developed by UNDP, GEF and WHO for its efficacy to assess climate change vulnerability reduction. The assessment was carried out in two locations of coastal area by comparing between the areas where climate change WASH focused project and no climate change focused WASH project is implemented.

The Vulnerability Reduction Assessment (VRA) tool provides a mechanism to follow up the results of projects by following some pre-set indicators that measure the reduction in vulnerability and increases in adaptive capacity. The VRA is a form of Participatory Impact Assessment (PIA), focusing on "health decision-makers" perceptions of health sector vulnerability to climate change, and resilience or capacity to adapt. It was designed for application at a variety of levels, from national to local, to capture the diversity of stakeholder experiences and knowledge.

The tool's strength is that it includes both quantitative and qualitative measures of vulnerability, producing a set of scores for each component and an overall vulnerability reduction score supported by responses that support the reasons and context for the ratings provided. The tool includes four key components namely existing vulnerability, future risk and vulnerability, existing adaptation actions and sustainability of actions in the future. For this particular sub-project or study, application of the tool served two purposes namely collecting some community data for better understanding of water and health related issues in vulnerable areas in order to plan for future projects and to assess the utility of the tool to measure vulnerability reduction by implemented projects.

The tool was applied using a workshop approach focussed on two highly vulnerable coastal areas of Bangladesh Matbharia upazila of Pirojpur districts and Shyamnagar upazila of Satkhira districts and a total of four workshops were conducted in these areas. In addition a national workshop was conducted for seeking comments and input on the tool and the above mentioned area. The Matbharia workshop represented a baseline area as no specific WASH projects were implemented at the time of the workshop, while the Shymnagar input was provided in the context of a Water Aid WASH project part-way implemented.

The findings of the project indicate an existing high level of vulnerability in the two communities, with reported significant existing impacts of climate change on both water supply and quality that have resulted in a range of community impacts, from perceived increases in diarrhoea, hypertension and reproductive health issues to food security problems, livelihood loss, migration and damage to the environment. Though the problems appear similar in the two communities, the national level workshop highlighted that though the climate change has an influence on the water quality issues identified by the Shymnagar community, land uses in the area such as shrimp farming were also an significant influence. This reinforces the notion that climate change is often an exacerbator of existing risk.

Despite both communities indicating significant water and health vulnerability issues (scores very similar for components A and B), overall the Shymnagar area scored higher than the Matbharia area suggesting a reduced vulnerability in this area. This was mainly driven by the successful influence of the implemented WASH project in that area and the related greater confidence in such measures being sustained in the future compared with the Matbharia area where there was significant water issues identified but no specific WASH project implemented. Common to both areas was an absence of health specific climate change activity.

The tool and its application through a workshop were found to be a useful approach to identify and understand the key vulnerabilities in the target communities, the future vulnerabilities under a projected climate change scenario and provide a discussion forum for the effectiveness of existing climate change adaptation activities and how they could be sustained in the future. Applying the process at numerous tiers of government (from community to National) was also useful as these different groups provided different perspectives. Some small modifications to wording and rating scales and increased time allocated for improved explanation of difficult concepts will enhance the workshop process in the future.
The success of the VRA process will be better judged following a repeat application at a different stage of project implementation within the target areas as per its intended purpose. However, caution should be exercised in over-relying on the VR score itself given the small sample sizes used to generate it. Interpretation should be made in the context of the qualitative data provided through discussion and individual reasons provided for the responses selected. The VRA process could also be improved in the future through improved health sector representation. Furthermore its utility will be maximised if the same individuals can participate in future workshops following implementation of WASH and climate change projects.

Table of Contents

1.0 Background

Bangladesh is extremely vulnerable to the impact of climate change. The global warming has been posing threat to Bangladesh by increasing the probability of the extreme events like flood, drought, cyclone, tidal surges leaving the people to a vulnerable situation. In course of time the mortality and morbidity has been increasing with destruction properties like communication infrastructure, houses, service facilities, infrastructure, agricultural productivity etc. and creating long term impact on livelihood parameters namely food, health, education, shelter and security. The livelihood of peoples of Bangladesh is inseparably mixed with water economically and culturally. The recent days the country has been experiencing the deterioration water quality and availability with a variable degree considering the season and geophysical location. The surface water has been becoming contaminated because of wide spread disposal of industrial effluent, fertilizer runoff and human wastes and the ground water has been becoming contaminated naturally with arsenic, iron, salinity, manganese. The surface, ground and rain water has been becoming gradually unavailable in some area which has been increasing the possibility of drought and plenty of water creating flood and water logging on other parts of the country. The primary climatic parameters like temperature, rainfall and humidity have been changing its historical distribution considering the seasons and increasing in its magnitude over the years resulting in increasing the frequency of extreme events like flood, storm, drought, tidal surges etc. These extreme events have been destroying the properties of the people and deteriorating the water quality chemically and biologically and availability leaving the people to a vulnerable situation.

Apart from the other use of water the most important use of water is drinking and cooking essentially and significantly related with health. The increasing trend of the extreme events, temperature, rainfall etc. due to climate change and its variability have been impacting the drinking and cooking water critically interms of both quantity and quality. The impacts of reduced quantity and poor quality of drinking and cooking water on health are evident in many areas of the country and are diverse and are highly dependent on the geophysical location. It include direct health related impacts such as diarrhoea, adverse pregnancy outcomes, livelihood and less direct or indirect impacts related to changing food preparation and practices, hygiene, sanitation and social changes associated with migration.

In response to these current impacts of climate change on water quality and quantity and the recognition that climate change will increase these impacts in the future, many agencies have implemented WASH focussed projects in different areas of the country. The extent to which the diversity of WASH projects has reduced vulnerability to climate change and variability is largely unknown. The UNDP has developed a participatory community based tool for the assessment of the vulnerability reduction (VRA).[1] It is designed and devised to measure the changing

1 UNDP Working Paper (December 2008): A Guide to the Vulnerability Reduction Assessment, Andrew Crane Droesch, Nickey //Gaseb, Pradeep Kurukulasuriya, Andre Mershon, Katiella Mai, Moussa, Dale Rankine, Alejandro Santos

climate vulnerabilities of communities, and to be comparable across vastly different projects, regions, and contexts, making it possible to determine if a given project is successful or unsuccessful in reducing climate change risks. The VRA can be compared to a guided participatory rural appraisal (PRA), focusing on community perceptions of vulnerability to climate change and capacity to adapt. It tool includes both quantitative and qualitative measures of vulnerability, including adaptive capacity and piloted in two highly vulnerable coastal areas of Bangladesh. This vulnerability reduction assessment report provides an initial assessment of a tool regarding its application and represents the situation of the vulnerabilities and adaptation capacity of the communities in the respective geographic location.

2.0 Overview and Objectives

The World Health Organization (WHO) Bangladesh Country Office has been implementing a wide range of climate change, health and WASH related projects and programmes supported by different donor agencies and WHO itself with a view to develop a National Climate Change and Health Adaptation Plan for Bangladesh. Among these project "Building adaptation to climate change in health in least developed countries through resilient WASH' funded by DFID was notable and an initiative was under this project to conduct a baseline vulnerability assessment by using the VRA tool previously jointly developed by UNDP, GEF and WHO. The Vulnerability Reduction Assessment (VRA) tool provides a mechanism to follow up the results of projects by following some preset indicators that measures the reduction in vulnerability and adaptive capacity. The VRA is a form of Participatory Impact Assessment (PIA), focusing on "health decision-makers" perceptions of health sector vulnerability to climate change, and resilience or capacity to adapt. It was designed to be applied at a variety of levels, from national to local, to capture the diversity of stakeholder's experiences and knowledge. The tool can be used at the beginning, in the middle and at the end of a project period for better understanding of the project impacts on the ground as mentioned by the author of the VRA.

The vulnerability reduction assessment indicators are organised into four key categories namely description and assessment of current vulnerability; future vulnerability; description and assessment of current adaptation/risk management projects and strategies; and description and assessment of the health (and other) system’s capacity to adapt in the current environment and into the future. The guidance tool of VRA recommended a series of closed-ended questions with supportive qualitative components in order to generate a numerical score(s) for each project at each stage during a project’s implementation. However, the objectives of the VRA are:

1. To test the tool including the developed questions, methodology and scoring system for understanding, ambiguity, applicability to the different contexts and specificity for answering the purpose of the tool
2. To use the VRA tool to generate information from the communities where a project is already implemented or where a project may be implemented in the future

3.0 Methodology

The project methodology is summarized and presented in Fig. 1 and composed of three key phases namely Phase 1 includes preparation of set of questions, testing and refinement, field site identification; Phase 2 field activities included data collection through workshop and Phase 3 includes scoring and preliminary tool evaluation.

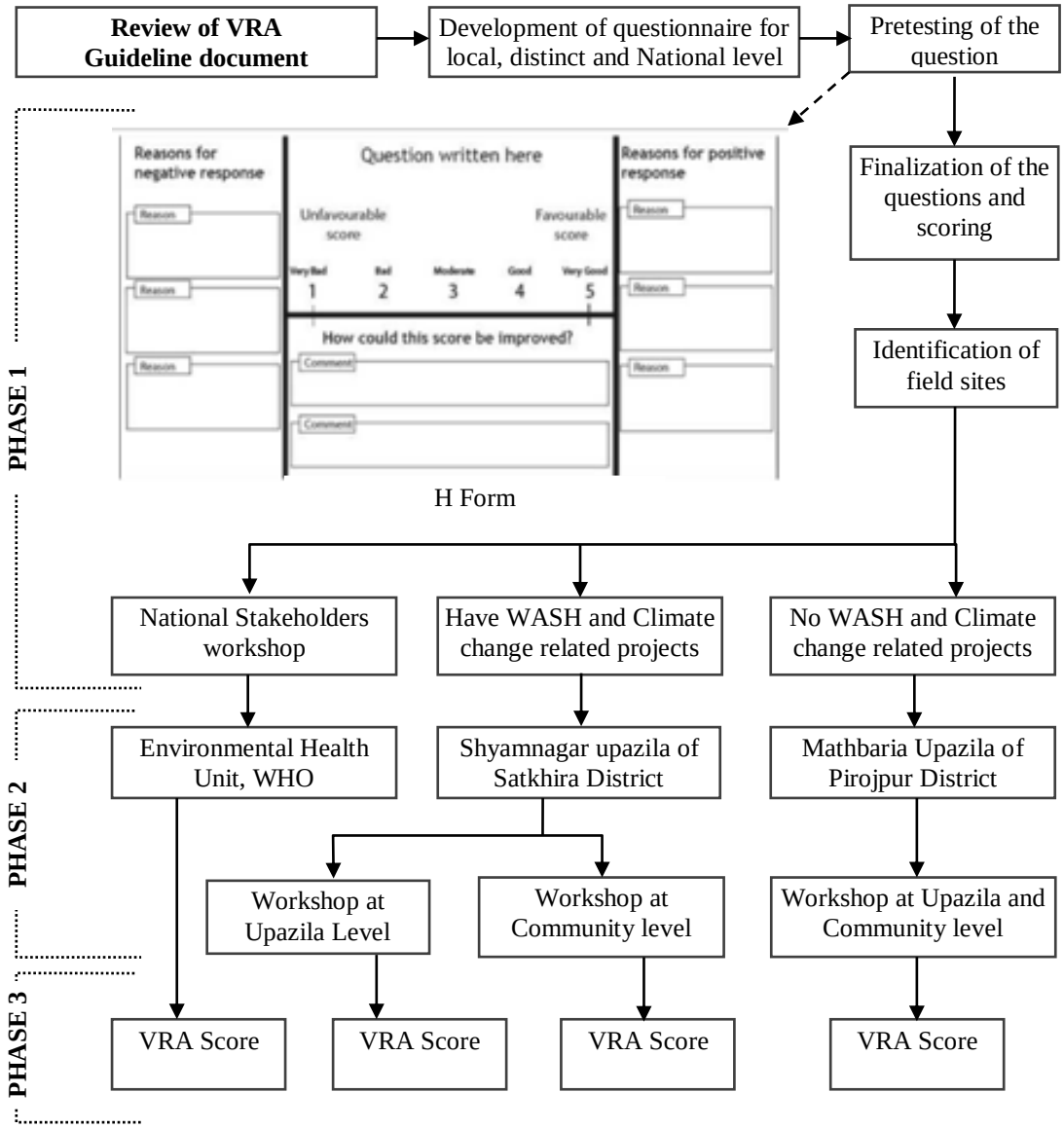

Fig 1: An overview of the vulnerability reduction assessment methodology

3.1 Phase 1 – Question Design and Pre-Test

The VRA team (CEPH, Griffith University) developed a series of questions for local, district and national level decision-makers and stakeholders and designed a workshop format for pre-testing of the tool after analysing the guidance document for the VRA considering its scope and objective. The developed questions was then tested in-person with the WHO project team and some national WASH sector stakeholders in October 2013, with a particular focus on the structure of the questions, scoring scales, response options, understanding about the questions among the intended variety of audiences and the number of questions. Considering the results of the pre-testing, the number of questions in the set was reduced, scoring system was refined and wording for some questions was modified.

3.2 Phase 2 – Application in the Field

3.2.1 Identified Field Sites

Following discussion with professionals from the Environmental Health Unit (EHU) of the WHO Bangladesh Country Office, the project team identified some areas of Khulna and Barisal division in the south-west and southern part of Bangladesh respectively. The Matbharia Upazila of Pirojpur district was chosen as a baseline site as no WASH and climate change projects currently existed in the area. Shyamnagar Upazila of Satkhira district was chosen as a mid-project site because a WASH and climate change related project run by Water Aid was mid-way through implementation here.

Fig. 2: The VRA Team is visiting the field sites

3.2.2 Workshop Tool (H form and questionnaire)

The final question sets were developed and selected for national, sub-district and community levels based on the project objectives and the results from the pre-test. Questions were developed by considering the four categories of assessment as outlined in the VRA guidance document:

- **Component A**

  Assessing current vulnerability: This component is designed to seek responses and scoring on the current impacts of climate change with a particular focus on water and health. It focussed on the exposure and sensitivity components of vulnerability and included questions related to:
  - Why is this particular community vulnerable?
  - Who is most vulnerable?
  - Are supporting systems (including health) vulnerable?

- **Component B**
  Assessing future risk and vulnerability: Participants were asked to comment about future risk and vulnerability with a particular focus on water, health and systems response capacity in the context of a simplified, but nonetheless potentially realistic scenario. This scenario was a doubling of extreme events and an increase in sea level rise. It included questions/issues related to water impacts of this future scenario, health impacts of this future scenario and the capacity of support systems (including health) to respond effectively to this scenario.

- **Component C**
  Formulating an adaptation strategy: This component was designed to ask for comments (and score) on issues of current adaptation including the effectiveness of existing projects or actions and barriers to adapting. It also included a question about common vision and awareness of climate change impacts across agencies – this was considered an important starting question to identify common understanding and responses to this critical issue.

- **Component D**
  Continuing the adaptation process: This component included discussion and questions about adaptation actions and ability to sustain them. It asked about sustainability to respond by governments at different levels and the community.

Following careful consideration, workshop formats for each question were categorized as either: i) group discussion, ii) group response using the standard 'H form', or iii) individual response using the standard 'H-form' (refer to Appendix 1 for the entire question set). A group discussion was considered necessary at critical points within the four categories of questions to set the scenario. Group responses were thought to be useful for key questions that would require all stakeholders to share their response and reasoning on a particular question and individual questions were included (aggregated by the facilitating team following the workshop) when it was considered that participants may not speak frankly in a group discussion and to give participants an opportunity to provide individual input on perhaps more sensitive issues.

Each group and individual question was inserted into the 'H-form' format as provided in the guidance document with little modification from the original concept. Appendix 2 shows the way in which the H-Form was presented to participants.

The question responses were recorded on a 5-point scale ranging from 'strongly agree' (1) to 'strongly disagree' (5) or 'not effective at all' (1) to 'very effective' (5). In the scale, 'can't say/neutral' was rated as a 3. Scales were designed such that a rating of 1 indicated either high vulnerability or low adaptive capacity with the overall goal following application of the tool over a project's lifespan to increase the score (to a maximum of 5) indicating that vulnerability is reduced.

3.2.3 Workshop Process

A total of four workshops were conducted over a five day period consisting two workshops in the Satkhira district and one at a community site Chingri Khali in Shyamnagar upazila level. One workshop was conducted in the Matbharia sub-district in Pirojpur district with a mixture of community members and upazila representatives. Community workshops were well attended with a broad group of participants from different corners of the society. The VRA team members (from CEPH, GU) facilitated each workshop. A WHO staff member participated in each of the workshops and explained the project and its context.

Facilitators introduced the project and its purpose and clearly explained participant roles. Then each of the questions was presented for explanation from each of the group. Scores were sought from each participant with the reasons for their scoring identified and recorded. Wherever possible, participants were asked to provide evidence for their statements by providing data or stories/examples.

Questions (including the H-form) were presented visually through the use of electronic projector in each of the workshop but in the community workshop at Chingri Khali a verbal discussion was considered as the best option due to lack of electricity, language and time restrictions. Group responses were recorded via audio-recording and manual note-taking to ensure that no information was missed. Not all questions were asked for all workshops. This was influenced by the extent of group feedback (for example, some material overlapped and was already covered in previous questions), by the stage of project implementation (some questions could not be answered as there were no water related projects implemented) and timing restrictions.

3.3 Phase 3 – Scoring

A score was calculated by multiplying the number of respondents for each nominated scale (from 1 to 5) for each question followed by summation for each scale, and then dividing by the number of participants (as per Equation 1). For the category of 'can't say/neutral' which was nominally classified as 3 in the scale (1 to 5), individual scores were ignored and so the denominator was reduced. A total scores were summed for each sub-component and then divided by the total number of questions responded to for each component.

Equation 1:

$$\text{VRA score} = \sum (s_1 n + \ldots\ldots .s_i n_i)/N$$

Where:

s= nominated scale (i= 1 to 5)

n=number of respondents for scale i

N=total number of respondents

The total VRA score was then assigned for each workshop based on averaging across the 4 categories (see Equation 2). A low score indicates high vulnerability and/or low adaptive capacity. It was expected that in the area where a project had already been implemented, that the scores would be higher.

Equation 2

Total Vulnerability = score on {Assessing current vulnerability + Assessing future risk and vulnerability + Formulating an adaptation strategy + Continuing the adaptation process}/4

This method provides a minimum score of 1 (most vulnerable) and a maximum score of 5 (least vulnerable, indicating vulnerability is reduced). However, for ease of interpretation the overall score can be classified into 3 broad categories:

- Highest vulnerability: score of 1-2
- Moderate vulnerability: >2-4
- Lowest vulnerability:> 4-5

4.0 WASH and Health and Climate Change Vulnerability

4.1 Overall VRA score

A summary of the scores obtained from each of the workshops itemised for each component of the VRA tool is presented in Table 1. Necessary caution should be exercised when interpreting these numbers as the sample sizes were low. The comments made to support the reported scores and/or the discussion points noted provide valuable information, hence the quantitative scores should be considered in the context of the qualitative information collected.

Table 1: Summary of the VRA scores

Questions	Shyamnagar Sub-district n=13	Shyamnagar Community n= 9	Matbharia Sub-district/ Community n=13	National (with reference to Satkhira) n=8
A. Current Vulnerability				
A5. There are currently significant problems with water quality in URBAN area (Strongly agree=1; Agree-2; Neither agree nor disagree (neutral) 3; Disagree=4; Strongly disagree=5)				1.25
A6. There are currently significant problems with water quality in this area (Strongly agree=1; Agree-2; Neither agree nor disagree (neutral)3; Disagree=4; Strongly disagree=5)	1	1	1	1
A7 These water quality problems are currently having an impact on the health of the community (consider direct disease, extreme events and social impacts) (Strongly agree=1; Agree-2; Neither agree nor disagree (neutral) 3; Disagree=4; Strongly disagree=5)	1	1	1	1
A8 This geographical area/community is particularly vulnerable to climate change impacts (Strongly agree=1;Agree-2;Neither agree nor disagree (neutral)3; Disagree=4; Strongly disagree=5)	1	1	1	1

Questions	Shyamnagar Sub-district n=13	Shyamnagar Community n= 9	Matbharia Sub-district/ Community n=13	National (with reference to Satkhira) n=8
A9 There are specific populations in this community/geographical area that are particularly vulnerable to climate change (Strongly agree=1;Agree-2;Neither agree nor disagree (neutral)3; Disagree=4; Strongly disagree=5)	1	1	1	1
A11 The health system (eg. service delivery, health workforce, information, medical products, financing, leadership and governance) in this area is vulnerable to climate change? (individual) (Strongly agree=1;Agree-2;Neither agree nor disagree (neutral) 3;Disagree=4;Strongly disagree=5)	1	1	1.1	1.38
Total A	**5/5=1**	**5/5=1**	**5.1/5= 1.05**	**6.63/6=1.11**
B. Future Vulnerability				
B1 If this area experienced a doubling of extreme events and an increase in sea level in the future this would be catastrophic for this area (Strongly agree=1;Agree-2; Neither agree nor disagree (neutral)3; Disagree=4; Strongly disagree=5)	1	1	1	1
B2 There would be major impacts of this scenario on water supply and quality for this scenario *(consider both types of climate change above)* (Strongly agree=1;Agree-2; Neither agree nor disagree (neutral)3; Disagree=4; Strongly disagree=5)	1	1	1	1
B3 There would be major impacts on health (direct and indirect) associated with this scenario (Strongly agree=1; Agree-2; Neither agree nor disagree (neutral) 3;Disagree=4;Strongly disagree=5)	1.15	1	1	1
B4 The capacity of systems in this area to respond effectively to this scenario is limited (Strongly agree=1;Agree-2; Neither agree nor disagree (neutral) 3;Disagree=4;Strongly disagree=5)	3.5 (8 respondents neutral)	1	1	1
B5 The capacity of the health system to respond effectively to this scenario is limited (Strongly agree=1;Agree-2; Neither agree nor disagree (neutral) 3;Disagree=4;Strongly disagree=5)	1.14 (4 respondents neutral)	1	1.36	1.33
Total B	**7.79/5=1.56**	**5/5=1**	**5.36/5=1.07**	**5.33/5=1.07**

Questions	Shyamnagar Sub-district n=13	Shyamnagar Community n= 9	Matbharia Sub-district/ Community n=13	National (with reference to Satkhira) n=8
C. Adaptive capacity – existing projects/policy				
C1 There is a lack of common vision and awareness about the impacts of climate change amongst all agencies in this area? (Strongly agree=1;Agree-2;Neither agree nor disagree (neutral) 3;Disagree=4;Strongly disagree=5)	1.5		1.38	1.43
C3 Has this project _____been effective in managing the impact of climate change? (Not effective at all=1; A little effective=2; Neutral/can't say= 3; Effective=4; Very effective=5)	1.71 (3 respondents neutral)	5	2 (5 neutral respondents)	1
C5 Has strategy _____ been effective in managing the impact of climate change? (include as many of these as there are actions/strategies/policies) (Not effective at all=1; A little effective=2; Neutral/can't say= 3; Effective=4; Very effective=5)	- all respondents neutral			
Total C	**3.21/2=1.6**	**5**	**3.38/2=1.69***	**2.43/2=1.21**
D. Sustaining adaptive capacity				
D2. It will be difficult for the national/provincial level authorities to sustain the water projects/strategies implemented in this area (Strongly agree=1;Agree-2;Neither agree nor disagree (neutral) 3; Disagree=4; Strongly disagree=5)			1	2 (6 neutral)
D3 It will be difficult for the local level authorities to sustain the water projects/strategies implemented in this area (Strongly agree=1;Agree-2;Neither agree nor disagree (neutral) 3;Disagree=4;Strongly disagree=5)	5	5	1	1.33
D4 There are limited opportunities available to increase the effectiveness of the water projects/actions/strategies that exist in this area (Strongly agree=1;Agree-2;Neither agree nor disagree (neutral) 3; Disagree=4; Strongly disagree=5)				
D5. Government health agencies (but not only the Health Ministry) have a limited capacity to manage ongoing implementation of water projects/ strategies/actions in this area (Strongly agree=1;Agree-2;Neither agree nor	- all respondents neutral			3.86

Questions	Shyamnagar Sub-district n=13	Shyamnagar Community n= 9	Matbharia Sub-district/ Community n=13	National (with reference to Satkhira) n=8
disagree (neutral) 3; Disagree=4; Strongly disagree=5)				
D6 The community has a limited role in effective and sustainable implementation of water projects/strategies/actions in this area (Strongly agree=1;Agree-2;Neither agree nor disagree (neutral) 3;Disagree=4;Strongly disagree=5)			5	5
Total D	**5/1=5**	**5**	**7/3=2.3**	**12.19/4=3.05**
TOTAL VRA SCORES	(1.0+1.56+1.6+5.0)/4 = **2.29**	(1.0+1.0+5.0+5.0)/4 = **3**	(1.05+1.07+1.69+2.3)/4 =**1.53**	(1.11+1.07+1.21+3.05)/4 =**1.61**

It is clear from Table 1 that both the target communities illustrated a very significant level of physical and geographical vulnerability as results are heavily skewed to a low value. Not surprisingly future vulnerability was also scored very low, indicating high vulnerability across all workshop groups. The upazila workshop at Shyamnagar scored higher, with comments suggesting that they were more confident about the authority's ability to respond to the projected scenarios provided in the workshop (eg. higher sea level and more frequent cyclones) in the future.

As well as identifying existing vulnerability, the tool is designed to identify current and future adaptive capacity. A question about shared vision and awareness about climate change impacts was asked in this question. A low score across all workshops for this question was recorded. The reason most commonly given for this low score was a lack of coordination between agencies and organizations.

Fig. 2: A Pond Sand Filter in the assessment sites

The Shyamnagar community overwhelmingly expressed their satisfaction with the effectiveness of the existing WASH project, scoring even higher than that for the sub-district level. This is a positive sign that the existing project has been making a difference within the community. There was little confidence reported in the capacity of the health system to respond to existing vulnerability or future risk, with comments citing lack of personnel, lack of policy and guidance and lack of infrastructure considering the health perspective. Interestingly, in both areas, no specific health projects, actions or policies related to climate change were identified.

The capability of the local authority to sustain a/the project implemented differed and there was a stark contrast between the two communities of Shyamnagar and Matbharia. The Shyamnagar sub-district workshop and the respective community workshops strongly considered that the local level authorities could sustain the existing project while the national workshop score indicated strong disagreement with this in the context of the Satkhira district. The Matbharia community also strongly disagreed that local authorities could sustain existing projects. This difference between the two communities of two different upazila within two districts might be because of the implementation of the WASH project in Shyamnagar upazila which provided confidence in the community and local decision-makers to sustain local projects. All groups strongly agreed that the community had a role in the sustainability of WASH projects.

According to the categorisation on page 12, the overall findings of the vulnerability assessment indicated that Matbharia could be classified as the highest category of vulnerability and is more vulnerable than Shyamnagar upazila (classified as a moderate vulnerability category). This finding is not surprising considering the absence of any existing WASH projects and the perceived high vulnerability of the area and its populations (as reported by the community workshop).

4.2 Workshops at Satkhira District in Khulna Division

4.2.1 Upazila Level Workshop Findings at Shyamnagar Upazila

The sub-district workshop was composed of 13 participants (including 2 women) which included a teacher, a journalist, a Union Parishad member, a representative from the Department of Public Health Engineering and the Ministry of Environment and Forests, community representatives working in disaster preparedness, representatives from the local NGO (working on the WASH and climate change) and a representative of a Women's organization. It took approximately two hours to conduct the workshop.

Fig. 3: Photograph of workshop at Shyamnagar

VRA Tool Component A: Assessing current vulnerability

Climate change is certainly being felt in this community with a high awareness about the vulnerability and a number of diverse impacts identified by the group. These include migration, loss of work due to salinity, less rainfall, ponds not holding water, changes in food (eg. eating more from outside of home, less productivity of rice due to saline water intrusion and changing foods that require high water input for cooking, water consumption and hygiene habits due to reduced water availability, increased distances to get safe water and saline contamination of tube well water. Specifically impacts of climate change on drinking water included reduction in choices for safe water, long distances to find safe water, increased hygiene challenges. In

addition, social consequences such as, permanent migration and difficulties for eligible young men to attract a wife due to perceived burden on women in these communities were reported. In the community, individuals collect their drinking water from tube wells or Pond Sand Filters (PSF), using pond water for household supplies and rainwater for business and agriculture. The dry season was identified as the worst time of the year for quality and supply.

The subsequent self-reported health impacts included gastric irritation (they indicated that 98% have gastric problems), increased skin disease, increased stroke, increased use of medicines (the area has the highest use of medicines in the Khulna division), uterus cancer and appendicitis. The indirect health impacts identified were increased fertilizer use, children drowning due to being left unattended while mother was collecting water and hair falling out due to use of salty water. Women and children were identified as the most vulnerable groups to climate change.

The supporting systems that were mentioned as being vulnerable to climate change were general infrastructure, road and health systems. Disruption of sanitation systems during extreme events associated with increasing diarrhoeal disease was also mentioned. The community did not provide any specific comments about the health system capacity. There was complete consensus in scoring for each of the questions in this section that indicated a high level of vulnerability to climate change and significant associated impacts (Table 1).

VRA Tool Component B: Assessing future risk and vulnerability

All participants agreed that the projected scenario would be catastrophic in the area and in particular for water quantity and quality because of a number of existing issues like the shrimp industry, pond retention and water drainage. However, there were some contradictory views about resulting impacts on health because a small number of participants mentioned that the impacts would not be as significant because the health system would be improved in the future.

Most of the participants felt that they couldn't say anything about the capacity to respond to the future risks from a general support systems perspective. Some expressed concerns about the capacity to respond based on their experience of a lack of coordination between current projects, inadequate allocation of resources, and insufficient cooperation between government and NGOs. When questioned about the health systems capacity to respond in the future scenario, many respondents agreed (strongly or moderately) that the response would be limited due to lack of hospital staff, lack of a monitoring system, lack of doctors, lack of awareness, lack of coordination, lack of facilities, lack of drugs, lack of qualified health professionals and lack of coordination with the government.

VRA Tool Component C: Formulating an adaptation strategy

The majority of the participants either agreed or strongly agreed that there was a lack of common vision and awareness of climate change impacts in the community providing reasons

such as the absence of coordination between agencies, lack of commitment for improving the life of the people, and lack of accountability for delivering programs etc. for the community.

A number of projects were identified related to climate change in the community, with the elements of infrastructure provision and climate change awareness. For the main Water Aid project, a majority of participants considered that the project was effective or highly effective in providing positive responses such as increased awareness and establishment of water sources during disaster time. Some commented that there was inadequate coverage of the project across the district, that there was a lack of coordination and the project wasn't long term. No specific climate change and health related projects were identified by the group in this district.

VRA Tool Component D: Continuing the adaptation process

When participants were questioned about "what needed to be done to help the area to cope with the risk of impact of climate change in the water sector in the future" responses included community rainwater harvesting, better utilisation of ponds, canal development that would be accessible to all, community infrastructure for filtration and a pipeline water supply system. Barriers reported to the above mentioned activities included lack of policy, competing priorities and focus on agriculture not safe drinking water. From a local level authority perspective, respondents indicated a high degree of confidence about sustaining the existing projects, particularly from a community involvement perspective. When questioned about the government health agencies capacity to manage ongoing implementation of projects, all respondents indicated a neutral response, though some indicated limited health resources, under-utilization of resources and limited staff capacity as potential challenges.

4.2.2 Community Level Workshop Findings at Shyamnagar Union

This workshop conducted in Chingra Khali, Sadar union of Shyamnagar upazila consisted of 9 active participants including 4 women and numerous observers. The group consisted of a member of the Union Parishad, local leaders, teachers (college, high school), the Imam, representatives from the Mother's club, adolescent club, disaster preparedness local community group and representatives from an NGO Shushilon (working with Water Aid on the WASH and Climate Change project). The workshop took a period of 1 hour and 15 minutes.

Fig. 4: Photograph of community level workshop at Chingra Khali, Sadar Union of Shyamnagar upazila

VRA Tool Component A: Assessing current vulnerability

The respondents indicated a wide range of noticeable climate change impacts which included seasons behaving differently (e.g., no summer during summer, spring is not there, no rain

during monsoon), various types of natural disasters, hygiene issues (can't wash hands), standard of living changes, health, saline water prevailing since Cyclone Aila, long distances for collecting fresh water (was 3km, now 7km), agriculture (less potato production now, no rice cultivation, can't produce onions), saline water corroding the walls of houses (previously changed the walls after every 5 years, now every year), saline water impacting toilet structures, loss of work and education due to illness, farming diversity (only shrimp farming in community now), no freshwater for domestic animals like cows, impacts of saline water on trees. Other comments related to the general landscape indicating that there were less leaves on the trees, the area has been turning into a desert (temperature and salinity), and there were impacts on livestock.

The specific health impacts reported by the community included disease, early delivery, menstrual problems, children's diarrhoea, kidney disease, less intake of water during pregnancy, childhood intellectual development, pneumonia, skin disease, gastric problems. Other indirect health impacts mentioned included lack of diversity of food crops and reduced food intake, and reduced food preparation (cooking all meals for each day in one session, where previously they prepared fresh food for every meal). Women, children, disabled and the elderly were identified as the most vulnerable groups to the impact of climate change.

For drinking water, community members indicated that they must now rely on rainwater and pond sand filtered water – but they have to collect it from a long way away (7km). Cooking water is collected from the local pond water and water for agriculture is mainly from rainwater. All of the community strongly agreed that the area is very vulnerable to climate change impacts and mentioning that the Sundarban forest has lost large number trees due to the recent cyclones. From a systems perspective, lack of electricity was identified as a major vulnerability.

There was a complete consensus in scoring for each question for this section as indicated by the rank of 1. This indicated a high level of vulnerability to climate change and significant associated impacts (refer to Table 1). The community representatives indicated that all 597 families in the community had the same water quality problems as they identified, citing drinking water as the common main concern.

VRA Tool Component B: Assessing future risk and vulnerability

All participants strongly agreed that the projected scenario would be catastrophic for the area, specifically water and health impacts. They also mentioned general issues of increases in temperature and salinity. The temperature may help to grow plantations but salty water will inhibit growth. The participants indicated that already the living standard was not good and that people could not live in this area if the challenging water conditions continued.

The participants indicated that the future scenario would impact their health and living standards in many ways but that they would prioritise the availability of safe water because it is important from a health point of view.

All the participants strongly agreed that the capacity of the systems, including the health system to respond to such a future scenario is limited and is currently unable to cope with the changed environment. Specific health system vulnerability issues included lack of human resources including doctors, a limited transport system, facilities located a long way from the community, general economic situation and limited hospital services (they need access to a comprehensive hospital).

VRA Tool Component C: Formulating an adaptation strategy

A number of climate change projects were identified by the participants and they included elements of provision of water supply infrastructure (PSF and rainwater harvesting) and awareness rising. All participants strongly agreed that the Water Aid project was effective or highly effective and provided good service delivery. Responses included increased awareness about climate change, increased access to safe water (the project provided rainwater harvesting units and PSF) and increased hygiene education. The participants mentioned that before the commencement of the project they didn't have any safe water but now they have.

A union-sponsored sanitation project (i.e. provision of slab rings for toilets) was identified by participants and they reported that the project had had some success. However the successes were overshadowed because of salinity which was altering the longevity of the slab rings and that the supplies provided through the project was less than the demand. The participants of the workshop mentioned some other small WASH projects that could improve community health, such as tube well distribution and latrine projects, but they indicated they were not sufficient. There was also a specific mention of the lack of an organisation involved in improving women's health.

VRA Tool Component D: Continuing the adaptation process

When the participants were asked about what needed to be done to help the people of the area to cope with the future risks of climate change their responses included: government provision of piped water, helping people to move away from the area and contributions to rainwater harvesting. All participants strongly agreed that it would not be difficult to sustain the water projects/strategies implemented in the area from a local authority perspective. They also indicated that local authorities need to make the projects sustainable for survival and would need to continue to raise money to support the projects for operation and maintenance in future. However, they acknowledged the challenges in finding such funds when they already have to fund diesel fuel and generators as there is no other electricity supply in the area. They commented on the current challenges relating to reduced diversity in food supply, lack of protection, problems for feeding their animals and lack of sweet water fish.

4.3 Upazila Level Workshop Findings at Mathbaria Upazila

This workshop included 13 participants composed of 2 representatives from the upazila administrative level (Agriculture and Community Medical Officer) representatives from the

Ministry of Agriculture, a Community Doctor, the Union Parishad Chairman, two school teachers, a social leader, a university lecturer and local NGO representatives. The workshop took a period of 2 hours.

VRA Tool Component A: Assessing current vulnerability

Participants provided an extensive list of climate change impacts in their community which included cyclones, increase in sea level, increasing river bed height leading to flooding, trees dying due to salinity, livestock death, fruits not available, decreasing cultivable land, decline in crop yields (rice, coconut, betel nut), salinity impacts on drinking water quality, health impacts, sanitation impacts (degradation of ring slabs due to salt) and increases in fertilizer use. They also commented on the changing patterns of seasons - there used to be 6 seasons but now only 4 distinct seasons. Migration has increased as well as changing of food habits because of unlimited availability of sweet water.

Fig. 5: Photograph of upazila level workshop at Mathbaria Upazila

All respondents strongly agreed that the impact of climate change on water is a major problem in the area. Water quality and availability have impacted on food, agriculture and health. Deep tube wells are drying up or being contaminated with saline water and as a result, the untreated pond water is the main source of drinking water. Participants commented that they had no choice but to drink untreated 'sweet' pond water due to quality and limited quantity of deep tube well water. They noted that were some PSF but they were limited. The rainwater or pond water is used for other household purposes and river and canal water are used for agricultural purposes. In the dry season the problem is increased because of increased saline water intrusion. Seasonal changes have reduced the total amount of rainfall in the monsoon period. The participants also commented on the impact of disasters on the Sundarban forest that flooding is now more widespread, river flow has declined, and salinity is reaching further into the interior areas of the coastal belt.

All participants strongly agreed that there were significant health impacts related to climate change and they reported a number of health related problems which included heat stroke, difficulty in breathing, skin disease, diarrhoea, cholera, kidney disease, psychological impacts, worm infections as examples. All participants strongly agreed that their area was vulnerable to climate change because of its low elevation, a high reliance on predictable seasonal temperature and rainfall for agriculture, poor transport system and river bank erosion. The participants also mentioned that cyclones SIDR and AILA damaged the Sundarban making the area more vulnerable to coastal winds and storm surges because of reduced physical

protection. Furthermore, the area had become vulnerable to frequent flooding because of the damaged polders on the riverbank. All the participants strongly agreed that old people, women, pregnant women, children, farmers, fishermen and disabled people are most vulnerable, along with domestic and forest animals. Systems such as transport (roads), housing infrastructure, animals, health, ecological, agricultural, food and economic activities were identified as being vulnerable to climate change.

All but one participant strongly agreed that the health system was vulnerable to the impact of climate change. The participants cited examples such as waterborne disease due to scarcity of safe water, water logging, salinity, cultivation problems, increased temperatures and malnutrition. The health system was also vulnerable to address the situation because of insufficient doctors and health workers, limited medical infrastructure, lack of medical equipment, poor communication and weak transportation systems. There was almost complete consensus among the participants in scoring for each question for this section with each rating a 1. Only one of the participants ranked the health system's vulnerability as a 2, which indicated the high (rather than very high) level of vulnerability (Fig. 1).

VRA Tool Component B: Assessing future risk and vulnerability

All the respondents strongly agreed that the projected scenario would be catastrophic for the area especially considering the water and health aspects. They cited general issues such as sea level rise, increasing floods, increases in cyclones and tidal surges, riverbed elevation, infrastructure damage, loss of animals, ecological imbalance and reproductive health of women. They mentioned that some of the families were already moving further inland (eg. 10 km) due to river bank erosion or planning to move away, but they indicated they were worried that in the future there will be no place to go. The disaster component of future risk would also lead to the increased malnutrition and food security issues. The participants predicted that the salinity will increase and that will lead to the exacerbation of the problems with both the ground and surface water. The situation will also worsen due to the large population growth in the area and this will lead to increased demand for water. Other issues mentioned in the workshop related to the weakened health of men and women due to less nutrition and concerns about the prevalence of a weaker generation in the near future. The participants also mentioned the impacts of cyclones on deforestation and the importance of trees to maintain clean air.

All strongly agreed that the capacity of different systems to respond to the future scenario provided in the workshop is limited due to reasons such as lack of awareness, weakness of sheltering system, inadequate dams to hold water, less resources and weak transport systems, weak health system, and weak communication system. The majority of the respondents also strongly agreed that the capacity of the health system to respond is limited because of lack of doctors, cyclone centre, health education, poor communication system, hospital, transport, equipment and good quality drugs.

VRA Tool Component C: Formulating an adaptation strategy

There was a strong consensus in this group that there was a lack of common vision and awareness among all agencies about climate change impacts in this area. Issues reported included lack of coordination, lack of finance, less supply than demand, political instability, bureaucracy, lack of coordination amongst NGOs, insufficient government coordination of NGO activity, wanting to acquire individual credit and wish to attract foreign funds.

There were a number of projects related to climate change issues identified in the area including: development of a warning system for disasters, awareness raising, an emergency preparedness and recovery restoration project (ECRRP), FAO world bank projects, farmers projects and electricity projects. There were no specific water projects or specific health projects identified by participants that related to climate change.

The group was asked to respond about the effectiveness of one of the projects named as "agriculture and climate change project" that had been implemented by Agricultural ministry of Bangladesh Government. As this project was not known to all, more than half of the participants mentioned that they couldn't comment on the effectiveness of the project. Of those that did, there were divergent views. 2 agreed the project was effective (it had led to an increased crop diversity and changed cropping systems, introduced new agricultural machinery, established farmers groups and training, improved awareness) and 1 disagreed that the project was effective (not sustainable – more production, but more waste). .

VRA Tool Component D: Continuing the adaptation process

When questioned regarding what needed to be done in the area to cope with the future risks associated with climate change, the responses included: the need for government's attention and response to repairing and building the embankments, resourcing reserve tanks and water treatment plants construction, investment in rainwater harvesting systems, more pond excavation, improved drainage systems, sluice gates repair and canal re-excavation. Barriers cited for conducting these activities included economic issues, area remoteness, maintenance of communication, transport, human resources, political instability, failure to implement, lack of coordination and corruption.

There was a consensus (strongly agree) among the participants that the national and local level authorities could not ensure the sustainability of the projects implemented ('referring to agricultural project') because there was little ownership by the government. However, all participants strongly agreed that the community would have a strong role in effective implementation of projects in the area indicating that community involvement was essential to ensure sustainability.

4.4 National Level Workshop with Reference to Satkhira District

The national level workshop included 9 active participants comprising of representatives from WHO Bangladesh, Department of Health and Engineering (DPHE), Department of Environment (DOE), Policy Support Unit (PSU) of Local Government Division, NGO professionals from Water

Aid, a UNICEF consultant and private sector water consultants. The workshop took a period of 2 hours. Participants were asked to consider the situation in Satkhira district.

Fig. 6: Photograph of national level workshop EHU WHO

The participants highlighted that the water issues in that area were very critical. The issues mentioned by them included saline water intrusion into ponds, permeability reduction of pond beds, variability in water quantity, less rainfall in dry seasons, and challenges associated with rainwater harvesting (e.g. storage limitations, water quality impacts). Other issues particularly indicated by the participants in relation to water were lack of big scale projects, water quality deterioration, reduced utility of tube wells, increasing salinity following cyclone SIDR and increased evaporation (related to temperature increases).

All participants strongly agreed that there were a significant number of water related issues though there were slightly different views offered for rural and urban supplies. In urban areas water treatment systems existed which reduce the vulnerability (hence increased the overall score) as compared to rural areas where water contamination was a significant problem and questions of sustainability remained.

All participants strongly agreed that there were significant impacts of climate change on health in the area including specific diseases such as diarrhoea, hypertension, pregnancy problems and blue babies. Due to the salinity problem, mental and social health of people in the area was also affected. All strongly agreed that communities in those areas were particularly vulnerable to the impact of climate change because of frequent extreme events, infrastructure losses (including sanitation), economic burden and water issues impacting on daily life (need to collect water from far away). The participants also mentioned and strongly agreed that populations vulnerable to impacts of climate change included women, children and those who were socio-economically disadvantaged.

Systems identified as vulnerable to impact of climate change in those areas included fisheries, water, food, transport, education, biodiversity and biological systems. Around half of the respondents strongly agreed that the health system was vulnerable to climate change in those areas. They cited reasons such as lack of financing, lack of incentives to maintain workforce in local areas, poor infrastructure, potential damage from climate change, health service not designed to address climate change, health workers reluctant to work in these areas due to remoteness, low health coverage is low, low accessibility, a poor service mechanism and increased impacts in the future (eg. extreme events).

VRA Tool Component B: Assessing future risk and vulnerability

All strongly agreed that the stated scenario would be catastrophic for these areas and there would be major impacts associated with water and health. The reasons behind these were limited resources and capacity for adaptation. They also indicated that migration of communities from rural to urban areas was already occurring. The participants also mentioned that under the projected condition, surface water stresses would also increase.

When questioned about the capacity of systems to respond to this scenario, more than half of the participants agreed that the systems could respond, though a small number indicated that the capacity is limited. Those who didn't strongly agree indicated that there was some capacity in existing systems at the moment. However, in contrast, the majority of the participants strongly agreed that the health systems capacity would be limited because of infrastructure damage, increased disease burden and communication problems and inadequate medical facilities, limited human resources and logistics; inadequate current policy and challenges to the medicine supply chain and supply issues.

VRA Tool Component C: Formulating an adaptation strategy

Response to the question regarding lack of vision and awareness was mixed though most agreed or strongly agreed with the statement. The reasons for responses indicated there was no uniform vision and awareness, that different organisations were working with their own objectives and visions, a lack of understanding of climate change impact, knowledge gaps, lack of evidence exists in different agencies, need for a common understanding, need common tools, working in different sectors (agriculture, water). Some indicated that while a common vision is missing, awareness is evident.

Participants indicated a breadth of projects occurring in the Satkhira area including: GIZ, CCPH Unit project, ADB assisted rural water supply, coastal infrastructure projects and all strongly agreed that the WASH and Climate change project of Water Aid was effective. Other activities noted included eco-housing (including rainwater harvesting) and an ADB water supply and sanitation project. The group also identified some planned health projects including the CCHPU water supply and sanitation project, ICDDR,B research in coastal areas and a reverse osmosis project (Japan Aid).

VRA Tool Component D: Continuing the adaptation process

Future actions taken by government so that the communities in the area would be able to cope with the impacts of climate change, particularly with water issues included: better allocation identified through the Water Act and the water resource management legislation for ensuring adequate supplies of water and subsequent planning to balance land use (especially the issue of shrimp culture). The government should also take initiatives to preserve sweet water, provide a piped water supply system, initiating more research and development activities and conduct more national level planning.

Most of the participants could not mention anything about the difficulties for national or district level authorities for upholding the sustainability of water projects in the area, but some of them agreed that it would be difficult. The reasons illustrated were lack of coordination, political commitment and resources. Those who couldn't say indicated that there were some good systems in place and existing good governance and that there would be an expectation of transparency. Others suggested it would depend on who implemented the projects.

When asked about ability for local level authorities (either Union or Upazila) to ensure sustainability of water projects in the area, all strongly agreed or agreed it would be difficult. The participants cited a number of reasons namely centralized governance system with little authority to local government, lack of vertical integration, lack of consistency of policy, lack of community empowerment and a top-down approach. When specifically asked about health agency's capacity, most disagreed or strongly disagreed that the health agencies have a limited capacity to manage the ongoing implementation of water project in the region suggesting that health has a potentially strong regulatory role. All of them strongly disagreed that the community had a limited role in sustainable implementation of water projects in the area, strongly stating that the community needs to be involved in every step of the implementation process so that community ownership is developed.

5.0 VRA Tool Evaluation

Tables 2 and 3 summarize the key issues identified following the application of the question set and the workshop in 4 settings in Bangladesh. Table 2 summarizes the issues encountered with the developed question set and makes recommendations for modification and Table 3 provides an evaluation of the workshop format and process issues and recommendations for future workshops.

Table 2: Question design issues and recommendations for modification

	Findings	**Recommendation**
A. Assessing current vulnerability	1. Questions easy to understand, with significant input provided by participants. 2. Some overlap in responses to questions, reflecting differing perceptions, understanding of concepts	Keep question set with limited modification.
B. Assessing future risk and vulnerability	3. The questions relating to the health systems capacity was difficult to describe to the participants especially the – but a crucial part about understanding health vulnerability	3. Keep questions about both general system's capacity and health specific system's capacity but need to be described the adaptive capacity to the audience before seeking answers and provide example to remove ambiguity
C. Formulating an adaptation strategy	4. Question asking about common vision and awareness should be split into two	4. Effective adaptation will require strong coordination of stakeholders

	Findings	Recommendation
	different issues separately	who have a shared understanding of impacts and a common vision for responding. Make two separate questions for these two issues separately.
	5. Lack of consistency in response relating to barriers to adaptation only and partly discussed by some the respondents	5. Make an explicit question or discussion point about barriers of adaptation to climate change, exploring more comprehensively technical, financial, administrative, policy categories etc.
D. Continuing the adaptation process	6. Difficulties in understanding questions about 'level of authority'	6. Explain more clearly the rationale for this question by explaining that part of the governance system which has the most ability to sustain the adaptation.
	7. Some questions complex and include a few components	7. Try to simplify questions without losing intent and/or provide additional explanations to supplement.
OVERALL	8. Qualitative questions very useful for identifying key issues for the target area (background) and for understanding reasons for responses but took a large amount of time.	8. Maintain a mix of qualitative group questions (non-scored) to help set the scene (context) at appropriate
	9. For some questions many answered 3 (can't say/don't know) but this response can't be used in calculation of score for the question.	9. Make 'can't say/don't know' option category 5 or 6 and use either a nominal scale from 1-4 or 1-5 to include in VR score. Explain the question by citing examples
	10. It is important to capture this neutral type of response as it may suggest that there is limited communication between key stakeholders within communities/ sub-districts/nationally about existing projects etc.	10. Try to ensure that subsequent workshops include the same participants so knowledge within the group grows.
	11. In an attempt, to ensure that all extreme values were consistently in the same direction, some questions included double negatives making them challenging for target audience to respond to and hence potentially reducing question validity	11. Simplify double negative questions and if this means a 1 can mean the opposite extremes for different questions, then caution needs to be applied when calculating scores.

Table 3 – Workshop process issues and recommendations

Issue	Recommendation
1. Spent significant time on qualitative discussion, sharing ideas, explaining perspectives and providing evidence, some overlap of questions but useful for consolidation and context provision.	1.1 Extend time of workshop to provide more time for this general discussion of concepts and issues 1.2 Maintain the amount of material collected on general impacts, issues and reasons for scoring decisions
2. Participant's representation in workshops generally included a good mix of stakeholders, though there was limited health representation. This is problematic as the stated objective of the VRA tool is to enhance 'health decision-making' and more depth in reasoning may have been provided with the inclusion of more health representatives.	2.1 Strive to ensure a balanced mix of health representation and other stakeholder input into all levels of workshops 2.2 Encourage female participation in future workshops to ensure more balanced gender representation 2.3 Strive to ensure the same representatives are involved in subsequent workshops to ensure consistency and continuity of feedback
3. Diversity of workshops (diverse experiences and knowledge) useful for triangulation of responses and to obtain different perspectives.	3.1 Continue to ensure a balance of workshop types as they provide useful, but different information about the target issues (eg. at a minimum: community, sub-district and National)
4. A lot of workshop time was taken up in Components A and B, with lesser time in C and D due to time restrictions, absence of projects to discuss (Matbharia) and possibly a lack of understanding of some of the questions.	4.1 Note that in subsequent workshops much of the material on vulnerability covered in A and B will not be new and so more time should be allocated to Sections C and D as project(s) are implemented.
5. Use of electronic media (eg. to project questions) reduced the time taken during workshops.	5.1 In the absence of electronic media, allow for more time to provide question sets in written form (on paper or whiteboard).
6. Having a native Bangla facilitator was critical to ensuring good understanding of task and questions.	6.1 Ensure project team has a native speaker facilitator 6.2 Consider translating questions into Bangla for all levels of workshops and including explanatory notes for more challenging concepts.

General issues of note:

- This tool is based on perception of stakeholders though evidence was sought as much as possible to justify statements; most evidence was in the form of stories. Very little surveillance or report data was provided (or available) to justify statements made. The focus of the tool is climate change and as highlighted by some of the National level participants, some of the impacts identified by workshop respondents in the community could also be attributed to other activities such as shrimp farming, engineering responses etc.

- Consistent across the community and sub-district workshops was the absence of knowledge of any climate change and health-related activities. This may indicate that there is no specific climate change and health work occurring in those communities or the participants were not aware of such work.
- Managing time in the workshop is very difficult for getting proper feed back. Most of the workshops went longer than the recommended time. This is mainly attributed to the nature of the task and the amount of information sought combined with the significant interest of participants in sharing experiences, information and reasons for their statements (and good facilitation to ensure everyone had an opportunity). In reality, a timeframe for the very first workshop relating to a target area should be around 2 hours to capture the background information necessary and describe the project and its objectives. It is expected that subsequent workshops within a single target area would be reduced in time as less time would be expected to be spent on geophysical and human population vulnerabilities that are less likely to change, and more time spent on the impacts of projects and other activity related to climate change implemented in the community.
- As the workshop methodology chosen for this project, the scoring approach used to quantify vulnerability reduction is based on very small sample sizes and hence extreme caution should be applied when interpreting the numerical scores. It should always be considered in the context of the qualitative data that provides reasons, issues and descriptions. As per the overall objective of the study, the score is useful to track over time and assess whether vulnerability reduction is occurring as a project is implemented

6.0 Discussion and Recommendations

6.1 Discussion of Results

This study has identified a high level of vulnerability to climate change in both target areas (Shyamnagar, Satkhira and Matbharia, Pirojpur), with water quality and supply issues ranked highly by participants. There is a high awareness of climate change and community vulnerability in both geographical areas and local participants were easily able to articulate impacts of climate changes in both areas. Interestingly, even in Matbharia where there is currently no targeted WASH program, there was a high level of awareness of the links between climate change and water. There was little difference in current vulnerability between target areas as measured by the VR scores for Component A and discussions around this current vulnerability were very similar in terms of types of climate changes observed and associated impacts. The Matbharia area cited more agricultural impacts, perhaps reflecting the diversity of agriculture in the area (livestock, vegetable and rice crops) compared with the domination of shrimp farming in the Shyamnagar area.

Health impacts identified ranged from skin diseases and hygiene problems to increasing diarrhoea, adverse pregnancy outcomes, and hypertension and kidney problems. Other health issues identified included anxiety and stress and increased reproductive cancers. Other indirect health issues frequently mentioned included food shortages, social impacts related to difficulty

in accessing safe water and migration. Common to both project areas was the reported absence of climate change and health related activity suggesting that the formal health sector has either been absent in climate change adaptation efforts in these areas or has not engaged well with the community relating to any specific surveillance or climate change health related activity it is/has conducted. Given the reported perceived health impacts identified, this is problematic and raises questions about the engagement of this important sector in local climate change adaptation.

Local groups from both target areas expressed mixed confidence for support systems (including health) to respond effectively to existing and future climate risks (as proposed by the scenario presented to them). Lack of coordination between agencies was the main reason given for the expressed low confidence. The future vulnerability was reported to be lower for the Shyamnagar sub-district group, indicating a higher confidence in effective systems response to future risks.

Matbharia has no existing WASH projects but the community expressed concerns about access to adequate supplies of safe drinking water (reduced groundwater or saline groundwater) and the challenges for food supply (animals and crops) of inadequate or saline water. In contrast, in Shyamnagar, despite significant challenges reported that still exist relating to safe water supplies, the existing Water Aid WASH project that has been implemented in the community is making a difference to the water challenges for the community. This perceived difference appeared to strongly influence the community scores with a high level of confidence in the ability of the local level authority to sustain projects expressed in both Shyamnagar workshops compared to that of the Matbharia area. Interestingly, the national respondents score about capacity of local level authorities to sustain projects was similar to that in Matbharia, citing reasons such as: a centralised governance system with restricted authority to local government, the lack of consistency, lack of community empowerment and a top-down approach. All groups strongly agreed that the community had a critical role in sustaining activities.

The overall higher score for the Shyamnagar area compared with Matbharia, indicating greater vulnerability reduction in this community is driven by components C and D which relate to current adaptation and sustaining adaptation activity from a VR scoring perspective. This was highly influenced by the community response in Shyamnagar where the community were united in their view that the current Water Aid project was making a difference and provided them with confidence that such activities could be sustained by local level authorities into the future.

The comparison of community and national level workshops confirms the need to include a diversity of stakeholder views and perceptions in the VRA process. National respondents had a much broader view and were able to provide more comprehensive reasons for adaptive capacity issues including sustainability and capacity of systems. The concept of systems which is critical to understanding adaptive capacity did not appear to be widely understood by the community workshops (as evidenced by written responses), despite explaining the concept and

providing examples. National respondents were also able to distinguish climate related impacts from other environmental impacts.

The VRA process (tool + workshop) appears to meet its overall objectives, though the absence of strong health representation means that the evidence for health impacts was based on lay-person observation in most cases with limited quantitative evidence. However, this absence of strong health representation may partly reflect the nature of the governance system and the focus on WASH activities for this project, recognising that WASH work is fundamentally a public health activity.

The concept of vulnerability (current and future risk) was well understood by all, but adaptive capacity responses were limited, partly because of a lack of understanding by all about effectiveness of existing projects and/or the absence of any specific projects. It might be expected that as the VRA is applied again and with the same group and apply to a particular WASH project (e.g., in Matbharia), that participants will be more knowledgeable to respond to the adaptive capacity parts of the VRA tool. Despite some minor adjustments to wording and additional explanatory notes, the 4 components of the tool provide a useful breakdown of vulnerability and adaptation activity and sustainability, allowing for an assessment of vulnerability reduction over time. The difficulty in participants being able to comment on effectiveness of specific projects may reflect the make-up of the workshop or lack of communication about project objectives, monitoring and evaluation or communication of outcomes.

6.2 Recommendations

1. For the vulnerability reduction assessment to work effectively it should be applied at least 3 times throughout a project lifecycle and ideally, the workshop participants should be similar for each time to ensure consistency and continuity of input. If ‘health’ is the key focus, then health stakeholders and decision-makers need to be better defined, and their contributions increased to improve the health aspects of the assessment process.
2. Matbharia would be a useful site to implement a WASH and climate change project given the reported vulnerability, interest and awareness of climate change issues and strong support to the pilot workshop provided by the local NGO, indicating an interested and committed partner.
3. Though the VR score maybe useful for tracking changes over time within a single community, its construct is constrained by very small sample sizes. Hence the reasoning and discussion associated with qualitative question responses is critically important for understanding the numbers and any unexpected numerical scores.
4. As identified in Table 2, some refinements are necessary for the questions in the tool (particularly in Components C and D) and some more time should be given to describing concepts such as ‘systems capacity’ and ‘sustainability’ and ‘level of authority.’ Overall, it would be difficult to adequately collect information and discuss concepts and issues in less than 2 hours.

7.0 Conclusions

This study/project report provides an overview of the application of the UNDP/UNEP, GEF, WHO vulnerability reduction assessment tool for 2 communities (Matbharia and Shyamnagar) in Bangladesh. One community had no identified WASH and climate change project, while for the other, a Water Aid climate change project was part-way through its implementation. The objectives were to field test the tool and a process for its application and collect some climate change and health vulnerability and adaptation information from these two selected communities to inform further WASH project development.

The project identified that the target communities perceived climate change to be a current and significant risk to their health, livelihoods, agricultural production and society. The key issue of concern was that of access to adequate supplies of safe water, that was impacted by extreme events, increased sea-level rises, reduced river-flows and changing seasonal patterns. In Shyamnagar where a WASH project is part-way through implementation, the community and sub-district stakeholders were positive about the benefits of the project on access to safe water quality and confident that such activities could be sustained by the local level into the future. This was reflected by the overall score for this community. This was in stark contrast to the response in Matbharia and to some extent the national level respondents who considered that local level sustainability of actions was challenged by issues such as a strong centralized governance structure, lack of vertical integration, lack of community empowerment and a top-down approach.

Many health impacts of climate changes were articulated by the workshop groups, however there appears to be little hard data to support such assertions and little specific health-related climate change adaptation action or policy was identified.

From a process perspective, the applied tool and workshop framework worked well. An overall vulnerability reduction score was calculated and supplemented by qualitative descriptions of impacts, issues and reasons for ratings given. This combination of a quantitative score and qualitative material makes for a useful assessment process, though care should be taken in interpreting scores, particularly between areas due to low sample sizes. The most important benefit of the process will be to compare the VR score over time to identify whether vulnerability has reduced as a result of implemented projects. Engagement with the community was significant and feedback comprehensive and responsive to questions asked and discussed. Some questions included concepts that were difficult to understand, requiring a higher degree of explanation and the double negative nature of some questions was challenging to respondents. These issues should be addressed in subsequent applications of the tool and a longer time should be allowed for further explanation of challenging concepts.

Appendices

Appendix 1 – Question Set Including Identification of Method for Data Collection

Climate change and water vulnerability and adaptation responses in the coastal areas of Bangladesh
(FINAL VERSION 2014)

Workshop of: NATIONAL / DISTRICT/ SUB-DISTRICT/COMMUNITY…….. *(Circle one and provide a name)*
Referring to: _____Project (*include name of project, agency responsible and location)*

Question	Form of Questioning	Input
A. ASSESSING CURRENT VULNERABILITY (VRA indicator: vulnerability of health, health systems, to existing cc and/or climate variability)		
A1. What are the current impacts of climate in this area? - Provide examples of evidence (observation, data, stories, etc)	Group Discussion	Group
A2. What are the specific impacts on **water – supply and quality in this area?** Provide examples of evidence (observation, data, stories, etc)	Group Discussion	Group
A3. Where does this area currently get its water: a. for drinking?, For other household purposes?, For business and agriculture?	Group Discussion	Group
A4. Identify the influence of time of year on: i) water quantity AND ii) water quality	Group Discussion	Group
A5. There are currently significant problems with water quality in this area (urban)	H-Form	Group
A6. There are currently significant problems with water quality in this area (rural)	H-Form	Group
A7. These water quality problems are currently having an impact on the health of the community (consider direct disease, extreme events and social change impacts)	H-Form	Group
A8. This geographical area/community is particularly vulnerable to climate change impacts	H-Form	Group
A9. There are specific populations in this community/geographical area that are particularly vulnerable to climate change	H-Form	Group
A10. Are systems other than health, like energy, communication and transport particularly vulnerable to climate change impacts in this region? Why? Provide examples, evidence. Are there any others?	Group Discussion	Group
A11. The health system (eg. service delivery, health workforce, information, medical products, financing, leadership and governance) in this area is vulnerable to climate change?	H-Form	Individual
B. ASSESSING FUTURE RISKS (VRA indicator: vulnerability of health, health systems to developing cc risks)		
B1. If this area experienced a doubling of extreme events and an increase in sea level in the future this would be catastrophic for this area	H-Form	Group
B2. There would be major impacts of this scenario on water supply and quality for this scenario *(consider both types of climate change above)*	H-Form	Group
B3. There would be major impacts on health (direct and indirect) associated with this scenario	H-Form	Group
B4. The capacity of systems in this area to respond effectively to this scenario is limited	H-Form	Group
B5. The capacity of the health system to respond effectively to this scenario is limited	H-Form	Individual
C. FORMULATING AN ADAPTATION STRATEGY (VRA indicator: magnitude of barriers(institutional, policy, technological, financial etc), including inter-sectoral and inter-agency barriers to health system's adaptation)		
C1. There is a lack of common vision and awareness about the impacts of climate change amongst all agencies in this area?	H-Form	Individual
C2. What projects are currently implemented in this area to manage the impact of climate change? Briefly describe them	Group Discussion	group
C3. Has this project _____been effective in managing the impact of climate	H-Form	individual

Question	Form of Questioning	Input
change?? (include as many of these as there are projects)		
C4. Other than specific projects, are there any strategies, policies or other actions planned or implemented to otherwise manage the impact of climate change and water issues in this area? (think about National and local)	Group Discussion	Group
C5. Has strategy _____ been effective in managing the impact of climate change? (include as many of these as there are actions/strategies/policies)	H-Form	Group
C6. Are there any planned or implemented specific health-related actions in response to climate change in this area?	Group discussion	Group
C6. Has action _____ been effective in managing the impact of climate change?	H-Form	Group
D. CONTINUING THE ADAPTATION PROCESS (VRA Indicator: capacity and willingness of the health system to continue to manage cc risks)		
D1. What does the government need to do so that this area and its vulnerable populations are able to cope with the impacts of cc, **particularly water**, into the future? - challenges, barriers, examples	Group Discussion	Group
D2. It will be difficult for the **national/provincial level authorities** to sustain the water projects/strategies implemented in this area	H-Form	Group
D3. It will be difficult for the **local level authorities** to sustain the water projects/strategies implemented in this area	H-Form	Group
D4. There are limited opportunities available to increase the effectiveness of the water projects/actions/strategies that exist in this area	H-Form	Group
D5. Government health agencies (but not only the Health Ministry) have a limited capacity to manage ongoing implementation of water projects/strategies/actions in this area	H-Form	Group
D6. The community has a limited role in effective and sustainable implementation of water projects/strategies/actions in this area	H-Form	Group

Appendix 2 – Example H-Form Used in The Workshop

Reasons (and evidence where possible) for a negative response	A7.This geographical area/community is particularly vulnerable to climate change impact Disagree ---------- Agree 1 2 3 4 5	**Reasons (and evidence where possible) for a positive response**
	How could this score be improved	