FINAL PROJECT EVALUATION REPORT

CARE BANGLADESH

Digital Early Warning Systems to Save the Lives and Livelihoods of Communities of Bangladesh (DEWS)

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CONTENTS

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DIGITAL EARLY WARNING SYSTEMS TO SAVE THE LIVES AND LIVELIHOODS OF COMMUNITIES OF BANGLADESH (DEWS)

SECTION 1 | PROLOGUE

ACRONYMS

BMD	Bangladesh Meteorological Department
BOA	Boat Owners Association
BTRC	Bangladesh Telecommunication and Regulatory Commission
CDMP	Comprehensive Disaster Management Program
CGC	Centre for Global Change
CPP	Cyclone Preparedness Program
CSRL/Oxfam	Campaign for Sustainable Rural Livelihood / Oxfam (CSRL/Oxfam)
DDM	Department of Disaster Management
DEWS	Digital Early Warning Systems to Save the Lives and Livelihoods of Communities of Bangladesh (DEWS
DRR	Disaster Risk Reduction
ET	Evaluation Team
EWS	Early Warning Systems
FGD	Focus Group Discussion
GD	Group Discussion
GoB	Government of Bangladesh
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile Communications
HIF	Humanitarian Innovation Fund
IVR	Interactive Voice Response
KII	Key Informant Interview
MEL	Monitoring, Evaluation and Learning
NGO	Non-government Organization
NID	National Identity Card
RIMES	Regional Integrated Multi-Hazard Early Warning System
SHOUHARDO	Strengthening Households for Responding to Development Opportunities
SOD	Standing Orders on Disasters
UDMC	Union Disaster Management Committee
UzDMC	Upazila Disaster Management Committee
VCA	Vulnerability and Capacity Assessment

ACKNOWLEDGEMENT

EXECUTIVE SUMMARY

Bangladesh land meets the sea in the south forming the geography of a coastal zone of the country. The coast is characterized by opportunities and vulnerabilities. While the coast is rich in diverse cultures, unique biodiversity and natural resources it is on the other hand is exposed to natural disasters, environmental degradation and climate change vulnerabilities. The zone, representing 19 out of the 64 districts in the country, contributes to the national economy from its diverse natural resources such as inland and marine fisheries, forests, ecosystems, vegetables and fruits, salt and minerals and agriculture crops.

Cox's Bazar is one of the 19 coastal districts of the country. The district is endowed with capture and culture fisheries and extended to marine fishery as well. Marine fishery is the main occupation of the marginal poor fisher families in the district. The livelihoods of these poor marine fishers are impacted by the increased incidents of robbery in the sea and dire consequences of natural disasters and climate change vulnerabilities.

"SEA IS OUR LIVES & LIVELIHOODS, IT GIVES MORE, TAKES LESS" — *Fishermen from Cox' Bazar*

Accurate and early storm warnings are essential to help fishermen remain safe – in particular in Cox's Bazar, one of the coastal areas at high risk in the Bay of Bengal. In order to address the gaps in existing early warning system that fail to provide reliable and timely life-saving information to fishermen at sea, CARE initiated the project entitled, *"Digital Early Warning Systems to Save the Lives and Livelihoods of Communities of Bangladesh (DEWS)"* , with the financial assistance of the Humanitarian Innovation Fund and technical support of the AirTel Bangladesh Limited which later on replaced by the Banglalink, the Bangladesh Meteorological Department and the Campaign for Sustainable Rural Livelihood, Oxfam.

The DEWS project was designed based on the successes of the pilot initiative in 2011 to test an initial prototype Vehicle Tracking System. Over its 28-months life beginning September 2012 the DEWS project implemented a completely water-proof, low-cost telecommunications systems linked with GPRS for fishing vessel tracking and early warning dissemination. The project target beneficiaries are 300 boats employing about 3,000 fishermen within the Cox's Bazar Sadar Upazila. Furthermore around 20,000 members of the selected fishing communities will indirectly benefit from education and training on DRR and EWS. *The goal of this EWS innovation is to reduce loss of lives and livelihoods as well as the need for humanitarian assistance.*

The evaluation team's findings of opportunities, issues and challenges are based on assessment and observations that included: visits to the DEWS project sites, interviews of the beneficiaries; discussions with the stakeholders and implementing partners; and telephone calls with organizations not covered by the interviews and visits. These findings also include the feedback of the CARE DEWS project staff.

From its beginning to the end, DEWS project experienced a rough and tough journey involving challenges, constraints and surprises. The most challenging and time consuming was the Government of Bangladesh (GoB) formal approval of the project, it required revisions twice of the original submission while the political turmoil prevailed from end-2013 to early-2014.

Moreover, GoB policy restrictions and frequent changes in government decision making personnel may be excuses for delays to some extent. One of the biggest challenging matters was the departure of the only technical partner at a crucial time. Restricted access to long range GSM network facilities had impacted the project implementation as well. These challenges and surprises, however, did not affect the support and cooperation of the project partners and stakeholders.

Despite numerous challenges and constraints the project has made reasonable progress on its innovation and community risk reduction aspects, which is familiarization of new digital technology, awareness on early warning mechanism and fishermen vulnerability, awareness on disaster preparedness focusing on natural hazards, safety and protection risk associated with deep sea fishermen as well as capacity building on boat tracking systems and broader risk reduction of the fishermen community.

The project deliverables and outputs have rational satisfactory achievement. Out of a total of 8 deliverables and outputs – some have reached targets; some were close to meet targets while a few of them were initial stage of their implementation.

Lessons learned associated with the performance and other dimensions of the innovation that reflected within the project: Digital early warning system is a dynamic innovation. Given many challenges and constraints the impact of the innovation could not be seen during project life but it showed promises for effective interventions in future as the targeted beneficiaries find it an opportunity to share experiences and good practices of disaster risk reduction with their neighboring communities in the coastal region.

Recommendations are made on the capitalization of knowledge gained and lessons learned from the project, feasibility of technological aspects, analysis of risks in project management, analysis, compatible with GoB policy and guidance, and advocacy with public and private sectors.

DEWS project has created a publicity of innovative warning devices in the coastal fishing communities and other relevant stakeholders interested in developing more effective community response to disasters. However any extension of DEWS or the project the like would have to show a greater degree of growth and sustainability. In order to maintain the current impetus and fledgling sustainability and to encourage wider penetration of the DEWS concept and greater self generating sustainability the evaluation team recommends that serious consideration to providing a follow-on project and such project should be extended to other coastal areas in the country. The following steps are recommended for an innovative project:

→ Conduct in depth stakeholder analysis as well as on the ground action research and feasibility study will require on technological aspects of the project with a view to look for who is doing what, what are the available technology, how the targeted community in neighboring countries getting two way communications support etc.

→ Capitalization and documentation of the lessons learned, especially capturing the process documentation.

→ Conduct advocacy and partnering with the concerned government ministries and agencies for endorsement and adaptation of innovative technologies in the main stream of development.

→ More importantly explore the partners experienced in the implementation of innovative interventions in and outside the country.

Eventually larger mobile network coverage would have made the early warning system mechanism more effective. Increasing the network coverage is essential for optimum benefit of the digital technology by the poor and vulnerable fishermen. CARE's strong relationships with many of the public and private sectors, national and international agencies, as well as national and local level project stakeholders will greatly assist in the effective implementation of the innovative projects targeted for the most food insecure and vulnerable populations in Bangladesh. All partners and stakeholders we communicated with were fully supportive of DEWS, thought it was worthwhile, useful and helpful and all wanted more in some form or another.

SECTION 2 | BACKGROUND AND CONTEXT

2.1 PROJECT BACKGROUND

Cox's Bazar is one of the 19 coastal districts of the country. Being located in the coastal zone the district is characterized by opportunities and vulnerabilities such as its diverse cultures, unique biodiversity and natural resources and on the other hand exposure to natural disasters, environmental degradation and climate change vulnerabilities. The district is endowed with capture and culture fisheries and extended to marine fishery as well. Marine fishery is the main occupation of the marginal poor fisher families in the district. The livelihoods of these poor marine fishers are impacted by the increased incidents of robbery in the sea and dire consequences of natural disasters and climate change vulnerabilities. These groups are extremely vulnerable to rough sea conditions, tropical cyclones, storms and tidal waves. Many of them loss their lives and livelihoods because of lack of awareness and capacity to respond to these types of natural disasters.

The poor and marginal fishermen of Cox's Bazar likewise those in the rest of the coastal zone in Bangladesh lack communication devices as well as access to communication services to receive and send messages while fishing in the deep sea. They rely on the existing communication and warning systems of radio broadcasts and red flags hoisting.

Accurate and early storm warnings are essential to help fishermen remain safe – in particular in Cox's Bazar, one of the coastal areas most at risk in the Bay of Bengal. The Government of Bangladesh (GoB) in its early stages of developing models and systems to increase lead time for early warning forecasts. So in order to address the gaps in existing early warning system that fail to provide reliable and timely life-saving information to fishermen at sea, CARE initiated the project entitled, *"Digital Early Warning Systems to Save the Lives and Livelihoods of Communities of Bangladesh (DEWS)"* , with the financial assistance of the Humanitarian Innovation Fund (HIF) and technical support of the AirTel Bangladesh Limited (Airtel) which later on replaced by the Banglalink, the Bangladesh Meteorological Department (BMD) and the Campaign for Sustainable Rural Livelihood / Oxfam (CSRL/Oxfam).

The DEWS project was designed based on the successes of the pilot in 2011 to test an initial prototype Vehicle Tracking System. The project intervention over its 28 months of implementation period beginning September 2012 has been proposed a completely water-proof, low-cost telecommunications systems linked with GPRS for fishing vessel tracking and early warning dissemination. It aims at reduced loss of lives and livelihoods as well as the need for humanitarian assistance through three specific objectives:

→ Strengthen communication systems to provide timely forecast and early warning messages to fishermen at sea who would be beyond regular mobile coverage. As an added advantage the system will also enable vessels at sea to relay distress calls and/or be tracked during rough weather conditions and thereby facilitating rescue missions;

→ Strengthen multi-disciplinary, multi-agency coordination and collaboration in order to inform and integrate warnings into DRR decisions and measures; and

→ Strengthen the response capacity of the Cyclone Preparedness Program and selected fishing communities.

2.2 PROJECT COVERAGE, ACTIVITIES AND TARGETS

The project target beneficiaries are approximately 3,000 fishermen through equipping 300 fishing boats with early warning communication devices (approximately 10 fishermen per boat) from 24 communities within the Cox's Bazaar Sadar Upazila. Furthermore approximately 20,000 members of the selected fishing communities will indirectly benefit from education and training on DRR and EWS.

2.3 PROJECT DELIVERABLE AND OUTPUTS

In order to protect lives and livelihoods of the targeted poor and vulnerable fishermen through introducing EWS and enhancing DRR capacities the DEWS innovation project over its 28 months life envisioned the following eight deliverables/outputs.

1. Vulnerabilities and capacities of targeted fishing communities documented

2. 300 boats equipped with GPS enabled GSM Handset devices and fishermen receive early warning messages and capable to send alerts in the event of an emergency

3. Local fishing communities and 3,000 fishermen report having developed knowledge and skills on the effective use of EWS technology and early warning information

4. Capacities of community platforms and CPP strengthened and linked with relevant multi-disciplinary bodies to facilitate effective and efficient people centered EWS and corresponding response and preparedness

5. Capacity of local disaster management committees and local administration strengthen to better coordinate and monitor effectiveness of EWS and corresponding response and preparedness

6. Fishermen report having access to information, at least 48 hours in advance, on rough sea events, critical weather updates, and information on fishing zones (important for their livelihoods), provided through community platforms

7. Monitoring, Evaluation and Learning (MEL) workshops and meetings are facilitated and best practices documented and disseminated

8. Evidence based advocacy efforts are materialized through learning dialogues, workshops and seminars, to raise awareness at sub-national and national levels amongst fishing communities, GoB and the private sector

SECTION 3 | EVALUATION OBJECTIVE AND METHODOLOGY

3.1 EVALUATION OBJECTIVE

The evaluation is to provide a comprehensive understanding on the contribution of the project in line with the project goal and objectives with a focus on what worked better and what did not work, which will enable the sector to draw critical recommendations.

The evaluation has been framed to focus on the following objectives:

→ Assess how effective the project was in implementing its activities and reaching its 'output' targets. Part of this will be assessing how effectively the project has addressed

the challenges encountered. This should include assessing the project's phase out plan, its rationale, practicality, upholding beneficiary accountability, and focus on testing a model for future adaptation and up-take that can benefit the fishermen and boat owners in future.

→ Analyze how effective the project was in reaching its 'outcome' targets. The evaluation needs to capture both technical and non-technical aspects considering issues of compatibility within existing institutional set up. The evaluation must capture both positive and negative impacts with plausible explanations.

→ Assess which approaches, interventions and activities have proved to be most effective and why. And those that have been less effective and why.

→ Articulate and package the lessons learned and recommendations from this innovative initiative to set up an early warning system (EWS) for deep sea fishermen, and the test that was conducted, so as to inform future efforts and planning by different stakeholders (donor, government, NGOs)

3.2 EVALUATION TEAM

A team of independent consultants, field research coordinator, qualitative and quantitative data analyst and field enumerators conducted the evaluation. The Evaluation Team (ET) members have extensive experience in training, program investigation and evaluation of disaster risk reduction programs.

3.3 EVALUATION METHODOLOGY, TOOLS AND APPROACHES

Through 25 February – 6 March 2015 the Evaluation Team (ET) carried out their field works. The team's findings of opportunities, issues and challenges are based on assessment and observations that included: visits to the DEWS project sites, interviews of the beneficiaries; workshop attended by project stakeholders; discussions with the stakeholders and implementing partners; and telephone calls with organizations not covered by the interviews and visits. These findings also include the feedback of the CARE DEWS project staff.

The analysis of program activity accomplishments is based on the qualitative assessments to the quantitative data available from the project progress reports (including blogs) and discussions and interviews with the project beneficiaries, communities, project stakeholders, nodal agencies (BMD and DDM), and project management team, program participants and communities. These three approaches served to triangulate the information gathered. The questions framed to collect these qualitative information included whether the progress of activities was on target and what were the challenges and issues faced in the implementation of activities.

An elaborate set of questionnaires and checklists developed in accordance with the evaluation objectives. The data and information collection tools included a document study, interviews and visual examination through field visits. It included crosschecking results from different methods. The team specifically applied methodological tools that included: Consultations and Interviews, Focus Group Discussions (FGD), Key Informant Interviews (KII), Group Discussions (GD), stakeholder's workshop, visits to communities and telephone interviews. All evaluation instruments and list of stakeholders are provided at **Annex – 1**. Section 9 of the report has a complete list of projects and documents reviewed by ET.

SECTION 4 | PROJECT IMPLEMENTATION

4.1 CHRONOLOGY OF PROJECT ACTIVITIES

From the beginning of the project in September 2012 until its completion in December 2014 there have been a rough and tough journey involving challenges, constraints and surprises. The most challenging and time consuming as well was the GoB formal approval of the project requiring revisions twice of the original documentations while the political turmoil prevailed from end-2013 to early-2014 and frequent changes in policy making personnel may be excuses for delays to some extent. One surprising challenge and risk was the departure of the only technical partner at a crucial time. These challenges and surprises however did not preclude the involvement of interested project partners as the project received support and cooperation from them enabling the project to implement most of the pre-approval phase activities such as deployment of staff, completion of baseline survey, selection of beneficiaries, finalization of procurement process. Following is a list of key activities undertaken in the pre- and post-approval phases. The chronology of the project activities which CARE reported in its project documentations are illustrated in a Timeline of project activities and provided as an attachment (**Annex - 2**) to this report. Key activities and their status are presented in the table below:

TABLE 01: LIST OF KEY ACTIVITIES (SEPTEMBER 2012 – DECEMBER 2014)

ACTIVITIES	PRE-APPROVAL PHASE September 2012 to April 2014	POST-APPROVAL PHASE May 2014 to December 2014	COMMENTS
Staff recruitment and orientation	Completed		
Project documents (FD-6) Submitted to NGO Affairs Bureau	- Original submission in October 2012 - First revision submitted in February 2014 - Second revision submitted in March 2014 - Final approval in April 2014		Final approval by the NGO Affairs Bureau took almost 18 months.

Stakeholders (national level) briefing and consultation	Continued	Completed	
Stakeholders (local level) briefing and consultation	Continued	Completed	
Baseline survey	Completed		
FGD with fishermen	Completed		
Selection of targeted fishermen as per criteria	Completed		
Device review (include GSM enabled mobile handset) and device testing by the technical partners		Completed	
Technical Partner Review and Changing (include BanglaLink instead of AirTel)		Completed	
Device tested by Banglalink		Completed	
Conducted Cost Benefit Analysis (CBA)		Completed	
Conducted workshop with the stakeholders on CBA findings sharing		Completed	
Distribution of mobile device		Completed	
Establishment and Testing of fishermen boat tracking center		Completed	

4.2 CHALLENGES AND CONSTRAINS

As discussed in the foregoing section the implementation of this innovation project faced enormous challenges and constraints. Most of them were beyond the control of the project. The findings of the project challenges and constraints are depicting below based on the assessment and observations by the evaluation team.

→ Limited mobile network, at maximum, 20-30 kilometers from the sea shore. Restricted and limited access to long range network coverage.

→ Fishermen (nearly four-fifth of respondents) were not allowed the carry the radio on board by the boat owners during fishing in the sea. Radio is the only one way communication medium for early warning signal dissemination to the deep sea. If a boat returns for cautionary signal in rough weather condition, a boat owner loose his investment (BDT 1.2 lac[1] per trip). This is a tactic of the boat owners to keep the fishermen away from any warning messages.

→ Change of the key technical partner in the crucial time of the project – Airtel left the project with a great surprise. AirTel reportedly left the project in August, 2014 on the ground of its internal management crisis. It was the time when the project was completing delivery of the devices to the beneficiaries.

→ There were situations beyond the control of the project such as the political turmoil, changes in the GoB policy making personnel. Involvement several GoB ministries and departments takes time for formal approval of a project. An innovation nature of project with short life suffers most.

→ GoB disaster management policy restrictions - The Disaster Management Act 2012 restricted the scope of the project to disseminate the warning message directly.

→ Project Management challenges in terms of project risk analysis and stakeholder analysis and project partner engagement

→ Restricted/limited coordination and engagements of the Bangladesh Navy and Coast Guards who are equipped with long-range communication devices and could have provided alternative options to the project.

4.3 PROJECT PARTNERS AND COLLABORATORS

CARE has partnered and collaborated with numerous stakeholders at the national, district and community levels throughout the project implementation. As the lead CARE's responsibilities were to coordinate and ensure quality of implementation and monitoring, including selection, mobilization and participation of fishermen communities and integration of all other stakeholders and endorsements and relevant agreements. CARE was also responsible to oversee transfer of technological equipment to selected boats in cooperation with AirTel, Upazila Disaster Management Committee (UzDMC) and Union Disaster Management Committee (UDMC) and Boat Owners Association (BOA).

The initiative is planned to operate mostly where UzDMC and UDMC are already in existence. CARE in collaboration with CSRL was to lobby with relevant stakeholders to reduce

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[1] One Lac = 100,000

rates on use of GPRS technology for fisher communities; advocate for boat owners to adopt this new innovation and eventually acquire the necessary skills to operate, repair and maintain the devices. The key partners and collaborators and their roles and responsibilities are shown in the table below.

TABLE 02: DEWS PROJECT PARTNERS AND COLLABORATORS

ORGANIZATIONS	ROLES AND RESPONSIBILITIES
BMD	Focal point to provide weather forecasting and warning services with a lead time of 48 hours
DDM	Focal point for facilitating GoB approval for facilitating any project related to disaster risk management. Key government institution for dissemination and sharing of EW messages accurse the country through the defined channel of communication.
AIRTEL **(Left the Project in August, 2014)**	AirTel will provide technological support in terms of developing map server, water proof devices, repair and maintenance services, training modules and trainers to educate fishermen and institutions on implementing the people centered EWS. In association with Bangladesh Meteorological Department early warning messages will be translated into local language for dissemination to its subscribers with a lead time of 48 hours. The alerts will be disseminated through coastal towers as recorded warnings via the GPS enabled GSM Handset devices supplied to each fishing boat. This is a two way communication system in which the boats can also send an alert in the case of engine failure or pirate attack. The telecommunication service provider and BOA will track its position and forward the information to the Bangladesh Navy and Coast Guard to organize timely rescue missions.
BANGLALINK **(Joined the Project in September, 2014**	Instead of AirTel, Banglalink engaged in the project to provide SIM card and to facilitate GSM network coverage. They also established and tested the GPS based boat tracking system.
CSRL	CSRL will promote the new early warning system at community level and amongst local institutions, and advocate for the subsidization and withdrawal of taxes on the GPRS devices. They will undertake research based advocacy campaigns to inform effective and favorable policy-making in adoption of the system, both nationally and internationally
CPP	Sharing and dissemination of the cyclone warning messages through their 64, 000 volunteers accurse the country
BOA	Coordination and linkages with the fishermen and the boat

	owners.
UzDMC	Coordination and sharing of the information with upazila administration level and with upazila disaster management committee members according to the government SOD
UDMC	Coordination and sharing of the information with union and village level and with union disaster management committee members according to the government SOD

These relationships like any have had their ups and downs, but seem to be working well. There is a need to promote greater integration of DEWS with national forecasting systems disseminated by the BMD, a dialogue needs to be promoted between the BMD and DDM to demonstrate and assure them of the benefits of DEWS. Outreach and advocacy should occur and the relevance of DEWS for the coastal fishermen should be encouraged. National agencies such as the Coast Guards, Bangladesh Navy should become more involved in the planning stage and implementation. CARE also held discussions with the Regional Integrated Multi-Hazard Early Warning System (RIMES) and the GoB Comprehensive Disaster Management Program (CDMP) to explore collaboration on technical and programmatic matters of this innovation project. Under the current phase of CDMP (CDMP-II) RIMES and BMD have undertaken a 12-month project (January – December 2014) for development and piloting of weather radio system for warning dissemination to fishermen at sea. A series of meetings were held between CARE and RIMES on technical matters of the project.

SECTION 5 | PROJECT MANAGEMENT

5.1 GENERAL MANAGEMENT

CARE has employed a decentralized approach appropriate to the overall management of this innovation project under direct guidance of the CARE Bangladesh Emergency Response and Preparedness Coordinator (ER&PC) based in the CARE country head office in Dhaka. The ER&PC is supervised by the Assistant Director (Program). In the field in Cox's Bazar the team responsible for implementation of the project was consisted of a Program Manager, a Technical Officer – Knowledge & Documentation and a Community Organizer. The project received management support and assistance from the CARE in-house management team (including HR, Finance, and Training) in Dhaka for project creation and closing, financial monitoring, subcontract management, and recruitment. The DEWS project has obtained a significant advantage from the work ongoing (SHOUHARDO II) and previously conducted by CARE in the coastal area. The evaluation team during various meetings and conversations held in the field has received positive feedback on the field staff interaction with fishermen, boatmen, local communities and stakeholders.

5.2 MONITORING AND EVALUATION

The DEWS Monitoring, Evaluation and Learning (MEL) includes tracking of project progress and performance and uses various tools such as blogs, project implementation review,

baseline study, interim progress reports, case studies, phase-out plans and project completion report. The ET found from the project records that these were submitted on a regular basis to concerned recipients. Documentation of lessons learned and best practices have been a key M&E component. Results from the program are disseminated within and beyond the program partners through the Blogs and other information-sharing networks and forums. The Technical Officer – Knowledge and Documentation was assigned for the preparation and submission of the above reports as part of the monitoring process. Project activities reported in a chronological order in a single document is found to very useful to know at a glance what have happened throughout the project period.

The ET found that there was no feasibility assessment of the project conducted. This would have been useful, especially for the technical aspect of the project. Pending approval of the government, the project engaged human resources for some activities. The team notes that further field team involvement in fishermen community mobilization, as well as systematic community risk reduction and capacity building could have increased the effectiveness of the project intervention. There were opportunities for the project to carry out several community based activities like conducting systematic participatory vulnerability and capacity analysis involving the fishermen.

SECTION 6 | LESSON LEARNED

6.1 LESSONS LEARNED

Lessons learned associated with the performance or other dimensions of the innovation that the DEWS project has worked on are as below:

→ EWS is a dynamic innovation. Given many challenges and constraints the impact of the innovation could not be seen during project life but it showed promises for effective interventions in future.

→ Innovations in DRR for poor and vulnerable communities are beyond the cost effectiveness as they deal with saving lives and livelihoods of these target communities.

→ Formal approval from the NOG Affairs Bureau of the Government of Bangladesh is always a key to the on-time and smooth implementation of a project that in particular requires involvement, resources and clearance of the national, regional and local level departments and administration. The process is not so smooth and quick which once again evidenced in the NGO Affairs Bureau approval of the DEWS project. Taking the example of this DEWS project there appears to be five different ministries and their respective departments[2] are involved in the approval and implementation of the project.

→ Before application of any new ideas or technologies, both GO and NGO collaboration and integrated approaches by all concerned stakeholders need to be ensured otherwise all efforts to devise any practicable and pro-poor technology will be fruitless.

→ Partners' hidden agenda on contrary impact accomplishments of project objectives. In order to promote humanitarian innovative system, technical partner and private sector's involvement with sincere humanitarian commitment beyond their business interest is very important. It is highly necessary and important to assess their interest and commitment for humanitarian perspective before their engagement as partners.

→ Overall the distribution of mobile devices to the fishermen/boatmen has generated an interest to the rest of the fishermen communities in the area. This is a positive achievement.

→ In an innovation process, learning often comes from the unexpected, and unanticipated results may function as a spring board for further innovation and scaling up future intervention. A well-functioning project monitoring system with capitalization and knowledge management process, which goes beyond simply recording predetermined outputs, is thus essential.

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[2]Department of Disaster Management under Ministry of Disaster Management and Relief, Bangladesh Meteorological Department under Ministry of Defense, Department of Fisheries under Ministry of Fisheries and Livestock, Bangladesh Telephone Regulatory Commission under Ministry of Telecommunication, NGO Affairs Bureau under the Ministry of Social Welfare

SECTION 7 | FINDINGS AND RECOMMENDATIONS

The key evaluation findings followed by the recommendations are based on analysis of the qualitative available from the project progress reports (including blogs) and discussions and interviews with the project beneficiaries, communities, project stakeholders, nodal agencies (BMD) and project management. These three approaches and the quantitative survey information served to triangulate the information gathered. The questions framed to collect these qualitative information included whether the deliverables and outputs were on target and what were the challenges and issues faced in the implementation of activities.

7.1 PROJECT DELIVERABLES AND OUTPUTS

Discussions: DEWS project envisioned a total of eight project deliverables/outputs. The ET review findings on the progress made of these deliverables/outputs are presented in the matrix below:

MATRIX: STATUS OF PROJECT DELIVERABLES/OUTPUTS

DELIVERABLES/OUTPUTS	IMPLEMENTATION STATUS	SOURCE OF VERIFICATION/ ANALYSIS WITH REMARKS
Vulnerabilities and capacities of targeted fishing communities documented	→ Vulnerabilities and capacities of the targeted fishing communities are documented through a baseline study and case studies. → No formal VCA was conducted	→ Baseline report → Case studies → Quantitative Survey, FGD and KII by Evaluation Team The selection criteria for the fishermen were: → Extreme poor with low income fishermen who have a valid fishing license to catch fish in the sea. → Fishermen who had experience on natural disaster (mainly cyclone and tidal surge), piracy, and robbery in the sea during their fishing period. → Level of knowledge, capacity and willingness to be able to access digital early warning system/technology

DELIVERABLES/OUTPUTS	IMPLEMENTATION STATUS	SOURCE OF VERIFICATION/ ANALYSIS WITH REMARKS
300 boats equipped with GPS enabled GSM Handset devices and fishermen receive early warning messages and capable to send alerts in the event of an emergency	→ 300 fishing boat received GPS enable GSM mobile device → Fishermen receive early warning message (from 20-30KM from the sea shore towards deep sea along 160 KM of coastline from Cox's Bazar to Mongla → Fishermen are and capable to send alert in the event of an emergency within the same frequency	→ Master role → Tracing centre data → End line analysis: capable to send alert if the network is available The selection criteria for the boat were: → Small and or medium size boat that can't navigate beyond 100km from the sea shore. → Suitability to install EW equipment in the boat. → A boat usually carries 10-15 fishermen for fishing in the sea. → Quantitative Survey, FGD, Stakeholders workshop and KII by ET
Local fishing communities and 3,000 fishermen report having developed knowledge and skills on the effective use of EWS technology and early warning information	→ Indirectly about 3,000 fishermen developed knowledge and skills on effective use of EWS technology and early warning information. Considering that 10 fishermen in each boat received benefit of the mobile device and EWS technology	→ No formal training received → End line analysis: capable to send alert if the network is available → Quantitative Survey, FGD and KII by ET Considered that one mobile device in each boat will be used by sharing among 10 fishermen in an average
Capacities of community platforms and CPP strengthened and linked with relevant multi-disciplinary bodies to facilitate effective and efficient people centered EWS and corresponding response and preparedness	Community platform created: → Boat Owners Association (BOA) Linkages created with relevant multi-disciplinary bodies:	→ Meeting records → Blogs → Case Study → Stakeholders workshop, FGD and KII by ET

DELIVERABLES/OUTPUTS	IMPLEMENTATION STATUS	SOURCE OF VERIFICATION/ ANALYSIS WITH REMARKS
	→ CPP, UzDMC, BDRC, etc.	
Capacity of local disaster management committees and local administration strengthen to better coordinate and monitor effectiveness of EWS and corresponding response and preparedness	Following local disaster management committees and administrations are informed, sensitized and coordinated: → UDMC → Department of Fisheries → DDMC → BMD Cox's Bazar	→ Meeting records → Blogs → Stakeholders workshop and KII by ET
Fishermen report having access to information, at least 48 hours in advance, on rough sea events, critical weather updates, and information on fishing zones (important for their livelihoods), provided through community platforms	→ Fishermen access information from Bangladesh Metrological Department (BMD) hotline IVR number: 10941 → Fishermen access weather forecast and cyclone preparedness message through radio (FM, Shortwave and Medium wave)	→ Quantitative Survey, FGD and Stakeholders workshop by ET → Project Completion Report
MEL workshops and meetings are facilitated and best practices documented and disseminated	→ No formal MEL workshop but regular meeting and sharing with the project partners (BMD, Airtel, BOA, BanglaLink etc) → Leanings are documented and disseminated through HIF monthly blogs	→ Project documentations → Blogs
Evidence based advocacy efforts are materialized through learning dialogues, workshops and seminars, to raise awareness at sub-national and national levels amongst fishing communities, GoB and the private sector.	→ Advocacy with relevant GOB through meetings and sharing project progress and issues (Sharing of cost-benefit analysis),	→ Internal meeting records Mainly due to limited GSM network coverage, broader advocacy of the digital early warning system were not carried out.

DELIVERABLES/OUTPUTS	IMPLEMENTATION STATUS	SOURCE OF VERIFICATION/ ANALYSIS WITH REMARKS
	→ Regular advocacy and work with BMD for regular update and functioning of the hotline IVR number (10941) for weather forecasting information. → Advocacy initiative are not carried out formally (mostly on adhoc basis)	

Findings: All but one of the deliverables, evidenced based advocacy, has made reasonable progress. There have been advocacy with relevant GOB generally through meetings. These were found to missing the process that project was referring to for the evidence based advocacy efforts through learning dialogues, workshops and seminars, to raise awareness at sub-national and national levels, amongst fishing communities, and the public and private sectors. There are no mentions of gender marker in the project deliverables/outputs.

Recommendation #1: Advocacy shall be well defined and clear monitoring mechanism and indicators need to be in place. Evidence based advocacy mechanism need to be put in place during implementation of such innovative project so that diffusion of innovation could be smoother.

Recommendation #2: Vulnerability and Capacity Assessment (VCA) shall be conducted in an appropriate way involving the fishermen community and by using participatory tools.

Recommendation #3: Gender marker need to be applied and considered in all aspects of the project designing and implementations.

7.2 DIGITAL EARLY WARNING SYSTEM APPROPRIATENESS

Discussions: A completely water-proof, low-cost telecommunications systems linked with GPRS for fishing vessel tracking and early warning dissemination has been included in the DEWS project to:

→ Provide the poor fishermen access to the forecasts of rough sea events much sooner than normal and communicate warning messages 48 in hours advance; and

→ Precisely locate capsized and/or vessels in distress to allow for more efficient rescue services.

This was triggered by the successes of the pilot conducted in 2011 by AirTel Ltd., CARE, CSRL/Oxfam, and Centre for Global Change (CGC) to test an initial prototype Vehicle Tracking System (VTS).

In 2011 Pilot project was based on a survey conducted by AirTel in November 2010 in Cox's Bazar on the risks and needs of local fishermen and boat owners. The key findings of the survey were: loss of boats during bad weather and the cost to replace one boat is between BDT 1,500,000-4,000,000 (GBP12,500-33,000); no storm alert system on the boats, only often unreliable radios; incidences of kidnapping and killings of fishermen by pirates; payments of ransom by boat owners to pirates between BDT 50,000-100,000 (GBP 400-800) to recover boats; and interests and willingness of the boat owners in install and use of EWS technology on their boats.

The Pilot project in 2011 had targeted 50 deep-sea going fishing vessels to test the VTS technology in Cox's Bazar marine belt. The pilot illustrated the following results based on which the DEWS project was designed in 2012.

→ **Fleet Tracking:** Fishermen could identify, track, and see all fishing trawlers up to 113 km from the shore.

→ **Weather News:** Fishermen were able to listen to weather updates up to 3 times a day during their fishing in the deep sea. The BMD Daily Weather Bulletin was translated into voice (IVR- Interactive Voice Recorder) and disseminated to vessels (normal radio frequency does not reach out to deep sea)

→ **Emergency Help & Rescue Service:** Every vessel was equipped with an SOS button messaging system and fishermen were able to generate an automatic voice call upon pressing the SOS switch on the equipment, able to communicate directly with authorities.

→ **Web Based Portal:** Implementers were able to log on to the web portal in the system using their login ID, and watch the position of vessels at any given point in time, something that the boat owners can also do.

Findings: Appropriateness of the EWS was assessed with respect to the project beneficiaries and stakeholders' awareness of, perception on, level of trust in, and support/benefits of the new system. The EWS was found to be appropriate for the fishermen for the reasons that the system is practical with respect to their needs. All of the focus group members stated about their awareness of new mobile network technology which were distributed to 300 boat owners. They had the notion that with this mobile phone they would be capable of receiving early warning messages about cyclone, tidal bore etc, as well as they would be capable of transmitting messages about their threats from armed pirates and risks and common diseases they face in the deep sea. Some of them could use the IVR # 01941 to get the weather signals/ message and some of them could see location of missing fishing boats in computer screen provided those fishing vessels were all within 20 to 25 kilometers from coastline to sea.

Responses from 175 fishermen/boatmen beneficiaries as shown in the **Figure-1** about their perception of the new early warning technology were that most of the fishermen 146 (83%) are interested about the use of mobile technology irrespective of their buying capacity. As few as 17 (10%) appeared to have been indifferent or deferred from passing any comments about positive outcome of new mobile technology.

In response to the question on the level of confidence in the new technology more than two-thirds of the fishermen (70%) expressed between high to full level followed by about 30% of fishermen reporting medium level of trust on the new early warning system. One half of the respondents acknowledged receiving message on cyclone and tidal bore while they were within the network of the EWS device. The network coverage reportedly supports communications within 25-kilometer radius of the base station antenna.
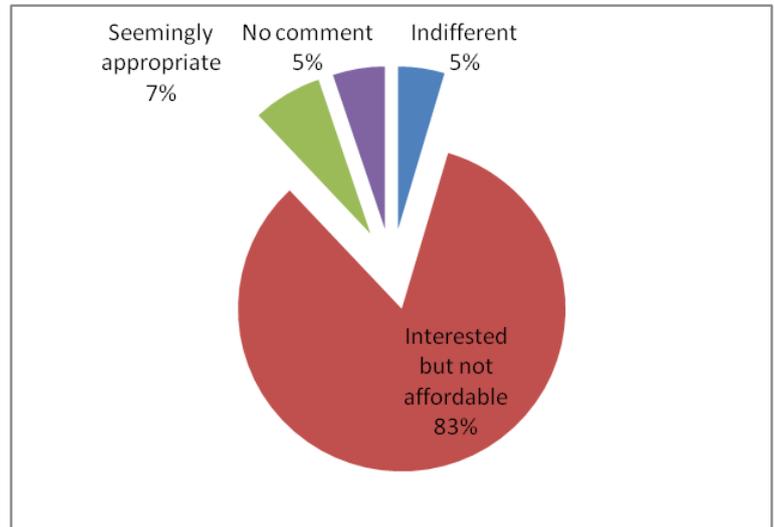

FIGURE 1: FISHERMEN PERCEPTION ABOUT NEW EWS

Most of the fishermen (69.7%) found it difficult to understand the English menu/message in the mobile device as they virtually have no schooling. They need devices compatible with Bangla key-pads/interface. Over 30% of respondents reported that the skin-touch mobile device is delicate to handle and sensitive to salty sea water.

Recommendation #4: A customized system with respect to the targeted community need to easy understand the early warning test messages. A user-friendly and saline water resistant mobile set compatible with communicating messages in Bangla would be a better device for the fishermen in particular those having with no school education.

7.3 DISASTER RISK REDUCTION AND PREPAREDNESS

Discussions: As mentioned in the DEWS project proposal that the risk knowledge, technical monitoring and warning service are the responsibilities of the government. Among the BMD-issued weather messages and warnings the cyclone warnings and messages are carried out by the CPP with the support of DDM for general communication and dissemination at community level. Studies show that the global warming results in adverse impact on the lives and livelihoods of coastal fishermen. The fishermen communities are highly vulnerable due to limited access to the services and lack of diversified opportunities for their livelihoods. Thus one of the DEWS project deliverables, **"fishermen report having access to information, at least 48 hours in advance, on rough sea events, critical weather updates, and information on fishing zones (important for their livelihoods), provided through community platforms",** has been proposed to address the basic key elements associated with effective and efficient people-centered early warning systems to include: risk knowledge, technical monitoring and warning service; and communication and dissemination of warnings and community response capacity. While the work carried out by the CPP is extensive there is no existing mechanism to reach out to fishermen at sea and monitor their whereabouts. The

DEWS innovation aimed at the fishermen communities for advanced proactive preparation for rough weather events to help minimize loss of lives and livelihoods and reduce the need for emergency assistance and post-disaster rehabilitation.

Findings: Fishermen awareness and capacity to respond to unplanned and unexpected events, i.e., cyclones, storms, surges, pirate attacks, etc. were assessed with respect to the effectiveness of new mobile technology in terms of present usefulness in providing early warning messages on weather and other ensuing natural disasters in the deep sea faced by fishers/boatmen on fishing vessels and how the challenges/constraints project faced and addressed. The digital early warning system has been a timely device to save the lives and properties of fishermen and boatmen who go to the deep sea for fishing for an average 11.3 days (**Table – 03**). Nearly 51% of them spend less than or equal to 10 days, 48% spend 11 to 15 days and 2% stay more than 16 days.

TABLE 03: DURATION OF STAY IN THE SEA FOR FISHING

Duration of Stay in the Sea	Number	%
=<10 Days	89	50.9
11-15 Days	84	48.0
16+ Days	2	1.1
Mean Duration of Stay in the Sea	**11.3 days**	

An analysis of the fishermen's knowledge about application of mobile devices (75% of 175 respondents are aware that they can communicate with boat owners for help. Of the 175 respondents: 65% can easily communicate with other fishing boats; 23% can communicate with family during illness; and 14% can learn about weather messages) and the threats and risks faced by them (41% reported cyclone/tidal bore, 39% face technical/mechanical problems and 14% attacked by pirates) show that the most fishermen are aware of use of these devices at the time of their needs (**Figure – 02**). Verbal and anecdotal evidence collected by the ET from field interviews and general discussions with communities support that the possession of EW device and knowledge and skill of its
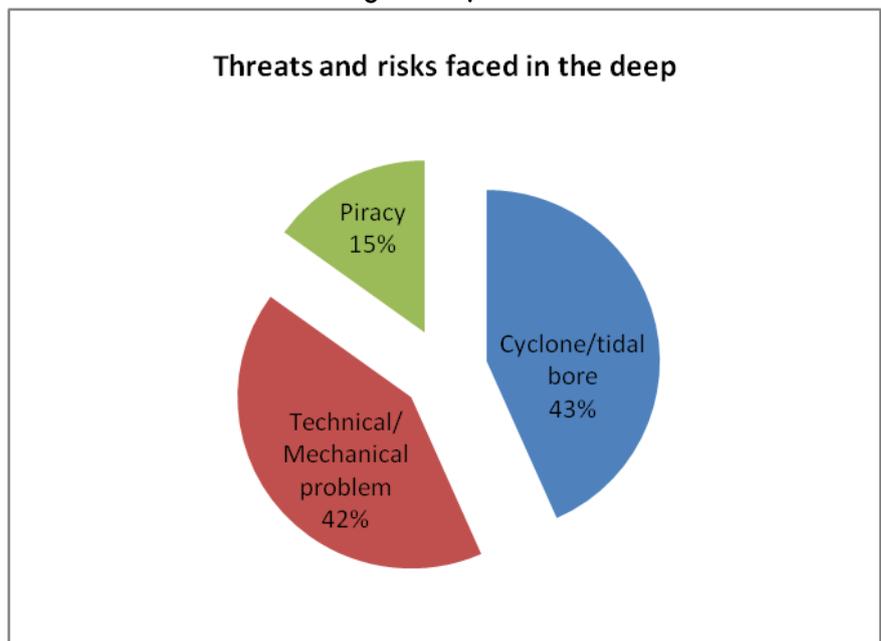

FIGURE 2: THREATS AND RISK FACED IN DEEP SEA

application help minimize loss of lives and belongings, meaning the fishermen are better prepared to respond to disasters.

Fishermen/boatmen reported communicating with their boat owners and family members while the fishing vessels are within the range of mobile network. They can seek help or protection from members of other fishing boats if the boats are within the close range of mobile network. All these show that DRR aspect of the project was effective because of their practicability. However the sustainability of the preparedness is subject to the community DRR plans to be enhanced through increase in risk knowledge, strengthening of monitoring and warning services, dissemination and awareness raising, effective and accessible communication and increased response capability. The DEWS project envisioned that these actions will be made possible through systemized coordination and collaboration and establishment of relevant and necessary linkages and will thus require providing formal training to all beneficiaries. The quantitative survey shows a low progress of training (18% of 175 respondents) provided to the project beneficiaries on DRR/EW. One half of these trained beneficiaries know how to get weather message through IVR # 10941.

Recommendation #5: In order for sustainability of the preparedness the community vulnerability assessment and risk reduction plans shall be enhanced through systemized coordination and collaboration and establishment of relevant and necessary linkages which the project has envisioned.

7.4 PROJECT PARTNERSHIP AND COLLABORATION

Discussions: The effective coordination among program implementing partners has been assessed by examining the working relationship and collaboration amongst them. Refer to the Section 4.3 - Project Partners and Collaborators under Section - 4 of the report.

Findings: With reference to the findings of project partnership and collaboration discussed under Section 4.3 there is a need to promote greater integration of DEWS with national forecasting systems disseminated by the BMD, a dialogue needs to be promoted between the BMD and DDM to demonstrate and assure them of the benefits of DEWS. Outreach and advocacy should occur and the relevance of DEWS for the coastal fishermen should be encouraged. National agencies such as the Coast Guards, Bangladesh Navy should become more involved in the planning stage and implementation. The strengthening of interactions between agencies and CARE is possible if prior meetings, programs and sharing of activities are scheduled. The project can focus on local nodal agencies and support them to coordinate. Empowering the local agencies makes a difference and this should be strengthened in future projects. The planning meeting with all stakeholders held prior to the launching of the project is an extremely effective way of ensuring support for a project and in maintaining project direction and pace. There were as usual a few complaints/weaknesses and suggestions recorded by the survey respondents. They are: project designed without consultations with potential partners; lack of interest of project partners in project implementation; formalize roles and responsibilities among the partners as appropriate and work according to the agreed terms and conditions.

Recommendation #6: If there is to be a future DEWS or the like it is recommended that more efforts are made to engage all national agencies in at least supporting the project in principle. Although being fully supportive would be preferable. Possibly this could be made a prerequisite for joining the project. Another possibility is for more extensive partnership with NGOs involved in emergency response programs. Whatever agencies are involved they must

lend their policy support and authority to enable maximum penetration of the program to encourage future sustainability.

7.5 MOBILE DEVICE NETWORK AND OUTREACH

Discussions: Building on experiences in the 2011 Pilot implemented by Airtel in the Cox's Bazar Coast the DEWS innovation project included Fleet Tracking (Discussed in Section 7.2 – EWS Appropriateness) intervention to identify, track and see all fishing trawlers up to a horizontal distance of 113 kilometers from the shore.

Airtel continued its technical support through identification of an appropriate mobile device and extended services for use for communication of messages via their eight telephone antenna towers located along the coast. With technical assistance of Airtel the project provided 300 GPS-enabled GSM handsets to the targeted fishing boat owners who engage fishermen for fishing in the deep sea. The boat owners, fishermen and project field staff received orientation on the operation of the device.

Findings: The main concern raised by the most interviewees/respondents during the evaluation process was, 'We gained knowledge and received devices. What do we do with the device? The second question is surrounding the communication reach beyond the mobile network. Generally the beneficiaries armed with the device which is not useful while they are outside the range of the mobile network. The project refers to coverage of a horizontal distance of 113 kilometers while the fishing zone covers from 25 to 200 km perpendicular to the shoreline (**Figure -03**).

RIMES in its project document states that the GSM network communication coverage is at maximum of 35 kilometers radius of the base station antenna. The radius could be more than double when the device is provided with an extended cell. Refer to the discussion about RIMES activity at Section 4.3 of the report.
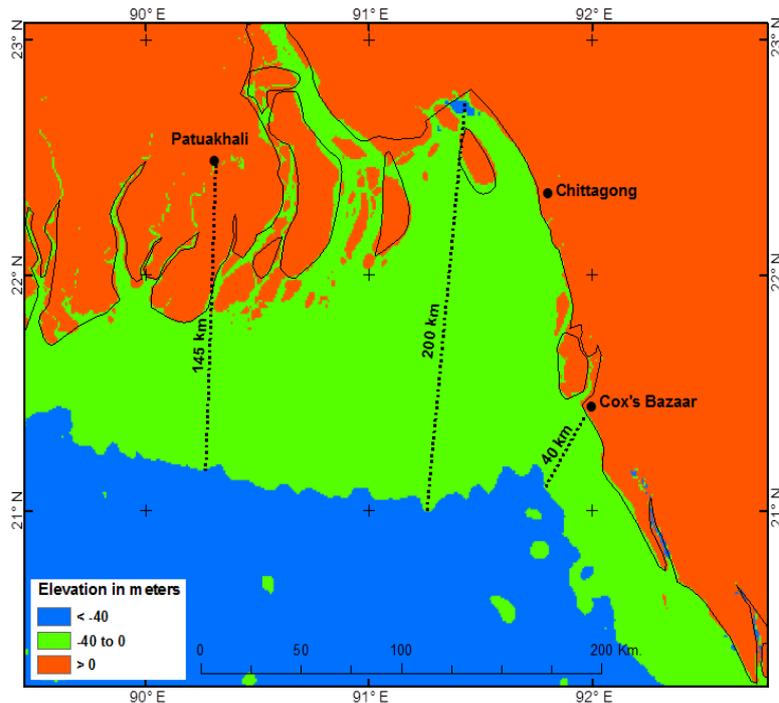

FIGURE 3: FISHING ZONE

Both quantitative and qualitative surveys show that the EWS mobile device was found to be fully functioning in the sea at maximum of 20 kilometers from the shore while fishing boats travel to an average distance of 207 kilometers from the shore to the sea (**Figure – 04).** Majority of the respondents (79%) go to the sea between 31-100 kilometers and 13% sail between 15-30 kilometers.

The ET could not establish the accuracy of this travel distance as these are based on fishermen's hours of travel from shore to sea and vice-versa. These distances are not perpendicular to the shore as the boats normally do not travel straight in the sea.
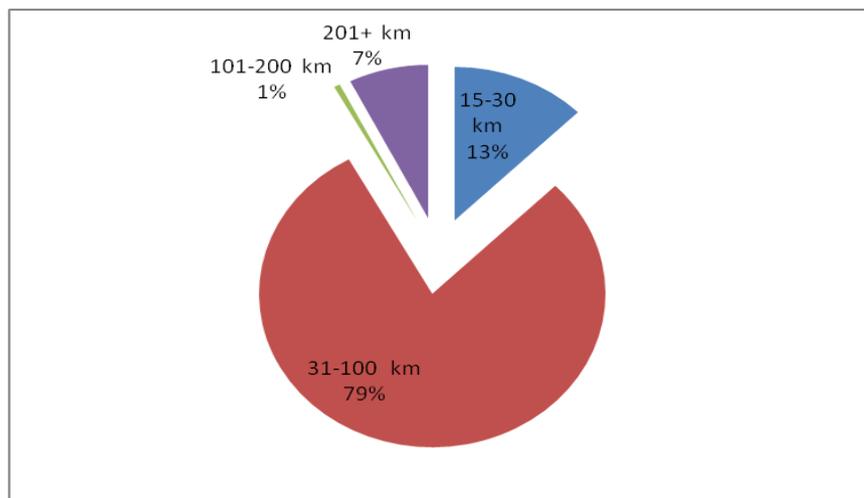

FIGURE 3: FISHERMEN TRAVEL DISTANCE FROM SHORE

Respondents of the KII and FGD participants suggested improved efficiency for tracking and communicating of digital early warning messages. The quantitative survey findings, presented below **(Table – 04)**, support these findings.

TABLE 04: SUGGESTIONS FOR IMPROVED AND INCREASED DEWS NETWORK COVERAGE

Suggestions for improved efficiency	Number	%
Increase the capacity of network technology	161	92.00
Installation of tower/floating tower in the deep sea	112	64.00
Provision of wireless set	28	16.00
To follow/adapt the wireless technology used Indian fishing boats	15	8.57

Most of the fishermen (92.0%) suggested increased capacity of network technology and 64.0% of the fishermen suggested for installation of tower in the deep sea followed by 16.0% and 8.6% of the fishermen with the provision of wireless set and adaptation of wireless technology used by the coastal fishermen in the neighboring countries (Myanmar and India) while they go for fishing in the Indian Ocean.

Of the two most common technologies available for dissemination of information, mobile (GSM) and radio communications, and the former has limited network distance coverage (at most 35 kilometers) and extension of this network reach involve capital cost. The latter technology of communication is done by a weather radio for broadcasting weather reports and emergency information in a very high frequency range, normally with a radius coverage of up to 320 kilometers. This radio communication technology was proposed in the RIMES project under which the Chatty Beetle technology, a two-way messaging system, was included for warning dissemination to fishermen at sea. Lately RIMES decided not to procure the device since it is at its demonstration stage. Instead RIMES is planning a new proposal to the

prospective and interested agencies on an alternative device technology similar to the Chatty Beetle.

Both technological (discussed in the foregoing paragraph) and legal (discussed in Section 4.2) aspects are important as the former refers to a viable and cost-effective technology and the latter refers to the adaptation of technology as permitted by the GoB policies and procedures. There have been reports of the growing concern of illegal use of communication devices. One very interesting finding is that none of the 175 respondents (fishermen) has the national identification (NID) card. An identity card is very important as it is prerequisite for accessing to and availing of public and private services and benefits such as bank loans, mobile SIM card purchase. The mobile SIM card is one of the means of receiving early warning messages, particularly for DRR capacity building of the poor and vulnerable fishermen. On the other hand no possession of NID cards lead to illegal collection or purchase of mobile SIM cards thus leaving rooms for illegal use.

Recommendations #7: An affordable wireless technology has to be innovated in future to make this mobile set more powerful and capable to receive and transmit message from long distance in the sea. The technological aspect such as the type of technology shall be explored and ensured from the cost-effectiveness and viability perspectives and the capacity and interest of the technical partners in the implementation of the project. With respect to the adaptation of the technology, the system of the device shall be compatible with the GOB laws and policies (e.g., Disaster Management Act 2012) and linked with the relevant government departments (e.g., DDM, BMD, BTRC).

Recommendation #8: In order to ensure the legal use of the technology there shall be risk analysis before designing the project in future and according to risk analysis the project shall develop the controlling mechanisms and monitoring procedures.

Recommendations #9: Take initiative to talk to CARE-India about the efficacy of Indian wireless network technology used for the Indian Ocean.

Recommendations #10: Explore how different radio frequencies are provided by the Bangladesh Telecommunication and Regulatory Commission (BTRC). How the Coast Guard and Navy can share their communication frequency for humanitarian needs of the vulnerable fishermen community? Advocacy, strong linkages and partnership shall be set up with those authorities.

Recommendation #11: Explore how small fishing boats can access to warning message communication system and services of the large and mechanized fishing trawlers those are equipped with long range communication devices.

SECTION 8 | THE ROAD AHEAD

8.1 THE WAY FORWARD

The final question (and what might seem like the most pressing) is **'What is next?'** The process of innovation is dynamic, and the end of a HIF grant may be just the beginning of a longer innovation process.

DEWS has created a publicity of innovative warning devices in the coastal fishing communities and other relevant stakeholders interested in developing more effective community response to disasters. However any extension

> "Most innovations don't change the world, and learning from failure is essential to successful innovation in the long-run" – HIF

of DEWS or the project the like would have to show a greater degree of growth and sustainability. In order to maintain the current impetus and fledgling sustainability and to encourage wider penetration of the DEWS concept and greater self generating sustainability the evaluation team recommends that serious consideration to providing a follow-on project and such project should be extended to other coastal areas in the country. The following steps are recommended for an innovative project:

→ On the ground research and feasibility study will require on technological aspects of the project with a view to look for who is doing what, what are the available technology, how the targeted community in neighboring countries getting two way communications support etc.

→ Capitalization and documentation of the lessons learned, especially capturing the process documentation.

→ Advocacy with the concerned government ministries and agencies for endorsement for adaptation of innovative technologies in the main stream of development.

→ More importantly explore the partners experienced in the implementation of innovative interventions in and outside the country.

8.2 CONCLUSIONS

Despite numerous challenges and constraints the DEWS project has made reasonable progress its sociological aspects - familiarization of new technology and awareness on DRR building. Increasing the network reach is essential for optimum benefit of the technology by the poor and vulnerable fishermen.

CARE's strong relationships with many of the public and private sectors, national and international agencies, and national and local level project stakeholders will greatly assist in the effective

> "SEA IS OUR LIVES & LIVELIHOODS, IT GIVES MORE, TAKES LESS" – *Fishermen from Cox' Bazar*

implementation of innovative projects targeted for the most food insecure and vulnerable populations in Bangladesh.

All partners and stakeholders we communicated with were fully supportive of DEWS, thought it was worthwhile, useful and helpful and all wanted more in some form or another. Eventually, the larger mobile network coverage would have made the early warning system mechanism more effective.

SECTION 9 | ADDENDUM

REFERENCES

ANNEXES

Annex – 1: Data Collection Instruments (questionnaires and checklists)

Annex – 2: Timeline of the Project Intervention

Annex – 3: Quantitative Survey Report with Analyzed Data

Annex – 4: Summary of the Stakeholder Workshop, FGD and KIIs