AGROMETEOROLOGICAL ADVICES FOR SUSTAINABLE AND ADAPTIVE FARMING IN CLIMATE VULNERABLE AREAS OF BANGLADESH

Jannat, F.1, Chakraborty, T. R.2 and Akter, M. P.3

ABSTRACT

Climate vulnerabilities in Bangladesh resulted significant changes in agriculture. The traditional cultivation practices are struggling to cope with this climate challenge. Targeting sustainable and climate resilient agriculture, Oxfam and Monash University have been implementing the project called Participatory Research and Ownership with Technology, Information and Change (PROTIC) since 2015 in the Char land, Coast and Haor where female farmers of the community are equipped with smart phones. Information on sustainable and adaptive agriculture is being provided through SMS, OBD, IVR and Call Center. Agro-meteorological advisory services were found very useful to them in terms of preparedness and protecting assets. The technical limitation of providing local context specified agro advice to the community has been a challenge for the project.

Introduction

Increased climate change and different weather variability has elicited reduction of agricultural yields and increased vulnerability. Bangladesh has total of 30 agro-ecological zone with huge diversified ecosystem and cultivation and adaptation practices. The increased variation in weather/monsoon patterns challenges the in-built traditional patterns and ability of farmers to take any strategic agricultural practice decisions which curved up the interest towards climate change adaption agricultural information/solutions. This growing interest and easy availability of mobile phones and network service created an opportunity for sharing sustainable agriculture information among the farmers. Oxfam in Bangladesh and Monash University have been implementing the project PROTIC since 2015. It has been initiated to develop a knowledge hub for female farmers that disseminates weekly information on adaptive and sustainable agriculture viz. agrometeorological advices through SMS. This following research is an initiative of portraying the role of agrometeorological advices in promoting sustainable and adaptive agriculture practice in climate vulnerable areas of Bangladesh.

Method

The process of developing an effective agrometeorological content was documented based on the direct observation from the project activities. The effectiveness and the user potential of the advisory services was consulted with the project beneficiaries also considered as the animators of the project who are trained on the participatory action research tools. They are the rural female farmers and half of them are illiterate. To set the criteria of justifying the effectiveness of the services they use the major benefits of warning services as indicators, viz., (1) Scope of preparation for action, (2) Loss reduction, (3) Lead time, (4) Assets protection. For this study, in all three areas the 12 people who entered first to the venue for the monthly meeting of July were interviewed. They followed a numerical scale (from -5 to +5) to assess the effectiveness of the agrometeorological services [Table 1]. The value was calculated based on the following formula;

\[ \text{Usefulness} = \text{Number of Response} \times \text{Score on the Numerical Scale} \]  

Table 1. Numerical Scale to Assess the Effectiveness of Agrometeorological Services

<table>
<thead>
<tr>
<th>–5</th>
<th>–4</th>
<th>–3</th>
<th>–2</th>
<th>–1</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unacceptable</td>
<td>Very Bad</td>
<td>Bad</td>
<td>Fairly Bad</td>
<td>Somewhat bad</td>
<td>Neither Good nor Bad</td>
<td>Somewhat Good</td>
<td>Considerable</td>
<td>Good</td>
<td>Super</td>
</tr>
</tbody>
</table>

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Findings

Agro-diversity

Community has identified that there is a growing need of both spontaneous and planned adaptation. The crop diversity has been decreasing but some new species and verities were discovered as well. In Dimla, around fourteen crops are being cultivated and around eighty farmers from PROTIC animators are only cultivating paddy, maize, wheat and pumpkin etc. The diversity of the homestead cultivation is increasing. And, in Shyamnagar, the cropping pattern has been shifted intensely. Although due to climate change the agrarian community is being shifted to fishery viz. shrimp cultivation, community is still cultivating sixteen crop species.

Agrometeorological Service

To sustain the increased variation in weather/monsoon patterns, there has been a lot of efforts of disseminating agrometeorological advices following the current weather trends. For PROTIC, the target audiences of the project get a regular weekly agrometeorological information. The regular early weather warning from Bangladesh Government is being blended with the situation of standing crop being shared with the female farmers through SMS from PROTIC [Figure 1]. For example, if there is a possibility of heavy fog, along with the weather warning, there will be advice to the farmers to cover their crops (that gets damaged due to fog).

Usefulness of Agrometeorological Service

Preparedness prior to any event is the most supported response from the community as the reason behind the usefulness of agrometeorological services in PROTIC. It gives them information to prepare beforehand regarding cultivation and other livelihood activities and common preparations like collect and store firewood, food and clothes in a safe place to fight the disaster itself as well. One of the participants has shared that in terms of preparedness agrometeorological information is considerable. There were also responses which shows that it can protect area resource investment and reduces crop loss. On the other hand, the lead time in the agro-meteorological services of PROTIC had the lowest ranking among the indicators. According to the community a service advice for one week is not enough to plan the cropping season. While comparing the response variation in three different areas, it is visible that Dimla shows less variation in their response than other two areas whereas Tahirpur has the most diverse response (described in Figure 2 explanation) [Table 2].

Figure 1. Development Process of the Agrometeorological Services
Table 2. Community Responses on the Usefulness of Agrometeorological Service

<table>
<thead>
<tr>
<th></th>
<th>Dimla</th>
<th>Shyamnagar</th>
<th>Tahirpur</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparedness</td>
<td>(6<em>5)+(6</em>4)</td>
<td>54</td>
<td>(12*5)</td>
<td>55</td>
</tr>
<tr>
<td>Reduce Loss</td>
<td>(6<em>5)+(6</em>4)</td>
<td>54</td>
<td>(10<em>4)+(2</em>5)</td>
<td>50</td>
</tr>
<tr>
<td>Time</td>
<td>(6<em>5)+(6</em>4)</td>
<td>54</td>
<td>(10<em>3)+(2</em>4)</td>
<td>38</td>
</tr>
<tr>
<td>Protect asset</td>
<td>(6<em>5)+(6</em>4)</td>
<td>54</td>
<td>(5<em>3)+(5</em>4)+(2*5)</td>
<td>45</td>
</tr>
</tbody>
</table>

On 9 December 2016, in Shyamnagar the animators of PROTIC received an agrometeorological advice stating, “This week there will be a deep fog in the river bank area, the day and night temperature will remain same. Deep fog may result in early leaf blight of potato. If you cultivate early variety please ensure balanced fertilizer and timely irrigation. If leaf blight symptoms occur irrigate using 2 gm reviroil per litter in 7 to 10 day intervals”. Following the information, farmers cultivated potatoes later than regular times and experienced better production of potato in Shyamnagar and got survived from a huge loss.

In terms of analyzing the responses of the different locations, there are slight differences noticed based on location pattern and behaviors. The importance of the defined indicators was decided by the people’s reaction towards disasters. For example, in Dimla, they have smaller number of sudden disasters. They experience similar disasters every year which influenced to shape their responses steadier than other areas. However, in Shyamnagar, they had quite a few experiences of sudden disasters like Aila and Sidr, so they find preparedness more important than any other things. And, for Tahirpur, they have lost so much asset due to flash flood, so, saving asset is more important for them and they think proper information to take preparation will help them a lot [Figure 2].

Figure 2. Variation in Community Response in Different Location on Agrometeorology

Scope and Challenges

Some challenges are identified in developing agro-meteorological contents. Firstly, only Bangladesh Meteorological Department (BMD) has the authority to provide basic weather forecasting and PROTIC has been blending the BMD weather alert with the growth stage of standing crop. To ensure effective information, the specific detail of the crop stage information with proper support of specialized and expert knowledge support is required which is very costly. For PROTIC, to develop content for a week it costs 19,400 BDT. Besides, the location-specific information is not available in the BMD data. For example, the BMD information for the south-west coast covers Khulna and Shyamnagar, but according to the local animators, the weather of the PROTIC project area which is on the Sundarban’s periphery varies from Satkhira township. In 2017, while producing the agrometeorological information for mango when there was heavy fog, the flowing of mango in Shyamnagar is nearly 2 week ahead then the core mango land Chapai Nawabganj. Animators identified that there are no similarities of the average growth stage of homestead crops including vegetables in the three locations of PROTIC.

Moreover, the project expected a wider impact of the disseminated advices that were send to the community, but the mobility of the information from the device owner to the others was quite slower than expected. Four non-animator male farmers out of 10 in Shyamnagar was found unaware of the agrometeorological services. Instead of being a community information hub, the mobile set was found more like a personal device.
Discussion

In India, agrometeorology has a rapid increase of fame and small family farms get the direct impact of climate change. The Integrated Agrometeorological Advisory Service (AAS) of India offers different services like including weather observation, forecasting, and agricultural advisories to the district level farmers (Tall, 2013). One of the potential characteristics of future global climate change is increased frequency and magnitude of extreme events (Salinger, Stigter and Das, 2000). The intensity of frequency of climate-induced hazards and the extreme weather conditions (floods and cyclones) have been increased in Bangladesh (Iqbal and Siddique, 2014). Even small changes in the frequency of extreme events have an adverse effect. For instance, the life cycle of perennial plants reacts to the frequency of extremes increases, because of the sensitivity of seedling establishment and mortality of these plants towards extreme changes (Salinger, Stigter and Das, 2000). So, more specified agrometeorological advices can help the farmers to cope with the challenges and it must be a part of Climate-Smart Agriculture in Bangladesh.

Recommendation

From the local experiences of the following research, some recommended actions were identified. There could be more localized weather bulletin from BMD so that the agrometeorological advices can be more specific. Besides, promoting citizen science for local crop information to ensure authenticity of the information. Lastly, developing an android application with the support of BMD so that the farmers do not need to depend on external stakeholder and the process can be more cost-effective.

Conclusion

In agriculture, climate and weather are the basic resources. It can affect every crop development process from growth to getting enough yield. In this era of diversified climate patterns, it has become a need for the farmers to get the specified and authentic agrometeorological advices for adaptive and sustainable agriculture production. This research is believed to have a strong impact in the process of developing a user-friendly and location-specific agrometeorological advice by addressing the learning from the fields.

References


Realities: Response Farming and the Consequences of
