PARTICIPATORY SCENARIO PLANNING FOR CLIMATE RESILIENT AGRICULTURAL LIVELIHOODS

BEST PRACTICES AND SUCCESS STORIES
## Contents

Editorial by PC ............................................................ i  
Editorial by DKMD .................................................... ii  
**PSP processes from Elgeyo Marakwet and Wajir Counties**  
Elgeyo Marakwet ..................................................... iii  
Wajir ................................................................. vi  

### Impacts of PSP & Advisories at the counties at a glance

#### Counties With High Rainfall Regimes

<table>
<thead>
<tr>
<th>County</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bomet</td>
<td>1</td>
</tr>
<tr>
<td>Bungoma</td>
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<td>Embu</td>
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<td>Homabay</td>
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<td>Kakamega</td>
<td>6</td>
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<td>Kericho</td>
<td>7</td>
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<td>Kianbu</td>
<td>8</td>
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<tr>
<td>Kirinyaga</td>
<td>9</td>
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<tr>
<td>Kisii</td>
<td>10</td>
</tr>
<tr>
<td>Kisumu</td>
<td>12</td>
</tr>
<tr>
<td>Meru</td>
<td>13</td>
</tr>
<tr>
<td>Laikipia</td>
<td>14</td>
</tr>
<tr>
<td>Migori</td>
<td>15</td>
</tr>
<tr>
<td>Mombasa</td>
<td>16</td>
</tr>
<tr>
<td>Muranga</td>
<td>17</td>
</tr>
<tr>
<td>Nairobi</td>
<td>18</td>
</tr>
<tr>
<td>Nakuru</td>
<td>19</td>
</tr>
<tr>
<td>Nandi</td>
<td>20</td>
</tr>
<tr>
<td>Nyandarua</td>
<td>22</td>
</tr>
<tr>
<td>Nyamira</td>
<td>22</td>
</tr>
<tr>
<td>Nyeri</td>
<td>23</td>
</tr>
<tr>
<td>Siaya</td>
<td>23</td>
</tr>
<tr>
<td>Trans Nzoia</td>
<td>24</td>
</tr>
<tr>
<td>Usain Gishu</td>
<td>25</td>
</tr>
<tr>
<td>Vihiga</td>
<td>26</td>
</tr>
</tbody>
</table>

#### Counties With Low Rainfall Regimes

<table>
<thead>
<tr>
<th>County</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kajiado</td>
<td>28</td>
</tr>
<tr>
<td>Kilifi</td>
<td>29</td>
</tr>
<tr>
<td>Kitui</td>
<td>30</td>
</tr>
<tr>
<td>Kwale</td>
<td>31</td>
</tr>
<tr>
<td>Lamu</td>
<td>32</td>
</tr>
<tr>
<td>Machakos</td>
<td>33</td>
</tr>
<tr>
<td>Makuene</td>
<td>34</td>
</tr>
<tr>
<td>Narok</td>
<td>36</td>
</tr>
<tr>
<td>Taita Taveta</td>
<td>37</td>
</tr>
<tr>
<td>Tharaka Nithi</td>
<td>38</td>
</tr>
</tbody>
</table>

### Arid and Semi-Arid (ASAL) Counties

<table>
<thead>
<tr>
<th>County</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baringo</td>
<td>41</td>
</tr>
<tr>
<td>Elgeyo Marakwet</td>
<td>42</td>
</tr>
<tr>
<td>Garissa</td>
<td>43</td>
</tr>
<tr>
<td>Isiolo</td>
<td>45</td>
</tr>
<tr>
<td>Manderu</td>
<td>46</td>
</tr>
<tr>
<td>Marsabit</td>
<td>46</td>
</tr>
<tr>
<td>Samburu</td>
<td>47</td>
</tr>
<tr>
<td>Tana River</td>
<td>48</td>
</tr>
<tr>
<td>Turkana</td>
<td>49</td>
</tr>
<tr>
<td>Wajir</td>
<td>50</td>
</tr>
<tr>
<td>West Pokot</td>
<td>51</td>
</tr>
</tbody>
</table>
The Agricultural Sector Development Support Programme is a sector wide programme implemented by the government of Kenya in collaboration with the Development partners designed to facilitate the implementation of the Agriculture Sector Support Strategy (ASDS 2010-2020). The programme is funded by the government of Kenya and Swedish International Development Agency (SIDA) and is implemented in the 47 counties.

Strengthening environmental resilience for value chain development is a key component of the programme in the face of the changing climate and weather patterns. The country has in the past experienced the impacts of climate change in the form of delayed onset of rains, prolonged droughts, flash floods and increased temperatures leading to degradation of land, decrease in agricultural productivity, increased incidences of pests and diseases and the destruction of physical infrastructure. The result has been reduced yields, food shortage and loss of incomes for agro-based communities.

ASDSP in collaboration with partners proactively addresses climate related issues through strategies aimed at building environmental resilience among communities. Specific areas include raising awareness and knowledge on the causes and effects of climate change, the importance of environmental sustainability and the use of technologies and services to improve natural resource management.

Access to weather information by value chain actors, especially the vulnerable is a vital component that helps communities make timely, informed and flexible decisions on their planned activities. In 2014, The Kenya Meteorological Department (KMD) signed a Memorandum of Understanding (MOU) with ASDSP for the implementation of the Environmental Resilient component of the Programme. The MOU was meant to bridge the gap that existed between climate service providers and users in the agriculture sector through Participatory Scenario Planning (PSP) processes and development of appropriate advisories.

ASDSP and other partners have funded two PSPs per year in the 47 counties to date. The results have been very encouraging as Value Chain Actors (VCA) actively seek weather information and advisories before embarking on their activities. This document contains narratives from the 47 counties. They provide an insight into how advisories assisted the various users respond to the weather forecasts and thereby changed the course of their intended activities and improved their livelihoods.

Climate change is here with us, it is my hope that the county governments and stakeholders in the sector will continue to support the PSP processes to build the resilience of value chain actors. I take this opportunity to thank the MOALF, the County Governments, SIDA, ASDSP staff, Partners, stakeholders, and value chain actors for their support to the ASDSP programme. Further I wish to sincerely thank the Director KMD for their collaboration, commitment, and guidance during the PSP processes.

Enjoy the reading

Phoebe A. Odhiambo (Mrs.), HSC
National Programme Coordinator
AGRICULTURAL SECTOR DEVELOPMENT SUPPORT PROGRAMME
The mandate of the Kenya Meteorological Department (KMD) is derived from the World Meteorological Organization (WMO) Convention, which is to provide accurate and timely weather and climate information and services for the safety of life, protection of property and conservation of the natural environment. Additional functions include Education, Training Research and Development.

The application of weather, climate and water information and related services helps to improve the safety and well-being of people, reduces poverty, increases prosperity and protects the environment for future generations. The Kenya Meteorological Department is fundamental to meeting the country’s development targets outlined in the Kenya Vision 2030. It also addresses international and regional protocols such as the United Nation (UN) Sustainable Development Goals, the Johannesburg Plan of Implementation 2002, the World Summit on Sustainable Development and other relevant environment and climate-related conventions.

The Constitution of Kenya, 2010, offers the opportunity for services to be moved closer to the people at community level. This calls for a concerted efforts by KMD to strengthen its infrastructure and services to reach and have the desired influence at the community level where the most severe impacts of climate variability and climate change are experienced.

The Department has established 47 county meteorological offices to fast track the expansion of meteorological observation network and improve the generation and dissemination of weather and climate information and advisories to the communities. The county offices enable customizing of the national forecasts for their areas of jurisdictions as part of the Disaster Risk Reduction Strategy in line with the Global Framework of Climate Services (GFCS).

The potential benefits of enhancing the quality and use of meteorological information and products requires stakeholder collaboration and engagement to improve the process for decision-making and realization of social and economic benefits. The Participatory Scenario Planning (PSP) for Climate Resilient Agricultural Livelihoods approach facilitates access to and sharing of interpreted climate forecasts to generate information for building livelihood resilience and disaster risk reduction.

The origin of PSP in Kenya can be attributed to the Adaptation Learning Programme (ALP), implemented in Africa by CARE International. CARE International piloted PSP in Garissa, Kenya in collaboration with KMD from 2011 to 2012. In early 2014, KMD signed an MOU with the ASDSP to implement Environmental Resilient component of the Programme meant to provide customized information on weather forecasts to assist farming communities respond to the changing weather patterns. KMD will continue to collaborate with the agricultural sector in the provision of the necessary support required in interpreting weather information for creation of resilient livelihoods.

I take this opportunity to thank and appreciate the ASDSP Programme for recognizing the role of KMD and the partnership created between the two institutions.

Mr. Peter G. Ambenje
Director
Kenya Meteorological Department
Participatory Scenario Planning and Development of Advisories: Elgeyo Marakwet and Wajir Counties

Participatory Scenario Planning (PSP) is a multi-stakeholder participatory process that brings together generators of weather and climate information and users to share and analyse available weather forecasts to develop appropriate advisories based on integrated forecasts. The Kenya Meteorological Department provides information that helps to predict future weather events from scientifically generated seasonal forecasts and give probabilities for three different rainfall scenarios; normal, above normal and below normal. The Community on the other hand through traditional forecasters provides invaluable knowledge on the weather patterns from past experiences. Using the weather information available, the stakeholders from various sectors explore different scenarios on the likely effect the predicted weather pattern will have on their activities and what measures should be taken. Thus PSP provides a means of collectively understanding, interpreting and using forecasts to take advantage of opportunities and to help overcome the challenges experienced in the changing climatic patterns. The PSP approach enables communities and county Governments to use seasonal climate forecasts to develop climate resilient plans and advisories for livelihoods, Disaster Risk Reduction (DRR) and sector services.

PSP was started in the counties when KMD signed an MOU with ASDSP to implement the Environmental Resilience chapter of the programme in 2014. Since then, two PSP activities have been carried out per year, one for the long rains season; March, April, May (MAM) and the other for the short rain season; October, November December (OND). The process has four standard stages; Planning and review, Development of advisories, Dissemination of the advisories and Monitoring and evaluation. Below are the PSP processes from Elgeyo Marakwet and Wajir Counties.

Elgeyo Marakwet

The concept of Participatory Scenario Planning (PSP) was started in the county in 2014. The aim was to link weather forecasters with value chain actors as successful planning and implementation of development and socio-economic activities largely depend on the prevailing and predicted climatic conditions.

The overall objective of the PSP was to enhance proper use of climate and weather information to cushion communities in Elgeyo Marakwet County against the vagaries of climate and weather which include droughts, floods and landslides. The PSP therefore provided an opportunity for various stakeholders to make informed decisions that encompass weather forecasts.

The PSP process in the county followed the four standard stages.

1) Review and Planning

This was the first step in the PSP process and was basically undertaken by the Natural Resource Management (NRM) Thematic Working Group and any key local actors. Two meetings for review and planning were considered adequate and were held at the county headquarters. The meetings were carried out at least a month prior to the beginning of the long or short rains seasons.

The process involved reviewing the previous season’s performance and the sharing the information with both the National and the customized County Seasonal Weather Forecasts Centres. The proposed budget and resource mobilization initiatives for all the PSP activities that were to follow were discussed and affirmed in this meeting.

The planning element at this stage also was finalized and included identification and invitations of the stakeholders/facilitators to participate in the PSP workshop that was to follow. The NRM TWG in one of their review and planning meetings

2) Multi Stakeholder Workshops

The second stage was the stakeholders workshop initially held over a 2-day period. The main purpose was to develop advisories for dissemination to the weather information consumers. Those involved in the workshop included officers from the...
meteorological department and other government departments, traditional weather forecasters, community representatives, value chain actors and representatives from the local NGO’s.

Traditionally, the workshops were carried out at the county headquarters due to the centrality of the venue but these were subsequently decentralized to the sub-counties to allow for more grassroots participation. The workshops were carried out at least 3-4 weeks before the seasons commenced to allow for adequate time for the dissemination of the advisories.

The workshops involved an exchange of seasonal climate forecasts from the local/traditional and scientific sources, a discussion and integration of the two forecasts, interpretation of the forecasts into three possible hazard scenarios and an assessment of the risks from these hazards. Further the workshop participants discussed the implications of the scenarios and the necessary actions to be undertaken. These were eventually developed into advisories that were packaged for dissemination to consumers.

3). Communication/ and Dissemination of Advisories

The third stage of the PSP process was the dissemination of the information contained in the advisories through various channels. The objective was to reach as many users as possible in the entire county. The main channels used were the field days, chiefs’ barazas, churches and other religious institutions, and the media. Dissemination of the advisories was carried out immediately after the workshop to ensure the messages reached the users on time. In 2015, the stakeholders developed a video documentary during the October-November-December El Niño season whose purpose was to show the perils of residing in sloppy land. The video was aired widely through road-shows, television and the internet. This resulted in the successful mobilization of the community to move from hazardous areas of the sloppy terrain to safer grounds.

In the short rains of 2016, dissemination of the advisories were supported through four sub-county forums. The forums were attended by selected key stakeholders who were carefully identified to ensure that dissemination of the advisories was a success.

Selection of participants for these Sub-county forums was based on value chains and the criterion was as follows:

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<tr>
<th>No.</th>
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<th>Total Number</th>
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<tr>
<td>1</td>
<td>Traditional weather Forecasters</td>
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<td>2</td>
<td>4 Value Chain Actors: 1 Agro-dealer, 1 Agro-wholesaler, 1 Agro-processor and 1 Agro-transporter</td>
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<td>3</td>
<td>1 Sub-County Agriculture Officer</td>
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<td>4</td>
<td>1 Sub-County Livestock Production Officer</td>
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<td>5</td>
<td>6 Ward Officers: 2 WAOs, 2 Chiefs and 2 County Ward Administrators</td>
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<td>6</td>
<td>1 Sub-County Administrator</td>
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<td>7</td>
<td>1 Deputy County Commissioner</td>
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<td><strong>TOTAL</strong></td>
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4) Monitoring, Evaluation and Feedback

The PSP monitoring, evaluation and feedback were done based on the dissemination channels that were used in the county as agreed upon during the Stakeholders workshop. Each channel was monitored independently and findings reported on. These were mainly as follows; County Commissioner and the four Deputy County Commissioners, County Executive (as reported by the Sub-County administrators), County Assembly, Ward Agricultural Extension Officers (WAEOs), Radio announcement and Television Documentary, County Digital Communication platforms and Value Chain Project Management Teams (PTMs).

Two different sets of questionnaires (one targeting service providers the other service consumers) were developed and dispensed randomly within the county, to climate information providers and users to determine the effect of weather on the various services in the county. During the 2016, an analysis of the exercise showed that;

- 100% of the respondents received the OND weather advisories as compared to 98% who received advisories for MAM.
- 91% of the respondents in OND received the advisories through radio (same as MAM), 38% through TV (31% during MAM), 75% through government officials (66% during MAM), 55% through friends (47% during MAM) and 11% through County digital communication platforms (6% during MAM). 72% percent received through the council of elders, 46% through the Value Chain PMTs and 61% through CSOs operating in their areas.
- 99% of the respondents agreed that the methods used to disseminate the advisories were sufficient.
- 18% suggested that use of SMS could increase the number of people receiving weather advisories.
- 7% of the respondents suggested that youth groups and women groups should also be considered as forums through which climate information can be disseminated (23% had suggested the same during MAM).
- 96% of the respondents confirmed that they used the weather advisories at the house hold level during the season.
- 88% of the respondents agreed that the advisories were timely (58% during MAM) while 12% said the advisories came when the season was about to start (42% during MAM).
- 100% of the respondents who used the climate advisories agreed that their plans and decisions that were based on PSP advisories improved their food security, increased their desire for environmental conservation and need to build resilience to extreme weather (same as MAM).
- 100% of the respondents in OND considered PSP weather advisories very relevant for productive and resilient agricultural development in Elgeyo Marakwet County.

5) Partnerships and Funding for PSP

The PSP process is a highly participatory, collaborative and consultative exercise that cannot be planned for and implemented without the support of available partners. Apart from meeting and discussing weather related information, the process is also a platform for dialogue and resource mobilization among various partners to determine the best actions that should be taken by the county should in the wake of climate change.

The process was funded by a number of partners including the County Department of Agriculture, Technoserve, World Vision International, the County Department of Meteorological Services and the Agricultural Sector Development Support Programme. Other contributions were from the media especially KASS FM/TV and Royal Media Services who highly subsidized their services at the local level.
Wajir

Wajir County is located in the North Eastern region of Kenya. The county covers an area of 56,685.9 Km² and borders Somalia, Ethiopia, Mandera, Isiolo, Marsabit and Garissa Counties. The County receives an average annual rainfall of 240-320mm distributed into two seasons, the short rains (October to December) and the long rains (March to May). The average temperature range is from 27.9-36°C. Agriculture is practiced in depressions and along drainage lines where there is more moisture due to seasonal flooding. Irrigation using underground water is limited to areas with permanent shallow wells. Most people rely on livestock products like milk and meat which is their staple food. Efforts have been put towards increasing crops productivity in the county, but over reliance on relief food has been a major hindrance in achieving food security. Poultry keeping is picking up in Wajir town. Livestock population density in the county is low due to the low land-carrying capacity of the rangeland. Droughts, livestock diseases and pests adversely affect livestock development in the county. The ASDSP Wajir County priority value chains include; camel milk, indigenous chicken and water melon.

A) The PSP Process

The Wajir Capacity Needs Assessment report (June 2015), the Wajir County Household Baseline Survey report (June 2014) and the Wajir County Agribusiness report (June 2014), revealed that there was inadequate access to climate and weather information in the county to enable value chain actors plan their activities according to the weather forecasts. To address this, CARE Kenya trained ASDSP County Environmental Resilience Officers and KMD county directors on PSP model in early 2014. Wajir County has since conducted PSPs from March-April-May (MAM) 2014 to March-April-May (MAM) 2017. PSP builds and enhances understanding of the value of climate information and related uncertainty in decision making and planning for climate resilient agriculture in a variable and changing climate by enabling better access to climate information by the agricultural sector stakeholders.

PSP Steps

Four critical steps were observed during the PSP implementation;

*Step 1: Preparatory meetings (Review and planning)*

Stakeholder consultative meetings were held every season since 2014 whose purpose was to prepare the stakeholders for the PSP workshops and bringing out information needs for subsequent season.

The meetings were attended by Natural Resource Management stakeholder consultative forum members among them; select representatives of the value chains, Wajir Community Radio Station, local NGO/ CBO reps, heads of agricultural sector departments (lands, water, forestry, religious leaders, NEMA, livestock, fisheries, roads), representatives of local government programmes and projects (ASDSP, NDMA, KAPAP), KENAFF, ITK), select area chiefs, KMD, County department of disaster management and farmers’ umbrella body (Wajir Farmers Association).

In Wajir, the 18 member NRM/CC stakeholder consultative forum formed by ASDSP always spearheaded the discussions around NRM/CC information in the county. During the meetings, focus group discussions involved reviewing plans of previous PSPs and what actually happened, and why; the successes and challenges encountered in facilitating the different PSP steps, what adjustments needed to be done, how previous PSP workshop information was communicated, levels of access and usefulness by different users categories, challenges encountered, most appropriate channels, and timeliness. PSP workshop participants, facilitation and logistics for every season were also agreed upon during the preparatory meetings.

OND 2015 preparatory meeting at the County Director of Meteorology Offices.
Step 2: PSP Workshops (Multi stakeholder workshop to develop advisories)

The PSP workshops served to create a multi-stakeholder forum for accessing and understanding scientific and local seasonal forecasts, co-generating a combined forecast and translating it into locally relevant and actionable information for decision making and planning at seasonal timescale. The workshops provided a forum through which climate experts interacted and exchanged information with users of climate information.

The workshops incorporated various representatives of the value chains, local NGO/ CBO reps, heads of agricultural sector departments (lands, water, forestry, Wajir Community Radio Station, NEMA, livestock, fisheries, roads), representatives of local government programmes and projects (ASDSP, NDMA, KAPAP), KENAFF, ITK (traditional weather forecasters), select area chiefs, religious leaders, KMD, County department of disaster management and farmers’ umbrella body (Wajir Farmers Association), organizations working in the area of DRR issues (Mercy corps, Islamic Relief, WASDA), financial institutions and other private sector actors (Kenya National Chamber of Commerce and Industry, Wajir chapter), among others.

For the OND 2015 season, the PSP workshop was held on 29th September, 2015 at the Sham- El Sheikh hotel, Wajir.

During the PSP workshops, discussions were anchored on six broad sessions during which past seasons were reviewed, current status analyzed, seasonal (Scientific and ITK) climate forecast presented and consensus developed. Sector specific scenarios and locally actionable advisories on best practices/ coping strategies developed under the predicted forecasts after analysing probable hazards, risks, opportunities and impacts in focus groups. The workshops ended by developing advisories communication plan outlining who does what, where communication is done, which channels are most desirable, when the communication would be done, the target audience, and the preferred language.

Step 3: Communication of the advisories to end users after the workshops

The main purpose was to ensure the seasonal weather forecast information and the resultant PSP advisories reached a wider target audience for climate informed decision making and planning.

Those involved in this phase included all the PSP workshop participants, value chain platforms, local NGO/ CBO, heads of agricultural sector departments (lands, water, forestry, NEMA, livestock, fisheries, roads, health), government programmes and projects (ASDSP, NDMA, KAPAP), KENAFF, area chiefs, KMD, Wajir Community Radio Station, County department of disaster management and farmers’ umbrella body (Wajir Farmers Association), organizations working in the area of DRR issues (Mercy corps, Islamic Relief, WASDA), financial institutions and other private sector actors (Kenya National Chamber of Commerce and Industry, Wajir chapter).

Communication of the advisories information was done at different locations of the county depending on the preferred channels. For the case of OND 2015 PSP, channels used included ASDSP Wajir Facebook page (posted on 29th September 2015), Public barazas, Somali/English Brochures, religious gatherings SMS, Wajir Community Radio Field visits by CDM and NDMA team and ASDSP Wajir and Partners WhatsApp (30th Sept. 2015)

The ‘how’ part of this revolved around execution of the communication plan developed at the tail end of the PSP workshops by the participants. The channel considered were those that had the following attributes; the most effective in reaching a diverse group of users and on time, those that were likely to reach the highest number of targeted users and those that were well understood by different stakeholders. In all the channels used, the CDM-Met and County Coordinator, ASDSP contacts were given to the users for more information. Building on traditional communication mechanisms such as local festivals and religious gatherings enabled people engaged in different livelihoods to gain access to climate information. Use of community radio allowed climate information to be disseminated in local languages and facilitated engagement through call-ins.
**Step 4: Monitoring, Evaluation and Feedback**

The focus of the M&E conducted was to improve the process in order to meet new and changing climate information needs and demands.

A 10 member M&E team comprising of CDM, 5 ASDSP M&E TWG (2 NGOs, 1 County Planning Officer, 2 farmer reps), ERSIO and 4 other partners was constituted and discussed the process, methods and tools to be used to capture the information on access and use of the climate/weather information along the various gender and value chain actor categories.

The field monitoring visits focused on:

- **Climate information Access** – to find out if the information was received as advisories or in any other form in the current season;
- **Timeliness, Language and channels (effectiveness)**: who received the information (Numbers), Understanding; the information content and its usefulness,
- **Use**: How the information was used or not used,
- **Benefits**: Any benefit so far from the use. Additional anticipated benefit from the use of the Information

The M&E field visits employed descriptive study design which aimed at describing the equitability of access to and use of the advisories among various VC actor categories within the 3 priority value chains

As an example, OND 2015 PSP, the M&E exercise convened from 14th to 18th December, 2015 and covered 5 out of the 6 sub-counties targeted. A total of 94 purposively sampled individual respondents were interviewed. The main goal of using purposive sampling was to focus on particular characteristics of the population that are of interest to value chain development. After data collection, the data was edited, coded, classified and tabulated for ease of analysis. The Microsoft Excel instrument and SPSS were used in analyzing the data for the individual assessment. Descriptive statistics was then used to present the information where data was summarized using frequencies and percentages and was presented in form of tables, graphs and charts. The resultant M&E report was then presented to the review/planning team during the subsequent preparatory meetings for consideration.

**Partnerships and Funding for PSP**

In Wajir, ASDSP has been successfully partnering with the MET department in actualizing PSP in the county since MAM 2014. The OND 2015 PSP, was support by partners that included ADESO and ALDEF-Kenya and NDMA. In 2017 The CIS Plan set aside 2% of the county funds to climate information and recognises PSP as a key activity in realizing climate information access in the county.
Impacts of PSP & Advisories at the counties at a glance

Counties With High Rainfall Regimes
1. Bomet

Pasture preservation

Bomet County experiences relatively high rainfall amounts ranging between 700mm and 2000mm per annum. Temperatures vary from 16°C to a high of 24°C. These climatic conditions are ideal for coffee, tea, and pyrethrum and Food crops such as maize, beans, Irish potatoes, sweet potatoes, sorghum, and finger millets. The main livestock reared are Dairy cattle, poultry, sheep and fish farming.

Climatic conditions that hinder value chain optimum productivity are more variability in rainfall patterns due to climate change. This has had negative effects on productivity, profitability and sustainability of value chains. Consequently, there is need for enhancing resilience capacity of value chain actors to climate variability through dissemination of timely and accurate weather or climate information. This has been achieved through participatory scenario planning (PSP) and dissemination of advisories to value chain actors.

PSP was started in March, 2014 and the Key players were ASDSP, Kenya Meteorological Services department, Traditional weather forecasters and stakeholders in the Agricultural Sector. Before the advent of PSP, the KMD provided seasonal forecasts disseminated through restrictive channels that included audio-visuals and print media. The forecasts were hardly taken note of as they did not offer meaningful advisories to the farming communities. With PSP, acceptance of the weather information and seasons advisories has taken root with VC actors inquiring about the season’s outlook and appropriate decisions to make.

Siongiroi dairy cooperative society

Siongiroi dairy cooperative society was started in 1997. Dairy farmers came together to bulk and market milk. The group was supported by The ministry of Agriculture, Livestock Production and fisheries, Heifer International, Technoserve among other organizations. The society bulks, chills and markets milk as well as offering extension services aimed at improving milk production and productivity among its members.

The society receives information regarding seasonal weather outlook with weekly and monthly updates. Advisories focus on fodder establishment, management and conservation as the rainfall pattern for the region has become variable either delayed or earlier than normal even though the amounts are more or less constant. The information has been very useful especially in planning for feeds establishment and preservation. The members have used the information to inform key decisions on when to establish pastures like napier grass, Rhodes grass among others and this has resulted in stabilizing milk production and supply to the dairy plant throughout the year.

In the past, members relied on natural pastures/grass to feed their animals and the availability of the same fluctuated with seasons. With the PSP advisories, members have established Boma Rhodes and put up hey stores in their farms. Siongiroi Dairy Cooperative constructed a hey store used for mopping up surplus hay from society members. A total of 11,700 bales were purchased and stored in 2016 while 8400 bales were sold to dairy farmers at an average price of KES 200 per bale. This has not only increased milk from members but also stabilized milk supply to the dairy plant.

Milk supply to the society in 2015 during the low rainfall months (1st quarter-January, February & March and 4th quarter-October, November) dropped to an average of 4,500 litres per day because of unavailability of feeds while in 2016 the lowest was 15,000 litres per day due to availability of hey which were availed to dairy farmers and cost recovered from the milk proceeds. The availability of feeds improved milk production at farm level for most members from 4 litres per cow per day to 6.5 per cow per day-translating to KES 75 per day (source-Siongiroi Dairy Plant Ltd).

PSP process has triggered demand for weather information and the same is assisting VC actors to plan their activities e.g. establishment and conservation of pastures among other activities. The process is very useful as it contributes a lot to the cushioning of the value chains against extreme weather conditions therefore protecting the livelihoods. VC actors who did not preserve animal feeds at the farm or at the society’s hey store as had been advised had their milk production drastically going down during the dry seasons hence reduced household income. The dairy farmers who had access to the feeds through check off system had their production remaining stable throughout the year hence stable income. Talks with County Government and other organizations have been initiated to help fund PSP.

“..... i used to experience serious animal feeds shortage in the past but nowadays I access feeds and able have fairly stable milk production thanks to hey storage plan by the society”. says Salim Ngetich, one of the Siongiroi dairy Cooperative society member during a field interview.
“For agricultural production and in particular dairy production to remain sustainable, weather information is key in developing proactive plans that are useful in mitigating extreme weather conditions” observes Mr. Richard Soi, manager Siongiroi Dairy Plant Limited.

Siongiroi Dairy Plant Stored hay

2. Bungoma

Tomato production

Bungoma County in western Kenya is a high potential area with an annual mean rainfall that ranges between 1000-1800mm with mean annual Temperature range is 19-32°C. The main Agricultural Enterprises include food crops such as maize, beans, finger millet, sweet potatoes, bananas, Irish potatoes and assorted vegetables. Cash crops include sugar cane, cotton, coffee and tobacco while the widespread livestock enterprises are mainly dairy cattle, poultry, piggery, sheep and fish farming. The prioritized value chains in the county under ASDSP are Cow milk, Indigenous Chicken and Tomato.

Optimal climatic conditions required for the development of the various enterprises is a rainfall regime of 700mm-2000mm evenly distributed per annum. This however is hardly obtained due to climate change and variability. The county experiences long dry spells during the dry seasons and flash floods, hail stones and thunderstorms during the wet season. This has a negative effect on productivity, profitability and sustainability of value chains. Consequently, there is need to enhance resilience of value chain actors to climate variability through dissemination of timely and accurate weather and climate information.

This has been achieved through participatory scenario planning (PSP) and dissemination of advisories to value chain actors. PSP was introduced and evolved to the county in 2014. Prior to this, KMD was responsible for the production and dissemination of seasonal climate forecasts. The channels for dissemination used were restrictive and included national radio and TV stations. The weather information applied to regions and was not downscaled to county levels. The information was not accurate as it covered wide regions and advisories were not developed to interpret the information into useful formats for value chain actors. ASDSP now links with KMD in weather forecast dissemination by bringing together stakeholders who interpret seasonal forecasts, formulate simple advisories/messages with value chain actors. The channels for dissemination include radio, local TV, internet, baraza, field days, and churches (table below). One of the partners, Wiser project, sponsored PSP workshops for the long and short rain seasons i.e March April May and October November December in collaboration with other actors. They enhanced dissemination of weather information by use of SMS to stakeholders and VCAs.

Musawe youth group is one of the beneficiaries of the PSP processes. The group was started as youth welfare whose main activities are horticultural production and transportation of produce and passengers. The group owns 20 motorbikes and has 10 ha of land under horticultural production. Tomato growing is one of their major enterprises.

Before PSP, the group planted their tomato crop when the rains fell and sometimes incurred losses in their produce due to drought, or even floods. After attending a PSP workshop and taking heed of the advisories from the various media the group planted their crop at the onset of rains using a variety that is tolerant to water logging. They prepared early for all farm activities to utilize scarce rain efficiently.
As a result of the advisories production of tomatoes increased from 3 tonnes per acre to 5-6 tonnes per acre for open field production, while a greenhouse measuring 15m by 8m increased production from 600kg to 6000kg.

Increased in rainfall amounts resulted in increase of pests and diseases i.e. tuta absoluta which had less effects on those farmer who took in the advisory to plant early and spray their crop on time.

"...I used to produce tomatoes but not using the weather information but when I started using the advisory now I can plan when to plant and to market to earn high returns from my tomato production..." says a tomato farmer.

The demand for advisories has been on the increase in the county by various actors in non prioritized value chains such as maize which is the main food crop. Many farmers took up insurance cover for their crops and livestock as a result of use of the advisories.

3. Busia

Indigenous poultry production

Climate change and variability increases incidences of local poultry disease which affects poultry output and increases the cost of production. High rainfall and relative humidity provides a conducive environment for parasites to breed leading to disease outbreaks.

The Pamoja Women Group in Kanjala village of Busia County was started in 2009 to economically empower women in rural areas with entrepreneurship skills and knowledge to enable them to participate effectively in development processes. The group has 18 members consisting of 7 men and 11 women. At the start, the indigenous chicken was affected by climate change and variability impacts. The group had no access to climate information and group’s activities were greatly affected.

When Pamoja Women’s group decided to venture into indigenous chicken farming to uplift the living standards and well-being of the group members, they didn’t expect to meet many challenges.

“When we started, we had a number of challenges and gaps that we had not anticipated. These include, pests & diseases, high cost of feeds, low egg production, poor quality eggs for hatching and lack of housing for the birds. ASDSP intervened to help us overcome the challenges through Value chain trainings and PSP". Says Zackayo Kubasu, the chairman of the group.

When the group was introduced to ASDSP, they were still struggling with the myriad of challenges in the Value chain. Through the programme interventions the members were introduced to PSP and were trained on the various advisories given that were critical in decision making to address the issues the group was grappling with. The members were also trained on poultry keeping and assisted to buy an incubator and feed-making machine.

“ASDSP moved the group a notch higher, after we went through the trainings, and received the advisories, we were able to plan well & expand our business. That way we created demand for our products significantly and earned more money.” adds Zackayo Kubasu.

Through the trainings and regular PSP advisories, the group members became more innovative and were able to plan ahead in line with the prevailing seasonal weather forecasts.

“We invested in a feed producing machine. We are now able to produce our own feeds using locally available materials. This has brought down the cost of feeds by almost half from Ksh 45 per kilo to Ksh 22 per kilo. Our problem is no longer production but meeting the market demand, I was able to rear 40 chicken and sold each at Ksh. 600 Kenya shillings on average. I realized Ksh 24000/" says Kubasu.
“Since I was trained by ASDSP, I have managed the diseases and improved my finances through savings. I increased the flock from 5 to 15, sold 10 (7 cocks at 1000 shillings each, 3 chicken at 600 each) and made sh8800/=”, adds Symon a group member.

Pamoja women group now actively seek information on weather forecasts before planning their activities.

Some members of pamoja women group at a PSP advisories dissemination session

4. Embu

Hay production

Embu County lies some 120 kilometers North East of Nairobi, on South-Eastern side of Mount Kenya. The County is experiencing impacts of climate change in which increased temperatures, heat stress, moisture stress, dry spells, and excessive rainfall is increasingly compromising its agricultural activities. These particular climate hazards affect Embu’s Dairy cow value chain in different ways. Frequent drought is particularly a limiting factor, especially in the hot and dry semi-arid zones of Mbeere where dairy cow value chain is most affected. It puts stress on cattle feed and water provision and compromises fodder production. In order to address the challenges of climate change and variability, ASDSP introduced PSP processes and climate advisories.

The Utugi Self Help Group of Mbeere North Sub County, Embu County, was formed in 2009 with the objective of increasing members’ bargaining power as they market their produce. The group consists of 24 members, 8 male and 16 female. The group has been using PSP advisories since 2016 and have reported benefiting from the process.

For example, the advisories for the MAM season of the same year had indicated below average rainfall. Farmers were subsequently advised to grow Boma Rhodes to be able to supplement animal feeds in the next three months.

The group opted to plant hay as per the advice given in the advisory. They planted Rhodes grass and were able to harvest and conserve it into hay. Out of their harvest, they used some of it to feed their own animals during drought and the rest they sold for income. The total amount they sold was 320 hay bales at ksh 250 per bale making 80,000/= in a span of (3 months). From the proceeds the group members were able to purchase foodstuff hence escaping the problem of food shortage due to drought. From this example, it is clear that if the group sustains their activities then they will no longer depend on relief food given by government. The whole experience has taught them that even in the worst climate scenarios, there is always an opportunity to find a way out if climate information and advisories are communicated clearly and on time and acted upon.

Fodder storage in Silage box - 8x4x4 ft that can carry 3.9 tons of silage, an improvement over the raised silo as shown below.
5. Homabay

Fish farming

Homabay county experiences climate related disasters in the form of flash floods, droughts, landslides, lightning and thunderstorms as well as pest & diseases infestation. The frequency and intensity of these climatic events have been on the rise and have had drastic effects on the community. The County, which is located in South Western Kenya along the shores of Lake Victoria, has two rainy seasons; the long rains season (March to June) and the short rain season (August to November). The average annual rainfall ranges from 700 to 800 mm of which 60% is received during the long rains season. The amounts received during the short season ranges from 500–700 mm. The annual temperatures range between 24°C and 34°C. The climatic conditions are suitable for various agro-enterprises that include sorghum, sweet potatoes, maize, sugarcane and livestock keeping.

Fishing from both the lake and fish ponds is the most important activity in the county. The county has about 2900 ponds, of which 2482 are functional. Climate related issues that affect fish ponds include floods, droughts and inaccessible roads during the rainy seasons.

Kanyandiko Community Based Organization in Kabondo-Kasipul Sub County is composed of 15 groups with 292 members. In 2014, the CBO had 11 fish ponds. Through ASDSP intervention, the groups’ number of ponds had grown to 110 as at May 2016, some owned by groups and others by individual members. Things have not always worked well for the group. In 2014 for example, the county had below average rainfall during the long and short rains. As a result, 11 members of the group experienced water shortage in their ponds leading to loss of livelihoods. In 2015 the county had above average rainfall and 24 members experienced flash floods which swept away their ponds, 8 of them were abandoned altogether. Another 32 members also complained of silted ponds due to heavy run off.

Following these events, the CBO management and some its members were invited to participate in the PSP workshops where weather forecasts were analysed and advisories developed. The main messages in the advisories included:

- Planting of the right tree species
- Water conservation and harvesting techniques for the dry spell
- Timing of fingerling stocking
- Proper time of harvesting fish from the ponds
- Improved sanitation
- Technologies such as raised fish pond embankment, grass terracing and suspended fish ponds for the control of flood,

To date 57 Members have participated in 6 PSP workshops held in the county. Four members have also been trained as early warning and disaster risk management agents by Plan International and World Vision.

Accordingly, members of the CBO have used the advisories to manage challenges associated with floods, soil erosion, pond siltation, sanitation, water seasonality, road access, powerblackouts and fish perishability. Women have used the advisories to make decisions on appropriate ways of harvesting clean water for processing and drying fish. Men and youths used the advisories to ensure correct timing in stocking fingerlings in the ponds which takes place at the onset of rains and harvesting of fish before floods.

The advisories have also been useful in strengthening the groups’ resilience and preparedness in the face of vagaries of weather. For example only 4 ponds owned by the CBO were swept away by floods in 2016 compared to 24 in 2014 because the group put in place mitigation measures. Similarly, the advisories helped two members of the group; Mrs Caren Onyango and Pius Odhiambo minimize their losses when flash floods affected their farms in May 2016. This was after they heeded the advisories and harvested their fish earlier in April to avoid peak rainy period in early May. They also delayed stocking of the ponds, reinforced the pond embankments and used suspended ponds to avoid flooding.

Through the linkages in participatory planning, Kanyandiko CBO members have adopted technologies that have made them more resilient to climate related disasters. They have planted more than 12,000 seedlings in their catchment which has reduced the rate of pond siltation by over 30%. Transporters have also used the Weather advisories to identify which bridges are affected to minimize fish perishability and accidents.
6. Kakamega

Maize production

Kakamega County has a bimodal rainfall pattern with an average of 1000-2000mm rainfall per annum. The rainfall pattern is unevenly distributed all year round with March and July receiving heavy rains while December and February receive the lowest rainfall. The county has an average humidity of 67 percent and temperatures ranging from 18°C to 29°C. January, February and March are the hottest months while the rest of the months have relatively mild temperatures except for July and August which have cold spells. These climatic conditions support a wide range of crops. Major food crops in the County include; Maize, beans, sweet-potatoes, bananas, sorghum, Irish potatoes, vegetables and cassava. The main cash crop in the County is Sugarcane; it is the most developed crop value chain in the County.

Kakamega County was one of the three counties in Kenya, in which KMD collaborated with Adaptation Learning Programme (ALP) to inaugurate Participatory Scenario Planning (PSP) workshop, in October 2013. The workshop was attended by the Kakamega County Minister for Environment and was opened by the Acting County Commissioner for Kakamega, Mr. M. Chimwaga. Also present was Mr. A. Alusa, a special advisor on climate change at the Ministry of Environment, Water and Natural Resources. Workshop participants included field officers drawn from various line departments and ministries, commercial enterprises and community based organizations in the county that deal or are affected by vagaries of climate variability and change; and the farming community. There were also 15 county directors of meteorology from KMD. Facilitators were drawn from KMD and CARE Kenya. Since this initial workshop, PSP workshops have been held in the county every season.

The challenge in kakamega County before weather information and advisories were incorporated in Agriculture were numerous. Most farmers planted their crops, fodders and pastures at the wrong time and used poorly adapted seed varieties resulting in poor yields. Similarly, post-harvest losses were high thus making the incomes from farm produce very low in both crop and livestock enterprises.

Since 2014 the value chain actors have been actively involved in PSP workshops and development of advisories. Some of the advisories include the following:–

- Timely harvesting, proper drying and dusting of grain before storing in well ventilated stores
- Soil testing for appropriate soil management and use manure and chemical fertilizers in consultation with extension service providers;
- Acquisition of inputs on time from agro-dealers before onset of rains and use of certified seeds only from reputable sources;
- Diversification for food security and income by planting short season crops such as beans, sweet potatoes, indigenous vegetables and sunflower;
- Early harvesting to significantly reduce post-harvest loses incurred through rotting, pest infestations and diseases

One of the beneficiaries of PSP advisories is The Malaha, Isongo, Makunga (MIM) Maize producer Group. It was formed in 2013 and has a total membership of 30. The purpose of the group was to improve the member’s livelihoods through production and marketing of Maize. The group adopted the advisories given which helped to reduce exposure to climate related risks. They have better access to localized seasonal climate information and use it for collective planning. This has resulted in timely support for the community, especially in terms of passing on information, providing extension services and giving early warning information. They have benefited from timely land preparation and early acquisition of the right planting materials. As a result yields from maize increased from 15 bags per acre to 22 bags per acre, translating to increased incomes from Kshs. 45,000 to Kshs. 66,000 per acre. The group continues to use the advisories since they can now collect rainfall data and are linked to service providers in the county. They also receive weather update on a weekly basis.

Edward Wambani, a volunteer weather observer with his rain gauge and his maize field on the right
Traditional vegetable production

Kericho County has temperature ranges from a minimum of 10°C to maximum of 27°C with an average rainfall range of between 1,200 mm and 2,200 mm per annum. Soils are chiefly of volcanic origin exhibiting high fertility. In spite of this, climate change (CC) impacts are being felt and with implications of a decrease in the county’s agricultural productivity. Of most significance is the decreasing and erratic annual rainfall. As a result, the months between the main rainfall seasons that occur in March- April- May (“Long Rains”) and October- November- December (“Short Rains”) are becoming drier. The erratic rainfall regime has also resulted in periods of flash-floods indicative of likelihood of future rise in incidences of landslide especially on steeper terrain areas that may have been deforested, as witnessed in Kipkelion in 2016.

Participatory Scenario Planning (PSP) has generally helped farmers in the county to better prepare for these changes in weather patterns. Since 2013/2014, a team of stakeholders has been preparing the March, April, May (MAM) and October November December (OND) PSP advisory packages for dissemination to the public in the county. The team of stakeholders are mainly from Water, Environment and Natural Resources; Agriculture, Livestock & Fisheries; and Representatives of various institutions within Kericho County. PSP advisories are communicated through brochures, barazas, WhatsApp groups and radio interviews (Kass FM and Chamgei).

The PSP takes due consideration for value chains being promoted by County Government of Kericho and Agriculture Sector Development Support Programme (ASDSP). Through PSP, the following has been possible:

- Climate information is well interpreted and understood by users in the agriculture sector and especially the prioritized value chains (tomato, poultry and dairy) actors.
- Stakeholders are embracing emerging weather issues resulting from climate change and are receptive to uptake of suggested interventions and mitigation measures. A good example is the willingness of the people of Kipkelion East and West to move from mudslide prone areas in 2015 when forecasts of El Nino were made.
- Growing respect for indigenous knowledge amongst users because of its coherence and integration into the scientific information forecasted every season.
- There is an increased uptake of climate smart technology within the county with the aim of mitigating climate change impacts.
- An international donor agency sponsored and installed a frost detector at Kenya tea research institute in Kericho and agreed on an MOU to share information possibility of frost for preparedness.

The most used outreach channel is Radio Chamge and Kass and there is need for partnership between the different agencies including the government of Kericho for sustainability of the PSP.

At beneficiary level, Silas Kipruto, one of the users of PSP information says he planted indigenous vegetable “saget” in good time, and utilising manure to improve soil fertility, he reduced moisture loss during January and February and significantly increase harvested vegetables for sale.

Traditional method of predicting rainfall onset are also used. This include observation of specific plants flowering pattern. The flowering of Ngotiotet (a herb with red flowers) takes two to three day. Onset of rains occur immediately after these red flowers are observed.

Ngotiotet herb that flowers a few days before onset of rains.

Preparation for PSP advisories.

A good stand of napier planted on the onset of rains.
8. **Milk production**

Mangu progressive Dairy Cooperative society is located at Mitero shopping centre in Gatundu North Sub County. The rainfall pattern in this part of the country is bimodal with long rains falling from March to June and short rains from October to December with average rainfall of 800-2000 mm. The Sub-County Headquarters is situated in Kamwangi Township, 23 kms from Thika town. The sub-county has a total area of 165sqkm and had a population of 116,646 according to 2009 census.

Dairy cattle farming is the major enterprise in the Sub County and the most demanded in terms of extension services followed by indigenous chicken farming. Farmers rate of adopting new technologies has greatly improved due to good milk prices. Other livestock enterprises are dairy goat farming, rabbit farming, bee keeping, commercial layer production and other emerging livestock such as Guinea pigs, ducks and geese.

Mangu progressive Dairy Cooperative society group was formed in the year 2013 and registered in the same year as a Self Help Group and upgraded to a cooperative society in 2017. The group was formed to promote farmer’s economic interest and general welfare of the members. The farmers were determined to initiate cohesiveness. They formed a cooperative to improve production and marketing their milk. The Cooperative society has an active membership of 443.

The Society received weather advisories for March April May (MAM) 2016 long rain season under agriculture livestock and fisheries sector with recommendations to adopt water harvesting technologies, undertake early land preparation and planting, plant early maturing and drought tolerant crop varieties and practice fodder conservation.

Weather advisories received for October November, December 2016 Short rains season under various sectors were also given. Livestock advisories included purchase/repair water harvesting structures and employ efficient use of water, culling of old and poor performing animals and planting fast maturing grasses and adopting livestock insurance. Crop advisories were adoption of drought resistant crops, growing fast maturing crop varieties and use of kitchen gardening to supplement supply of vegetables. Other advisories were on water, environment and natural resources, and recommended water harvesting from roof catchment, construct soil and water conservation measures, plant trees on the onset of rains and de-silt dams and pans before the rains set in. For energy, it called for embrace of alternative energy like solar and biogas technologies and adherence to efficient use of energy practices.

The advisories were communicated through local FM radios stations including Kameme FM and Inoro FM, the newspapers, brochures, barazas, short messaging service (sms), emails and the local Utugi TV station.

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**Past and present value chain practices following PSP**

Before PSP advisories very few members of the Cooperative Society could understand the purpose of vaccinating their animals and so few used to vaccinate. Water harvesting was being practiced at very low levels with most rainwater and runoff just going to waste. Silage making was a practice of very few with silage making as fodder conservation technology being adopted by very few farmers. Similarly, farmers faced milk glut during wet season and reduced production during dry season and milk value addition was not emphasised.

With PSP advisories, there have been significant changes on these practices. These include increase in water harvesting for many households ranging from 3500 litres to 10,000 litres of water per rainfall season in storage tanks. Silage making is now practiced by 30% of the members of the society with an average of between 10-50 tonnes of silage per season. Members are adhering to vaccination and disease control routines for their animals and carry out de-silting of dams and fishponds before the rains. It is also noted that insurance of livestock is spreading very well among members of the dairy cooperative society.

**Some of the specific impacts of PSP advisories include:**

- Increase in average milk yield from 6 litres of milk per animal per day to between 10-15 litres per cow per day
- Milk sales are done through a contract with Brookside dairies at Ksh. 35 per litre.
- Household food availability has gone up.
- Members are getting reasonable income from their farming activities therefore farming has become a worthwhile source of self-employment have been able to employ themselves in their own farms.
- There is increased technology adoption; silage making for example the 30% active members of the Society produce an average of 30 tonnes per season per household making a total of 4000 tonnes of silage in total per season. Similarly, 60% of the members of the society are doing water harvesting at an average of 7000 litres per season amounting to a total of 1,820,000 litres of harvested water per season.
- A total of 40 households have installed biogas thus investing in renewable energy and energy conservation and also utilise bio slurry manure on their farms
- Generally, there is reduced exposure to climate related risks. Feed conservation for instance has lead to reduced shortage of feeds during dry seasons. Farmers not only feed cows for maintenance during dry periods but also to stabilise milk production and maintain income flow.

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**County success stories at a glance**

8. **Kiambu**

- Increase in average milk yield from 6 litres of milk per animal per day to between 10-15 litres per cow per day
- Milk sales are done through a contract with Brookside dairies at Ksh. 35 per litre.
- Household food availability has gone up.
- Members are getting reasonable income from their farming activities therefore farming has become a worthwhile source of self-employment have been able to employ themselves in their own farms.
- There is increased technology adoption; silage making for example the 30% active members of the Society produce an average of 30 tonnes per season per household making a total of 4000 tonnes of silage in total per season. Similarly, 60% of the members of the society are doing water harvesting at an average of 7000 litres per season amounting to a total of 1,820,000 litres of harvested water per season.
- A total of 40 households have installed biogas thus investing in renewable energy and energy conservation and also utilise bio slurry manure on their farms
- Generally, there is reduced exposure to climate related risks. Feed conservation for instance has lead to reduced shortage of feeds during dry seasons. Farmers not only feed cows for maintenance during dry periods but also to stabilise milk production and maintain income flow.
Due to community preparedness there has been reduction in cow mortality rates. There is also reduced emission of methane because of utilisation of biogas energy. Adoption of fodder trees and general tree planting every season has increased sequestration of carbon.

**Demand and sustainability**

There is increased demand for weather information owing to consistent capacity building of early warning agents and value chain actors every PSP workshop. Involvement of value chain actors in dissemination and implementation of weather advisories have increased their trust of weather information and hence demand. This is also attributed to decentralising PSP workshops at the sub-counties. Other mechanisms that have been put in place for sustainable dissemination of weather advisories to value chain actors include capacity building of value chain actors to disseminate advisories at both organization level and farmer-farmer and pinning of information posters at all milk collection routes as sources of information for the value chain actors.


Mrs Ngure removing some silage from the pit to feed her animals  
Mr. Kariku attending to his Biogas

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**9. Kirinyaga**

**Banana production**

Banana farming is catching up with leading cash crops like tea and coffee in Kirinyaga County. The success of the banana value chain is attributed to interventions by ASDSP and other value chain actors that focused on addressing key gaps along the value chain.

Previously the banana value chain was characterized by disorganized producer groups and marketing structures; inadequate market facilities; exploitation by middlemen; high cost of Tissue Culture Banana (TCB seedlings); inadequate production and value addition skills; poor post-harvest handling; poor quality planting materials; weak linkages to service providers and poor road infrastructure. The biggest challenge however was the threat caused by erratic weather changes.

About 70% of banana producers depend on rain fed water supply for their production. Rainfall has however proved unreliable in recent years hence becoming a major impediment to banana farming. In particular, tissue culture Banana crop production cannot be economically viable without an adequate water supply throughout the year for quantity and quality of produce. The situation is normally compounded by heat stress and strong winds which make the stools to fall over.

To address some of these challenges, ASDSP has been in the lead to support PSP and dissemination of climate advisories since 2013 to date. These climate advisories give technical skills and practices which when applied in the short or long run can help mitigate against climate risks. Karinga Self Help Group (and its members) in Kirinyaga Central of Kirinyaga County is a good example of the beneficiaries of PSP and climate advisories.

**The case of Fleciah Kinyua of Karinga TCB Self Help Group**

Fleciah Kinyua is the chairperson of the Karinga group and has participated in PSP activities including development of advisories since OND 2013 to MAM 2016. As an individual farmer operating a commercial mixed farming system Fleciah has over the years been able to adopt climate smart technologies and skills on her 3 Acre farm that have impacted positively on her livelihood as followings:

**In Crop management**

Adopted crop diversification to reduce risk and well as carrying out crop rotation to help manage soil fertility as well as control pests and diseases.

Planting appropriate crop varieties that suit her agro-ecological zone keeping in mind the rainfall expection for...
She harvests water through roof catchment, and has a shallow well to ensure availability of water for both her domestic and livestock requirements. She does crop mulching to reduce evaporation on her banana plot and practices minimum tillage mainly through use of herbicides. She uses improved and water efficient drip irrigation method for her banana stools and has planted farm friendly trees to shield bananas against strong wind and cool the farm. She also practices improved pre and post-harvest methods.

In Livestock Management
1. She uses improved feeding strategies using homemade rations
2. She does Fodder conservation through Silage making
3. She has done Bio gas installation.

The two most outstanding technologies that have turned around Fleciah’s live as a result of PSP are;

Bio-gas technology
Fleciah installed the bio gas system from her zero grazing unit in 2014 after reading the OND advisory. Through this project, she was able to solve two issues including cutting out her firewood expenditure that totalled 14,400 per year and getting clean energy for domestic use. The environmental impact is the harnessing and use of methane gas which would otherwise pollute the environment. Furthermore, fewer trees are now cut which conserves our agroforestry system.

Drip irrigation system
Fleciah used to have sprinkler system on her farm to irrigate both the horticulture plots and the banana plantation. One of the costs she used to incur was that of pumping water from the Karinga stream using a petrol pump. Every pumping session in a week could use KES 600 and 4 months translates to KES 9,600. This cost used to be exclusive of labor for distributing sprinkler pipes to achieve uniformity. She installed the drip system which has enabled her to save the costs and utilize water more efficiently.

10. Kisii

Fodder conservation
Kisii County is located in the western part of Kenya on the south east of Lake Victoria and is bordered by six counties with Narok, Migori, Homa Bay, Kisumu, Bomet and Nyamira. The county experiences a highland equatorial climate resulting into a bimodal rainfall pattern with average annual rainfall of 1500m with the long rains being received between March and June while the short rains are received from September to November. The months of July and January are relatively dry. The maximum temperatures in the county range between 21°C – 30°C while the minimum temperatures range between 15°C – 20°C. The high and reliable rainfall coupled with moderate temperatures is suitable for growing crops like tea, coffee, pyrethrum, maize, beans and bananas as well dairy farming.

Participatory Scenario Planning Processes in Kisii County
Since 2013-2014 financial year, a total of six Participatory Scenario Planning (PSP) processes (3 MAMs and 3 ONDs) have been conducted in Kisii County. The PSP processes in the county involves a series of workshops in which participants develop advisories which are then disseminated to the actors through barazas, brochures, training sessions and other public gatherings in the County. The main partners involved in PSP in the county include Kenya Meteorological Department (KMD), Departments of Agriculture, Livestock and Fisheries, Department of Environment, Kisii university, KALRO, Kisii rainfall prediction elders and the county and government.

Impacts of PSP on specific value chains:
a) Dairy value chain: Following advisories from the PSP processes, the dairy value chain actors adopted a number of technologies to boost productivity in the value chain. One of the technologies widely adopted was fodder conservation to address the low milk production during dry spells. 5 out of the …….. that were reached with advisories established hay storage barns.
b) Banana value chain: The advisories given for the banana value chain have mainly focused on improving soil and water conservation practices in order to address the problem of declining banana yields; and reduce the cost of banana production using targeted integrated technologies, including physical, biological and cultural conservation measures.

c) Indigenous poultry value chain: The advisories given
are mainly related to impending high temperatures, low supply of water, incidence of diseases and conditions e.g. New castle disease (NCD), Fowl pox, fleas, lice, cannibalism, egg eating syndrome among others which will result into reduced productivity and deaths from diseases and other conditions. To curb these challenges, advisories were given on supplementary feeds, destocking, routine spraying against pests, timely vaccinations, treatment and improved management and stocking or value addition of products for dry seasons.

PSP Success example: The case of Samogara Inlight IDP Women Group

Samogara Inlight IDP women group is a milk production and marketing group based at Bobaracho village, Matongo Sub location, Ng’enyi location, Monyerero ward in Kitutu Chache North Sub County. It is one of the groups that benefited from PSP advisories and seasonal weather forecasts. The group has a membership of 43 and was registered in 2008 with an aim of enhancing food security and economic empowerment of the members.

Before PSP, the group’s milk production and productivity used to drop significantly during the dry season due to fodder shortage. In some cases, productivity reduced from 5 litres to 2 litres per cow per day hence low income. During the wet season, they also had issues with storage of fodder with most of it getting lost through spoilage because of poor storage.

The group participated in the MAM and OND PSP processes starting in the year 2014 and implemented the PSP advisories that were issued at the time. As a result of this, the group improved their management practices including feed conservation, water storage, disease surveillance control, thereby reducing climate related risk. Since 2014 when they started using the PSP advisories the group has recorded the following achievements:

- Milk production has increased to an average of 7-8 litres per cow through improved production methods e.g. improved fodder.
- Fluctuation of milk production is no longer experienced since the group started using climate smart technologies like the “tumbukiza” method of growing fodder especially nappier grass. The group has about 5 acres of fodder which they harvest, bale as hay and store for use during the dry season.
- Water shortages during the dry season have been reduced through rainwater harvesting. 5 group members have purchased water tanks with a combined capacity of 30,000 litres and they are still pooling resources to purchase tanks for the rest of the members.
11. Kisumu

Cotton growing

Kisumu County covers an area of 1727.6Km² and borders Kericho, Nandi, Vihiga, Siaya and Homa Bay Counties. The climate of Kisumu is humid to sub-humid with a bimodal rainfall in which the long rains are received from March to June and the short rains in September to November. The mean annual rainfall ranges between 350mm to 1,800mm, while temperatures range between 17°C to over 35°C. Altitude ranges from 900m to 1,600m above sea level. The County experienced the severest drought in the year 2000 whereas the wettest recorded year was 1988.

Cotton farmers used to plant the crop before the onset of seasonal rains using the off season rains which resulted in poor growth of the cotton and reduced yields. In Nyando Sub-county, the farmers used to practice poor agronomy, poor management of cultivated land and water resources leading to the deterioration of ecosystem and agricultural farms. Poor land and water management contributed to loss of soil structure, soil nutrients and organic matter and therefore reduced soil fertility.

Furthermore, farmers used to apply excess pesticides on cotton and incorrectly. This threatened the ecosystem as insects were destroyed indiscriminately. There was also frequent water logging in Nyando basin due to inadequate drainage and seepage from canals and ditches established to drain away excess rain water. The water logging concentrated salts from lower soil profile leading to Salinization. Due to these problems, cotton used to perform poorly in the county with yields as low as 400 Kg of cotton per acre.

To solve these problems, ASDSP conducted a number of participatory scenario planning (PSP) and dissemination of weather information where Mr. Onyuro was one of the participants. During the PSP the farmers received both early warning information and agricultural advisories including recommended agronomic practices. Mr. Onyuro implemented the advisories by planting cotton after the onset of rains and used the recommended agronomic practices. As a result the quality and quantity of his crop improved.
12. Meru

Silage making

Meru County is located on the eastern slopes of Mt. Kenya. The county receives an average annual rainfall of 1250mm and temperatures range from 8°C to 32°C. The main agricultural enterprises are maize, beans, bananas, Irish potatoes, vegetables, coffee, tea, dairy, goats, sheep, poultry, pigs, and fish farming. The prioritized value chains in the county are dairy (cow milk), maize and indigenous chicken.

Participatory scenario planning (PSP), a mechanism for collective sharing and interpretation of climate forecasts was introduced to the county in 2014. Since then 6 PSPs have been conducted to provide weather information for informed decision-making among farmers and other stakeholders. PSP workshops aim to interpret and provide user-friendly climate information that had traditionally not been available to communities and the county government to use when planning for subsequent seasons.

These advisories have impacted on the agricultural sector especially in the prioritized value chains and in the infrastructure, health, water, environment and natural resources sectors. For the agriculture sector, access to and use of climate information has enabled the Value chain actors to make informed, appropriate and anticipatory decisions and plans on agricultural technologies and practices. For instance on the types of crops that can be best grown and types of livestock that can do well in different areas.

Dairy Value Chain

During the MAM season in 2014, it was predicted that the most probable scenario was that the amount of rainfall received would be below normal (below 1250 mm). In the advisories that followed, farmers were advised to plant maize for fodder and to preserve pasture from the previous season in the form of hay and silage to take care of the expected drought which could lead to loss of animals or low production. About 13 tons of yellow maize was acquired through the Meru Dairy Union and planted during the season. This translated to 16,250 acres planted with maize for silage making. About 325,000 tonnes of maize silage was made which led to an increase of milk produced. Meru dairy union (lead implementer of dairy value chain) had a marked increase in the amount of milk supplied to the plant per month. In July, 2014 milk delivery was 2,530,606 litres this increased to 3,405,896 litres in October 2015, a difference of 875,290 litres. Incomes earned by the dairy producers rose by over six fold over the same period rising from Kshs96,163,028 to Ksh 136,235,840.
13. Laikipia

Maize growing

Laikipia County is located in the Great Rift Valley and borders Samburu County, Isiolo County, Meru County, Nyeri County, Nyandarua County, and Baringo County. The altitude ranges from 1,500m to 2,611m above sea level. It receives low rainfall of between 400-750 mm per annum characterised by periodic droughts. According to Kenya Bureau of National Statistics (2012) the county had a total Population of 399,227 dispersed in 103,114 Households. The county covers an area of 9,462 Sq. KM, with population density of 42 persons per km2.

Participatory Scenario Planning (PSP) started in the county in 2014 courtesy of ASDSP initiative to enhance resilience of value chain actors by facilitating access to accurate customized weather information at the right time for informed decision making. Notable Stakeholders within the county include: Africa Conservation Tillage (ACT), Laikipia County Natural Resources Network (LAICONAR), Kenya Water Towers Agency (KTWA), Caritas, Laikipia Wildlife Forum (LWF) and National Drought Management Authority (NDMA). All these have contributed in one way or another through funding and supporting the processes involved in PSP. The NDMA develops mitigation measures for disaster management based on the PSP advisories. The advisories are usually disseminated to the value chain actors through multiple channels which included barazas, churches, newspaper, radio and brochures.

Laikipia Produce and Marketing Cooperative

Laikipia Producer and Marketing Cooperative was established in 2014 to produce and market maize. According to a member of the group, Mr. Francis Waweru Kanja, the cooperative has a total of 400 members and have been receiving advisories since 2015. Some of the advisories they received included the onset and cessation of the rains, planting of drought tolerant/early maturing maize and use of conservation agriculture (CA) in light of changing climate. Before PSP advisories, planting time was not informed by the weather advisories and none of the group members were practicing conservation agriculture. After the PSP processes were launched, the advisories became instrumental in influencing value chain actors to start practise conservation agriculture and plant appropriate varieties for their climate.. As a result, Mr. Kanja reported some of the impacts of PSP advisories to include:

- Increased production of maize from the previous 8 bags to 20 bags per acre
- Improved household food security where food is available throughout the year unlike before when it lasted for only 6months.

From these successes, Mr. Kanja was confident that the value chain actors will continue using PSP advisories. He however suggested that PSP should be more frequent and that more community members should be capacity build on weather forecasting interpretation. Furthermore, PSP information should be translated in local languages for enhanced understanding.

Figure 3: The KDMS Officer taking participants through weather forecasting

Incorporating traditional Indigenous Technologies Knowledge in weather forecast.
Indigenous poultry production

Migori County is one of the forty-seven counties in Kenya. It is situated in the South-Western part of Kenya. It borders Homa Bay County, Kisii, Narok Counties Republic of Tanzania. It also borders Lake Victoria. The county covers an area of 2,596.5Km$^2$ including approximately 478 km$^2$ of Lake Victoria water surface. The county has an inland equatorial climate modified by the effects of altitude, relief and the influence of the large body of water of Lake Victoria. Annual rainfall averages between 700 and 1,800 mm. Rainfall is generally continuous with little distinction between first and second rains. Temperatures show mean minimum of 24°C and maximum of 31°C, with high humidity and a potential evaporation of 1800 to 2000 mm per year. The climate favors the cultivation of cotton, maize and a variety of other food crops.

From the start of the seasonal weather forecasts, six PSPs (3 MAMs and 3 ONDs) have so far been conducted in the county. During the workshops, the participants were taken through the forecast scenarios for the preceding seasons and advisories issued for the actors to implement the seasons. They developed advisories that were subsequently disseminated to the actors through barazas and other public gatherings in the whole county.

Successes as a result of PSP advisories: the case of Kelnwakony Women Group

Kelnwakony Women Group was formed in 2013 for the purpose of food security and Economic empowerment. It has a membership of 15 members consisting of 2 adult men, 3 young men, 4 adult women and 6 young women and they deal in Indigenous Chicken Production. The group received PSP advisories from MAM 2013 to OND 2016, through various channels like Barazas, Sub-county climate change working groups, Brochures, and Local radio stations. The messages received were clear and applicable as per the level of education of the members of the group.

The group began utilizing PSP advisories in carrying out their activities including in the construction of Chicken units, Feeds conservation, Eggs management and Disease control and management. The outcomes of these were reported to include:

- Households increased food security through eggs, chicken meat, chicken manure for crops’ production, reduced expenses on commercial fertilizers.
- PSP advisories have helped the group expand its operations, thus creating employment of the three people engaged in the group farm for payment.
- The group has reduced its exposure to climate related risks through rain water harvesting, biogas production and climate smart agriculture.

The PSP information beneficiary
15. Mombasa

Indigenous poultry production

Mombasa County is located in the south eastern part of the coastal region of Kenya. It covers an area of 229.9 Km² excluding 65 Km² of water mass which is 200 nautical miles inside the Indian Ocean. The county borders Kilifi County to the north, Kwale County to the south west and the Indian Ocean to the east. Mombasa experiences 1196 mm of rainfall per annum with an average temperature of 26.7°C. The main crops grown in the county include cassava, cucurbits, maize, vegetables, millet and sorghum. These are most preferred due to the hot and humid climatic conditions that increase plant susceptibility to pest and disease attacks.

The first PSP Workshop in Mombasa County was carried out in April 2014. Advisories developed and disseminated through different media including posters, brochures and local newspapers. Since then, two PSPs have been carried out per year benefitting the communities including Mombasa Kuku Kienyeji Development CBO and Faidika Boresha group.

a) Mombasa Kuku Kienyeji Development (MKKD) Indigenous chicken value chain

Mombasa Kuku Kienyeji Development (MKKD) was started in 2014 and registered as a CBO with the goal of having a socially inclusive, innovative, competitive and commercially oriented association of indigenous chicken agribusiness enterprise. The CBO members are beneficiaries of PSP trainings and usually prepare their members well ahead of the rainfall season. Kongowiea Great Hope, one of the CBO affiliates, states that they are able to plan ahead in terms of feeds and vaccines acquisition. They also undertake repair of poultry units, waste disposal and general cleanliness before the start of rain season as this comes with increased incidence of various diseases.

b) Faidika Boresha indigenous vegetables value chain

Another group that has embraced PSP advisories is Faidika Boresha group operating within Likoni Local Vegetable growers association. They practice in-situ water harvesting on their farms and supplement with irrigation during drought. The group has progressed and diversified to local poultry production. This has ensured that they have regular income from their activities even during drought. They thus consider themselves better off than most people in full employment as they do not run short of food and money to cater for their expenses.
16. Muranga

**PSP in crop production**

Muranga County in central Kenya occupies a total area of 2,559 Km². The county borders Nyeri, Kiambu, Nyandarua, Kirinyaga, Embu and Machakos counties. The county lies between 914m above sea level in the East and 3,353m above sea level to the west along the slopes of the Aberdare Mountains. The highest areas in the west have deeply dissected topography drained by several rivers that flow from the Aberdare ranges to join Tana River. The average rainfall ranges between 1400 mm to 1600mm per annum while the minimum temperatures range between 14°C and 18°C and the maximum between 26°C and 30°C.

The climatic conditions are suitable for crop and animal production. The main crops grown are tea coffee, maize, beans, banana, sweet potato and cassava avocado, mango, macadamia while tomato, cabbage, kale, spinach and french beans. Livestock keeping includes dairy poultry and fish farming.

Participatory Scenario Planning has been used in the county since 2014 to produce advisories for each production season. This was done by 36 trained, trainers of trainers (TOTs) in PSP selected from extension service providers and other stakeholders. The TOTs normally held day long workshops at their respective sub counties comprising of at least 10 stakeholders. Weather forecasts were reviewed for the two regions of the county; the lower drier parts and the upper wetter parts. The products of these workshops were the scenario plans for the March, April and May (MAM) and October, November and December (OND) seasons for the 8 sub counties. The value chain technical teams then used the scenario plans to produce advisories targeting value chain actors.

The advisories were then disseminated through field days, chief’s barazas, churches and other agricultural forums. Kangema Rannet FM station was widely and today runs a continuous program that deals with climate issues called *Kinya kiarie naimera* every Tuesday from 7.00 pm to 8.00 pm. The programme is hosted by county director of meteorology.

Among the key stakeholders in the PSP in the county are CALITAS and Anglican development services.

![PSP TOT at a workshop](image)

![Multi story gardens and use of mulch at the drier parts of the county](image)
17. Nairobi

Vegetable production

Nairobi City County covers a total area of 696.1 Km². It is located between longitudes 36° 45’ E and latitude 1° 18’ South and lies at an altitude of 1,798 metres above sea level. The county’s population is estimated at 3,138,369 and a density of 4,508 persons per km² (2009 census).

The county experiences two rainfall seasons; long rains season in March, April and May (MAM) and short rains in October, November to December (OND). The average annual rainfall is 880 mm. The period between June and August is the coldest when the minimum temperatures average about 11°C to 12°C but occasionally drops to below 10°C, while the average maximum temperatures is 22°C. The hottest period is between January to February when maximum temperature averages at about 27°C but can rise up to 30°C especially on the western parts bordering Machakos County. Most of the farming is small scale and mainly relies on water harvesting for crop production.

The PSP concept started in 2014 MAM season with funding from ASDSP where a workshop was organized for the value chain actors and the relevant service providers. The advisories developed were disseminated through barazas, FM Radios, brochures and posters.

One of the groups that benefited from the advisories is Kamanagu SACCO. The group was formed as a result of ASDSP’s efforts in encouraging individual kale producers to aggregate and market as a group for economies of scale. The membership of the group is twelve (12), five adults and seven youths. The group received advisories on the need to plant early maturing and drought tolerant crops clear the drainages in order to avoid flooding and to report any incidences of crops and animal diseases.

Previously, members of Kamanagu SACCO planted one variety of kales seeds season after season, recycled the seeds, had inadequate knowledge on pests and disease control, poorly disposed empty pesticides containers and neglected management. The group was trained on appropriate pesticides to use depending on forecast of the season and this greatly reduced disease and pest incidences. They started using the certified seeds, routinely cleared the drainages and adopted raised beds technology for seed production to avoid destruction by runoff and storm water. They have also diversified the crops to include cassava as well as thorn melon.

Implementation of the advisories has resulted in increased productivity of kales from 230 Kg to 320 Kg of kales per week from the group’s farm. The incomes also increased from KSh 7,000 to KSh 10,000 per week. One of the group members attested to the benefits of PSP advisories; the respective seasonal forecasts stated that there was the likelihood of depressed rains and increased incidences of pests and disease. Armed with knowledge from the advisories, the member effectively controlled aphids using recommended insecticide and realized significant yields of the kales. Additionally, the advisories assist the farmers in deciding when to procure subsidized fertilizer.
18. Nakuru

Milk production

Nakuru is an agriculturally-rich county covering an area of 7496.5 Km² and with a population of 1,603,325 people, according to 2009 National Census. There are three lakes in the county; Lake Naivasha, lake Elementaita and Lake Nakuru. The average altitude is 1850 meters above the sea level. The county receives between 700mm and 1200mm of annual rainfall distributed between two rainy seasons; March to May (long rains) and October to December (short rains). The average temperatures range between 10°C and 29°C and the cold season is experienced in July to August while the hot season is experienced in January to March. The predominant soil type is loam. Soil cover in the region is poor and the inappropriate agricultural practices have resulted to impoverished soils resulting in reduced agricultural productivity. The prioritized value chains are dairy (cow milk), fish and pyrethrum.

Ngapia dairy group is situated in Piave Ward of Njoro Sub County. The group was started in 2012 with a membership of 51 (27 adult females, 18 adult males and 6 Youth). The objective of the group was increase the production of milk and to undertake collective marketing of the milk by the group.

The group was a beneficiary of PSP advisories released in 2014. Lucy Kimani, a member of Ngapia group owned two cows which were producing 5 litres per cow per day in 2013. During severe dry weather conditions she usually experienced shortage of feed resulting in reduced milk production as her animals would dry up. With little or no milk sales during such period, her household food security threatened. Furthermore, she had no sustainable fuel energy and had limited knowledge on conservation agriculture. The PSP advisories in 2014 recommended: fodder conservation, soil and water conservation, reduction of deforestation, afforestation by planting fodder trees and water harvesting. Lucy has adopted the PSP advisories, for example, she has constructed a water pan which harvests water for road run off and a tank for roof water catchment. Lucy is also a community weather forecaster and her group members and community have benefited immensely.

Lucy realized increased milk production from 5 litres to 7 litres milk per cow day, installed biogas from income obtained from milk sales and is engaged in vaccination of cows to address prevalence of diseases. With increased income, Lucy has been able to pay college fees for her two children and has also renovated her house.

Lucy standing besides bags of conserved fodder

Lucy displays her cooker that utilizes biogas
19. Nandi

**Fodder, maize and fish production**

Participatory Scenario planning (PSP) started off in Nandi County in 2014 and has made it possible for the value chain actors to access climate information and translate it to relate to local livelihoods, knowledge, experience and development. It has therefore facilitated the value chain actors make informed adaptation decisions, plans and actions. Before PSP, the weather information was less accessible and was mainly through the radio. Those who could access the weather information through the radio often could not comprehend it to the level that they could utilize it for the benefit of their value chain activities. With lack of agro-weather advisories, most value chain actors either did not use any weather information for planning their activities or only relied on traditional ways of weather forecasting.

**After PSP: Some successes in the County**

Following PSP, value chain actors can now access weather information through WhatsApp, short messages service (SMS) and email. Others make direct calls to the office of the Director Meteorology Services where they are provided with the information they require. Agro weather advisories from PSP are usually communicated through barazas, field days, exhibitions and brochures.

Due to the sensitization that has been done, most actors are able to comprehend the scenario information from PSP advisories and thus can make informed decisions with regard to planning for the season. They can appreciate scientific weather forecast of the long season March April and May and short season October November and December. Some of the positive outcomes of PSP in Nandi County are outlined below:

**a) Establishment of fodders and fodder conservation**

Following PSP advisories to establish and conserve fodders, cow milk value chain actors started the planting of Boma Rhodes. The advisory aimed at ensuring availability of feeds during the dry season. The Boma Rhodes was used to make hay as a way of conserving the feeds. The County government supported this effort through purchase of baling machine that they made available for farmers to hire at Kshs 75 for every bale made. Over 500 acres of Boma Rhodes have since been established in the County. This has made it possible for milk production to improve significantly during the dry months of January and end of February from an average of 4 litres per day to 7 litres per day. As shown in the table below, milk production higher milk production was reported in the three cooling plants for the dry months of January, February and March in 2016 when compared to 2015.

**Milk production from 3 cooling plants in Nandi County for period January-March**

<table>
<thead>
<tr>
<th>Cooling plant</th>
<th>2015 Litres</th>
<th>Value in Kshs</th>
<th>2016 Litres</th>
<th>Value in Kshs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aldai</td>
<td>16,941.90</td>
<td>508,257.00</td>
<td>65,329.25</td>
<td>1,959,877.50</td>
</tr>
<tr>
<td>Lelchego</td>
<td>619,250.60</td>
<td>18,577,517.7</td>
<td>938,142</td>
<td>28,144,260</td>
</tr>
<tr>
<td>Lessos</td>
<td>525,127.60</td>
<td>15,753,828</td>
<td>960,843</td>
<td>28,825,290</td>
</tr>
</tbody>
</table>

*Source: Kenya Dairy Farmers Federation milk Data 2013-2014*
b) Maize Drier, Lemook Kamasia Value Chain organization

The Lemook Kamasia Value Chain Organization is a group of maize value chain actors interested in maize bulking and selling. At the beginning of 2016, the group had bulked maize with very low moisture content with intention of later selling it for profit. Following PSP advisory that indicated above normal rainfall and less sunlight, the group approached the County government for help who subsequently helped them with the purchase of a maize drier. The drier has since been effective in reducing aflatoxin contamination as well as reducing the rate of rotting. Farmers can keep the maize until the prices stabilize rather than when they used to sell at low prices to avoid getting rotten.

Maize drier at Lemook Kamasia VCO

The actors had aggregated maize with very low moisture content and after being advised that there was going to be above normal rainfall thus less sun light the actors approached the county government for help and they were bought the drier. The groups dries maize for other maize producers/dealers @100/= per bag.

c) Establishment of the raised Ponds

This came about after a PSP advisory for actors to use raised ponds to avoid flooding of the ponds due to a forecast above normal rainfall. A total of 4 Value chain organizations have taken up the technology and are realizing the benefits of fingerlings maturing faster than in normal earth ware ponds.

Raised Pond in Taet group.
20. Nyandarua

Milk production

Nyandarua County is located in the central part of Kenya. The predominant sources of livelihoods in the county are crops, livestock and fish farming. The main crops grown include Irish potatoes, maize, cabbages, garden peas, carrots, wheat, beans, Kales, spinach, tree tomatoes, pears, plums, and pyrethrum. Livestock farming include indigenous and exotic species of cattle, goats, sheep, rabbits, and poultry. Dairy farming is the dominant enterprise in the livestock subsector.

The county experiences moderate to low temperatures with mean average temperature range of 12°C to 25°C. However, temperatures in the valleys may fall to 1.2°C and -1.3°C for a few hours before sunrise. The county experiences two rainy seasons: Long rains from March to May with a maximum rainfall of 1600 mm and short rains from September to December and with a maximum rainfall of 700 mm.

Agriculture in the County is largely rain fed and therefore climate change and variation poses serious risks. The major climate hazards frequently experienced in the county include: drought, heat stress, high temperatures, intense rain and frost. The prioritized value chains are affected differently by the different hazards and therefore the importance of improved access to weather based agro-advisories. The commencement of PSP and dissemination of advisories in the county has empowered value chain actors in making farm level decisions based of seasonal variation.

Mulango Kubwa Moto Moto Women Group was formed in 2012 with a membership of 20 women and is engaged in dairy milk production and marketing. In 2014, the group received PSP advisories; rain water harvesting, early land preparation, use of clean certified planting materials, clearing drainage channels, planting of trees and fodder conservation. The group has adopted most of the advisories and consequently members have recorded increased milk output.

21. Nyamira

Traditional vegetable production

Nyamira County experiences a warm and temperate climate. The county has a bimodal pattern of annual rainfall with the long rain season in December to June and short rain season in July to November with no defined dry spell separating the two seasons. The rainfall ranges between 1200-2100 mm per annum and is well distributed, reliable and adequate for a wide range of crops. The average temperature is 19.4°C and is favourable for both agricultural and livestock production.

The impact of encroachment of water catchment areas and destruction of wet lands is evident and has resulted in reduced water levels in most permanent rivers in the county, reduction of rainfall and prolonged droughts. Consequently, this has led to depressed agricultural production and food insecurity and therefore the need for reliable weather based agro advisory.

Mapema Star Women group is one of the beneficiaries of PSP processes in Nyamira County. The group is located in Masaba North Sub-county and was formed in 2012. It has consistently received and utilized seasonal weather forecasts and advisories since 2014 and has experienced tremendous success in seed production, processing and marketing of indigenous vegetables (sagaa and managu).

- Production increased from 8-12 to 64-128 (70kg) bags per acre in cropping cycle
- Harvest per cropping cycle rose from 4-6 to 6-8 harvests
22. Nyeri

Irish potato production

Nyeri County is located in the central region of Kenya. The county has two major rainfall seasons. The long rainfall season runs from March to May with rainfall amount varying from 160mm to 2000mm, while short rainfall season is between October and December with rainfall amounts varying from between 150mm-600mm. This variability in rainfall amounts has an impact on Irish Potatoes production. The low rainfall performance during any season has been attributed to decline in the production of Irish potatoes and vice versa.

The Kianjogu-kiambogo group, was formed in October 2013 with the objective of growing Irish potatoes and then selling collectively as a group. The group consists of 15 Adult men, 10 Adult women, 5 male youths and 19 female youths. The group is led by Mr. Lee Waithaka. The group has been using PSP advisories since 2014, but the one they can’t afford to forget is for October December 2015 El nino related short rainfall season.

Mr. Waitha recalls that before PSP, their group used to plant any variety of Irish Potatoes one week after the rainfall, and used any fertilizer and planted in one area for long period. In 2015, after attending the PSP workshop in early September, the group was armed with information for the season.

“We were told the variety of Irish potatoes we should plant, when to prepare land, when to plant, and how to implement good agricultural practices like zero tillage” he continued.

Irish potato production rose from an average of 30 bags per acre to 60 bags per acre. There was a marked food increase at household level and source of employment for the youths on farms. Besides, Irish potatoes, the PSP advisories were also used to reduce exposure to climate related risks such as floods since water harvesting structures were in place to conserve water for irrigation.

23. Siaya

Indigenous poultry production

Siaya County borders Busia County to the north, Kakamega and Vihiga Counties to the northeast and Kisumu County to the southeast. It shares a water border with Homa Bay County located to the south. The total area of the county is approximately 2,496.1 km².

Participatory scenario planning approach on weather advisories and dissemination have been held in the county for last four years (8 seasons). The weather forecasts in all the seasons were generated by the County Director of Meteorology. Local knowledge given by community participants was integrated to give appropriate scenarios during the PSP workshops to enable the advisories to be generated.

One of the key participants in the workshops was Siaya Kuku CBO represented by the chairperson Beatrice Otieno. The CBO, located in Pandi village of Alego Sub County, is composed of 20 members (5 males, 12 females and 3 youth) was established in 2012 for production of local and exotic poultry breeds. The main weather related challenge experienced by the group was unreliable rainfall that either result in increased incidences of pest and disease infestation or inadequate feeds for local poultry.

As a poultry farmer, Beatrice Otieno received advisories on weather and how to manage her poultry more efficiently. She was made aware that during drought New Castle Disease (NCD) and fowl pox diseases are prevalent while in rainy seasons, chicks require proper brooding to decrease chick mortality. During this time poultry feeds are more available (increase of termites, ants and other insects and greens). The challenge is transporting poultry feeds and chicks during rainy season. With this knowledge she was able to synchronize her production with vaccination regime. According to different scenarios which come with different pest and disease infestation. She understands that the calendar is about timing of weather. The other group members were also sensitized on the relationship between poultry and weather through the advisories given. This has increased production for all members as they are able to control all common poultry diseases effectively.
"PSP advisories have greatly assisted me in knowing how to plan for the coming season in poultry enterprise, this has enabled me to sell up to 100 local poultry per season resulting in 800 birds for the four years giving an income of KES.400,000 with a profit of KES.126,000". Says Beatrice

24. Trans Nzoia

Maize production

Trans-Nzoia County borders Uganda to the West, Bungoma and Kakamega Counties to the South, West Pokot County to the East and Elgeyo Marakwet and Uasin Gishu Counties to the South East. The county receives an average annual rainfall of 1264 mm which is tri-modal in nature. The mean maximum temperature from 1998 to 2012 is 26.3°C while the mean minimum temperature based from the same period is 12.4°C. The rainfall is poorly distributed with a dry spell from November to March of every year. The agricultural Sector prioritised value chains of the county are: Maize, Dairy Cow Milk and Local Chicken.

The Chemungo value chain group was started in 2006 with an initial membership of 16 people (6 men, 5 women and 3 male Youth and 2 Female Youth). The purpose for starting the group was to produce maize and market together to minimise the challenges of maize marketing. The current total group membership is 30 with 13 adult men; 12 adult women, 3 male Youth and 2 female Youth.

Mr. Franco Sitati Khaemba a member of the chemungo value chain group used to plant maize and other crops and keep dairy cows and local chicken without access to and use of weather and climate change information. He also used to be food insecure and would struggle not only to pay school fees for his school children but would also many times buy vegetables for his family. At one point he lost most of his chicken because he did not know how to relate weather conditions to disease control. He used to get 3 liters of milk per day per dairy cow because he did not have fodder for his two dairy cows during the dry spells.

In 2014, Mr. Khaemba started to receive the PSP advisories, which he has followed to date. These include Weekly weather forecasts and advisories from KMD and other stakeholders. He is a recipient of the advisories and a communicator of the same. He is a trained weather and climate change intermediary.

Through participatory Scenario planning advisories things have changed for Mr. Khaemba. His maize productivity has increased from 28 bags/ acre in 2014 to 33 bags per acre in 2016. His post-harvest loss has reduced from 21% in 2014 to 2% in 2016. The Milk production from his cattle has improved from 3 litres per cow per day in 2014 to 6 litres per cow per day in 2016. His wife no longer buys vegetables for the family. In April 2016, Mr. Khaemba took credit of Sh. 60,000 in Equity bank and paid back by end of the same year from the improved maize harvest. He keeps 17 bags of maize per year in Hermetic bags for his family of 10 persons. He has managed to pay fees for one secondary
school student and another one in a village Polytechnic. Mr. Khaemba has his own monitoring and evaluation system on his farm. He planted maize on 0.1 acre plot in 2014 without use of PSP messages and harvested 2 bags with post-harvest losses of 50%. On the same area of his farm he got 3.75 bags of maize in 2016 with post-harvest losses of 0.7% by use of 2016 PSP forecast and advisories.

There is reduced exposure to climate risks like diseases and pests, floods and droughts. His farm is well conserved with soil and water conservation structures. He has planted a variety of trees on his farm. He has also planted napier grass strips on his farm which serves as fodder for his cattle and as soil and water conservation structures.

25. Uasin Gishu

Milk production

Uasin Gishu County is a highland plateau ranging from 1500m – 2700m above sea and covers an area of 3,327Km², 90 percent of which is arable land. The County has cool and temperate climate with annual rainfall ranging between 900mm and 1200mm with temperatures of between 8.4°C to 26.2°C. The main agricultural enterprises are maize, wheat, pyrethrum, Irish potato, horticulture, dairy cattle, sheep, goats and poultry.

Participatory Scenario Planning (PSP) in the county is a multi-stakeholder, collaborative activity that involves development and dissemination of climate outlook and advisory information while integrating indigenous knowledge on weather forecast. The information and the advisories generated are normally disseminated through barazas, local radio and TV stations and the daily newspapers.

Agricultural value chain actors in the County have benefitted in various ways since PSP processes began in the County in 2014. One of the value chains that has experienced these benefits is the cow milk value chain. Actors in the value chain have been actively utilizing weather forecasts and advisories. A good example is how the farmers used the forecasts and advisories released just before the 2015 El Nino to prepare themselves for its effects. They planted fodder crops such as Rhodes grass, fodder maize, oats and sunflower during the rains and conserved the same for use in the subsequent dry season. This way they were able to keep their dairy herds in good condition and ensured that there was no drop in productivity. Weather based agricultural advisories were also disseminated to passion fruit value chain actors who adopted the sunken planting holes technology for water harvesting. They also planted agro-forestry trees in the orchards which they would later use for trellising their fruit trees.

Another response to the weather advisories was the construction of a dam by the county government and de-silting of an existing dam by Kenya Agricultural Productivity for Sustainable Land Management (KAPSLM) in Moiben Sub-county. These were done to increase amount of water reservoirs in the County and make it available during drier periods of the year.

Rhodes grass, maize and sunflower planted during the OND 2015 El-Nino rains in Soy sub-county

Hay storage barn

New dam constructed in Moiben sub-county

Sunken planting holes technology in passion fruit orchard
26. Vihiga

Banana Production

Vihiga County covers a total area 531km² of which 75 percent is arable. The county experiences equatorial climate with well distributed rainfall ranging between 1800–2000mm per year. It has two rain seasons namely long rains in the months of March to May and short rains in September to November. The mean temperature is 23°C with a range of between 14°C -32°C. The climate is ideal for agricultural production such as growing of coffee, tea, and horticultural crops and rearing of livestock.

The main agricultural enterprises are maize, banana, local vegetables, sweet potatoes, cassava, kales, avocado, beans, tea and sorghum, millet, sunflowers, coffee, dairy cows/goats, pigs, honey, quails, poultry, sheep, rabbits and fish. The value chains prioritized by ASDP are cow milk; banana; and indigenous chicken.

The impact of climate change in the County is apparent from the high temperatures and the heavy and erratic rainfall experienced in recent years. There is therefore the need to build up climate resilience in the County. The County has existing weather forecasting systems for instance the Nganyi traditional weather forecasters based in Emuhaya who in collaboration with Nairobi University and Meteorological department predict the onset of the rains and share the information with the rest of the community.

The introduction of PSP in the County encouraged the sharing and integration of the traditional and the Kenya Meteorological Services seasonal climate forecasts through multi-stakeholder planning of scenario and advisories. Communication of the advisories is carried out through the radio, barazas, posters, brochures, and public institutions.

Agricultural officer presents advisories at a baraza in Luanda

The Banana PSP success story, the case of Moses Okasa

Mr. Moses Okasa hails from Itumbu West Bunyore Ward where he has a 4 acre farm out of which 0.5 acres is under commercial banana bulking. Following dissemination of agro-based weather advisories, he adopted water harvesting as mitigation to delayed onset and early cessation of rain and has dug two water pans. The intervention ensures that the bananas have adequate water supply throughout the year.

Water harvesting pan at Mr Okasa's farm

Banana Orchard before water harvesting intervention at Mr. Okasa's farm

Banana Orchard after water harvesting intervention at Mr. Okasa's farm

Mr Okasa has since increased his orchard by one acre through establishing tissue culture bananas. His orchard is also a bulking site for Bunyore West Farmers and in addition he has established drip irrigated kitchen garden.

County success stories at a glance
Impacts of PSP & Advisories at the counties at a glance

Counties With Low Rainfall Regimes
27. Kajiado

Pasture management

Kajiado County in the southern part of Kenya borders the United Republic of Tanzania to the South West, Taita Taveta, Machakos, Makuengi Nairobi, Kiambu and Narok Counties.

The County has a bi-modal rainfall pattern. The short rains fall between October and December while the long rains fall between March and May. Heavy rains occur around Ngong Hills, Chyulu Hills, Loitokitok and Nguruman Escarpment which receive an estimated 1250mm per annum while Magadi receive less than 500mm per annum. Temperatures vary both with altitude and season. The highest temperatures of about 34°C are recorded around Lake Magadi while the lowest minimum of 10°C is experienced at Loitokitok on the eastern slopes of Mt. Kilimanjaro. The county is vast and the main agricultural enterprises are cattle production for beef and milk, Maize and horticulture.

The main climate related challenges to production include low rainfall in most parts of the county and frequent prolonged droughts that affect availability of pasture for livestock. This leads to community migration in search of pastures for more than 7 months in a year. Incidences of flash floods also occur in some parts of county when the rains finally fall.

PSP in Kajiado started in March 2014 and mainly focused on pasture management for beef and milk production. Multi stakeholder workshops comprising of sector ministries, NGOs, county government, chiefs, farmers, Indigenous weather forecasters and ward administrators were held to share climate information from both local and scientific knowledge. Advisories were then developed and the best mode of disseminating the information presented. Some of the channels used were Opinion leaders, Chief’s Barazas, Churches/mosques, Radio, local press, Television, County government press(monthly), Extension staff, NGOs, Input suppliers (Agro vets).Bulk SMS, and posters. Through PSP and weather advisories, Pastoralists have seriously embarked on pasture production, conservation and harvesting.

Mr Sayanka Ntore, a young entrepreneur is the coordinator of Emparanat milk cooperative. The cooperative was started to bulk and market milk to the Maasai community and has 500 members. Mr. Sayanka had over the years been migrating with livestock during the dry spell. During one of the migrations, he lost all his livestock due to severe drought. He then resolved to start conserving grass and make hay for use during the dry spell using information on weather forecasts for the county. He received the advisories through radio, TV, Bulk SMS as well as through trainings and PSP workshops.

He bought two brass cutters, a motorized hay cutter and employed two youths for the sole purpose of harvesting hay for farmers. As a result, his animals have not migrated as he has hay in store. Members of the Coopreative are also conserving grass for hay making and the incidences of migration have lessened. In one season he harvested 3724 bales for farmers from 41 acres and earned KSH 132,560.

Mr. Jeremiah Rombo, has also has been using the weather advisories given during PSP workshops. After losing 36 cattle due to drought early 2015, he stopped migrating his animals in search of pasture and resolved to fence off his farms after receiving advisories on pasture conservation and fencing in the workshop.

He fenced his land using treated posts and high tensile plain wire. This immediately paid off. The fence kept off over 200 zebras that used to graze on his farm at night and he was able to see the difference between the fenced areas and the unfenced on his own farm.

Mzee Rombo has 280 acres of land out of which over 100 acres have been fenced with 3 large paddocks and plans to complete fencing the whole farm.
28. Kilifi

Cassava production

Kilifi County is one of the 6 Counties in Coast region. The County lies between 2o 20’ and 4o South, and between 39o 05’ and 40o 14’ East.

Kilifi County covers a total surface area of 12,610 km2. It borders the counties of Tana River to the North, TaitaTaveta to the West, Mombasa to the South, Kwale to the South West and the Indian Ocean to the East.

The average rainfall ranges from 300mm in the hinterland parts of the County to 1,300mm along the coastal belt. The temperature ranges from 210c to 340c with altitude ranging from 0 to 450 metres above sea level.

Two PSPs in the county have been implemented per year since 2014 giving a total of six PSP to date. The PSP advisories were tailored to address the weather and climate change risks that face the agriculture based value chain activities with an objective of inculcating resilience in the Value chain development. Songa mbele youth group was one of the beneficiaries of the PSP process.

Cassava production, a game changer in Kilifi County 1/4

Songa Mbele youth group produce and process cassava, Jacline Kabibi is a member of this group which formed in 2007 for the purpose of economic empowerment and food self-sufficiency of the group members who number 20, with 3 adult members and 17 youth members.

The group received PSP advisory elements including planting of high yielding medium to late maturing crops e.g. PH4 Maize, Rice, Coast composite, cassava, vegetables like Brinjals, kales, cabbages for selected areas, onions, passion. Use of solar cookers and dryers in integrated food energy systems and Provision of blended maize with sorghum/cassava flour, cassava flour/cowpea, cassava/wheat flour for enhanced nutrition.

They started receiving and using the advisories in 2015 and have continued up to 2017 through Brochure, local FM radio station, Barazas and SMS. The group agreed that the messages were clear, applicable and useful.

The group reported that before receiving PSP advisories, they used to plant more of maize and little cassava but now they grow other drought tolerant crops like green grams, millet and cow peas. This has saved them from total crop failure and food scarcity was common.

Jackline do mixed farming with Goats, chicken and cattle and use livestock manure to improve soil fertility on her farm.

The new practices which she has since adopted include use of solar cookers and dryers in integrated food energy systems which we are using in cassava value addition activities and manure application which improves the soil fertility and hence improved crop productivity as evidenced by Cassava productivity improved in 2015/2016. The harvest yielded KES 250,000.00, compared to the previous year when we got less than KES 50,000.

There is a remarkable improvement in the food availability as food crops now thrive in the farms and on farm employment has also improved as our group members have been economically empowered and are able to hire casuals on the farms especially just before planting, weeding and harvesting seasons of the year.
Demand and sustainability

The group promised to continue using the advisories since I have registered obvious benefits and continuous use of these advisories would help to teach those who have not started using them to learn by seeing the benefits from their neighbours.

A copy of the brochure print out containing the climate change advisories for the long rains 2015.

Agricultural extension officer stressing a point as the area assistant chief looks on at one of the PSP dissemination barazas in Kilifi County.

Participatory Scenario Planning (PSP) and dissemination of advisories to value chain actors commenced in the County in 2014/15 Financial Year. The advisory information is disseminated through brochures and local FM radio station. Subsequently, one of the stakeholders Caritas-Kitui is coordinating the development of agro-advisories that will be disseminated through the local FM radio stations, under the Climate Resilient Agriculture Project (Match Fund III).

29. Kitui

Green grams

Kitui County is the sixth largest county in the country, covering an area of 30,496.4 Km². It has a low lying topography and altitude between 400m and 1800m above sea level. The County experiences arid and semi-arid climate with a mean annual rainfall of 700 mm. The long rains are erratic and unreliable and are received in the months of March to May while the more reliable short rains fall between October and December. The County experiences high temperatures throughout the year, ranging from 14°C to 34°C and a mean annual Temperature of 24°C. The main agro based livelihood enterprises are pigeon peas, green grams, sorghum, cowpeas, millet, maize, indigenous chicken, goats and honey. ASDSP has prioritized indigenous chicken, sorghum and green grams value chains in the county.

A PSP advisories dissemination baraza in Ganze trading centre Ganze sub-county-Kilifi

Participatory Scenario Planning (PSP) and dissemination of advisories to value chain actors commenced in the County in 2014/15 Financial Year. The advisory information is disseminated through brochures and local FM radio station. Subsequently, one of the stakeholders Caritas-Kitui is coordinating the development of agro-advisories that will be disseminated through the local FM radio stations, under the Climate Resilient Agriculture Project (Match Fund III).

Kanini Kaseo Women group located in Kyangwihya West Ward, Kitui Central sub-county is one of the beneficiaries of PSP advisories. Their utilization of the advisories has helped them to increase production of green grams. The group was started in 2012 and has 28 members and carry out production of green grams, cowpeas, and maize.

Previously, the group experienced frequent green gram

County success stories at a glance
crop failures as a result of unreliable weather patterns coupled with lack of contingency measures. With introduction of PSP, the group received weather based agro advisories on appropriate planting dates, optimum fertilizer rate and time of application, soil and water management and appropriate postharvest practices. Application of the advisories for farm level decisions has contributed to realization of significant yields even during periods of unfavourable weather. Overall, the outcomes of the PSP advisories for the group include:

- **Increased productivity:** The aggregated production from group members rose from a baseline of 20 bags of green grams in 2013 to 35 bags in 2014 and 50 bags in 2015. The drought experienced in 2016 did not dampen their spirit as it had already been forecasted and they had put in place contingency measures that helped them realize 10 bags.

- **Increased profitability:** The group has realized the higher potential and profitability of green grams when compared to maize and have ceased to grow maize in order to concentrate on green grams production. The certainty of significant yield despite adverse weather has increased the groups bargaining power in marketing therefore obtaining better prices for the produce from Ksh 85 per kg in 2014 to KSh 110 in 2016.

### 30. Kwale

**Passion fruit**

The county experiences climate that is generally tropical humid due to the high humidity that originates from the Indian Ocean. The County lies at an altitude between 100 to 462 metres above the sea level with an average temperature of 24.2 °C and an annual rainfall range of between 400-1200mm. The County receives two rainy seasons, short rains (October to December) and the more reliable long rains that occur between March to July. The County agricultural production is mainly rain-fed and therefore adversely affected by climate change. Heat stress, dry spells, drought and flooding are hazards that strongly contribute to agricultural risk in the County. The main agro based livelihood enterprises are formal employment (tourism), mixed farming, fisheries and livestock farming.
Water pan belonging to a member of the organization

The value chains prioritized for intervention by ASDSP include Indigenous chicken, African bird’s eye chillies and Passion fruit. Climate change has impacted on these prioritized value chains mainly because of increased frequency of extreme weather events and unpredictability of weather patterns. To address the challenges of climate change and enhance resilience of value chain actors in the County, ASDSP and partners introduced PSP and dissemination of weather based agro advisories in 2014. Since then, PSP is a bi-annual event, with the weather forecast customized to the Ward level via diverse communication channels such local radio and TV stations, Whatsapp, internet, baraza, field days, churches, schools and brochures.

Kwale Farmers Collection Centres Organization is one of the value chain actors that has benefited from these advisories. The organization is community based and is involved in seedling propagation, production and marketing of passion fruits. It has a total of 26 collection centres and works closely with research institutions in the development of resilient and highly demanded passion fruit varieties. Prior to the introduction of PSP, the production of the fruits was mainly rain-fed. A few members have however adopted climate smart technologies such as drip irrigation, water harvesting and minimum tillage.

Member’s passion fruit plot under minimum tillage

In 2015, the advisories indicated that the expected rainfall would be depressed and poorly distributed and farmers were advised to implement water harvesting and drip irrigation initiatives, which were supported by the Micro Enterprises Support Program Trust (MESPT).

One of the impacts realized from implementation of PSP advisories is that some of the group members have been able to achieve all year-round production as a result of installed drip irrigation technology and hence have the opportunity for better returns from off-peak season produce.

31. Lamu

Cashew nut production

Lamu County is located in the northern coast of Kenya and has a total land surface area of 6273.1km² composed of the mainland, 65 Islands, 130 km coastline and water mass covering 308 km². The County is characterized by bimodal rainfall distribution of 540 mm per year and a mean temperature of 28°C. The main economic activities in the county include crop production, livestock production, fisheries, tourism and mining. Cashew nut, cotton, coconut, mango, maize, simsim, cassava, bixa, green gram, cowpea and pigeon peas are the main agro based livelihood enterprises. The County’s priority value chains include cashew nuts, indigenous chicken and capture fish.

ASDSP began supporting dissemination of climate advisories in 2013 by bringing together stakeholders to synthesize the weather forecasts generated by KMD, develop agro-based weather advisories and disseminating the information to the value chain actors. The dissemination channels used include radio, local TV, Whatsapp, internet, baraza, field days, churches, mosques.

One of the beneficiaries of PSP advisories in the County is Mpeketoni environmental conservation beautification youth (MECOBY) group in Lamu West. They received advisories and implemented advisories on crop diversification and rotation, use of suitable crop varieties, pre- and post-harvest management, value addition of cashewnut, water harvesting and conservation technologies, zero tillage, conversation agriculture, agro-forestry. For cashewnut production in particular, the following impacts from PSP advisories:

- Cashew nut yields increased from 3- 10kg/tree/year to 25-30kg/tree/year and the produce is of premier grade recognized by FTI (fair trade international) market standards.
- Cashewnut acreage increased from 4123Ha in 2011 to 7223Ha in 2015.
- Production rose from 3016 tons in 2011 to 7771 tons in 2015
- Reduction of losses due to pest and diseases by 30 percent.
- Prices increased from Ksh. 25-42 to Ksh. 65 per kilogram
- Cashew incomes increased from Ksh. 60.2 million in 2011 to Ksh. 412.2 million in 2015
Mr. David Ndambuki, a dairy farmer in Kangundo Sub County started receiving information on the weather and the weather advisories through the radio in 2013. Before the advisory, he used to grow food crops on his farm when the rains fell. Sometimes the harvest was good and other times there would be crop failure as is common in the county.

Machakos County is ASAL in nature and is located in the lower Eastern part of the Country. The county receives bimodal rains averaging between 500-1300mm. The short rains fall between October to December and long rains in March and May. The annual average rainfall ranges between 500mm in the low lying areas and 1300 mm in the highland areas, and is unevenly distributed and unreliable. Temperatures vary between 18˚C and 29˚C throughout the year. Periods are experienced in January to March and June to September. The main crops grown are maize, beans, cow peas, pigeon peas, and mangoes. The major livestock are Dairy cattle, Beef cattle, Goats, Sheep and Bee hives.

The PSP processes started in 2013/2014 funded by CARE International. There after ASDSP partnered with CARE International and the county government to support the processes. Six PSP have been produced and the messages have mainly focused on the occurrence of depressed rains while the advisories concentrated on conservation measures as the weather forecasts disseminated through the local radio station and poster.

In 2016, Mr. Ndambuki came across the advisory poster at the Agricultural office. The advisory said rains would be depressed and Farmers should plant legumes, plant fodder for animal like brachiaria and boma rhodes. After reading the advisory he realised that the rainfall season would not favour the growth of maize which he used for fodder. He therefore planted Brachiaria in 90% of the farm and food crop (maize and beans) in only a 10% of the cultivated land.

Out of this initiative, Mr David Ndambuki realized an increase of 20 percent in milk production due to availability of livestock feed, he increased the number of dairy animals from ten to seventeen animals as there was plenty of feeds available. As a result of using the advisory Mr Ndambuki has realized the following: Increased milk production by 20%; Year round supply of animal feeds; Sold 600 bales of hay at Kshs.300 in 2016; Sold root splits worth 20,000/= to 10 dairy farmers; Sold seeds worth 2,000=.

Mr. Ndambuki now purchases his food requirements from the shops to avoid crop failure and he has employed 5 casual laborers. Mr. David Ndambuki has reduced the climate risk by storing the brachiaria as hay. He says he has benefited from the advisory and would continue using the advisories.
Indigenous poultry production

Bene farm is located in Kako/Waia ward in Mbooni Sub-county. The area is hilly with shallow soils. Rainfall is erratic, poorly distributed and unreliable for successful crop production. The farm belongs to Mama Eunice Mukai who had been growing maize and beans but always harvested below her families requirements. In 2011, following an exchange visit to Machakos County, she decided to engage in poultry production after visiting medium and large scale poultry farms. She started off with a small poultry unit and few indigenous birds financed through her group’s Merry go round. She then started saving with universal traders SACCO, a micro-financial institution that has a loan product for poultry farmers. After saving for six months she acquired a farming loan of seventy thousand (Ksh. 70,000/=) and constructed a large unit, put a perimeter fence around the house and sourced for KALRO improved indigenous chicken.

Feeding her poultry was a challenge as Makueni county is the area semi arid in nature. The county which lies in the south eastern parts of the country covers an area of 8,034.7 Km2. The county’s terrain is mainly low-lying and semi arid to arid in nature at an elevation of 600m asl. Chyulu, Mbooni and Kilungu hills rise to 1900m above sea level and have distinct micro climates. The county experiences two rainy seasons, the long rains occurring in March /April while the short rains occur in November/December. The hilly parts of Mbooni and Kilungu receive 800-1200 mm of rainfall per year. Average temperatures in the low-lying areas are 35.8 °C and range between 20.2° to 24.6°C at the hills

Crops grown include maize, green grams, pigeon peas and sorghum. The major fruit trees grown are mangoes, pawpaw and oranges. Dairy farming is practiced in the hilly parts of Kilungu and Mbooni. The lowlands are used for livestock keeping, ranching, cotton and fruit production.

"I have realized that chicken is profitable and am now preparing to construct another poultry unit that can house 1000 chicken. My target is to keep 3000 birds at any given time. I normally sell chicks at day old, one week old, two weeks all through to mature birds. Whoever wishes to buy chicken at any age, I normally sell. With seriousness and commitment one can earn livelihood from production of chicken only. Now I have 600 birds among them about 200 layers which are currently laying. I also maintain KARI Kienyeji chicken”. Says Eunice Mukai
Poultry house constructed in December 2012 with chain link fence as Bio-security measure.

Trenches constructed in 2014 to harvest runoff waters and maize planted for poultry feed.

Fish pond construction to harvest rain water for fish.

Poultry house constructed in December 2012 with chain link fence as Bio-security measure.

Commercial layers

Improved KALRO kienyeji
34. Narok

Milk production

Narok County is situated along the Great Rift Valley. The county is named after, Enkare Narok, the river flowing through Narok town. The County has both the Pastoral and agricultural community living in the Lower and the upper zones respectively. The pastoral community is mainly the Maasai who traditionally keep large herds of cattle, sheep, and goats as a means of livelihood. The County has a bimodal rainfall distribution pattern with the long rains falling from March to May, and short rains received between September and November. The average annual rainfall ranges 500-1800mm. The lower zone of County is relatively dry, receiving an annual average rainfall of 500-700mm. The County is prone to climatic related disasters such as floods and droughts which impacts negatively on county livelihoods.

Enelerai Farmers Cooperative was formed in 2008 with the objective of producing, collecting and selling milk. The Cooperative has 1,005 members (540 females and 265 youths). Mrs Esther Tuya, a member of the group, started receiving PSP advisories in 2014. She confirms that most members of the group have been receiving the advisories through workshop attendance, FM radio station and Chief Barazas.

“The advisories are clear, specific and very important to our group. We can now overcome the negative impacts brought about by drought” she says.

“We are now growing pasture Rhodes grass, Napier grass and store maize stovers recommended by advisories for preparedness during dry seasons” she explains.

“We harvest water at household level using ROTTO tanks and participate in excavating a water pan at village level to store enough water for our cows during dry spells or drought” she narrates.

“As a result, volumes of milk per cow have increased from 2-3 litres to 10 litres, income per milking cow has increased from 100/= to 500/= per day, household food availability has improved, and youths have employment” she explains.

“I am very happy with the PSP advisories and I urge the organization involved to continue supporting the initiative” says Esther.

“My husband and I are now employed on the farm and I equate this to a monthly Job” she concludes.
35. Taita Taveta

Hay production

TaitaTaveta County is located approximately 200 Km northwest of the coastal city of Mombasa and 360 Km southeast of Nairobi. The County covers an area of 17,084.1 Km².

The County is divided into three major topographical zones. The upper zone, suitable for horticultural farming, comprises of Taita, Mwambirwa and Sagalla hills regions with altitudes ranging between 304 metres and 2,208 metres above sea level. The lower zone consists of plains where there is ranching, national parks and mining and the volcanic foothills zone which covers the Taveta region with potential for underground water and springs emanating from Mt. Kilimanjaro. The County is mainly dry, except for the Taita hills which are considerably wet.

The County experiences two rainy seasons - the long rains between the months of March and May; and the short rains between October and December. During long rains, on average the highlands record 265 mm while the lowlands record 157 mm whereas during short rains, annual rainfall is 1,200 mm and 341 mm for highlands and lowlands respectively. The annual mean rainfall is 650 mm.

The average temperature in the County is 23°C, with temperatures getting as low as 18.2°C in the hilly areas, while on lower zones, temperatures rise to about 25°C.

The prioritized value chains in TaitaTaveta are Banana, cow milk and indigenous chicken. The main challenge to agricultural production in the plains is the low and unreliable rainfall. In spite of the unpredictable rains, the local communities engage in maize production which gives marginal yields due to the prevailing climatic and weather conditions.

To enhance the capacity of agriculture value chains actors to adapt to climate change in the County, Participatory climate Scenario Planning process was introduced in the March, April, May (MAM) season of 2014 to enhance the development of the value chains. Through this process it was realized that the erratic rains cannot economically support and sustain a good harvest of maize. However, season after season the same rains support massive growth of natural pastures of good nutritive value capable of supporting dairy cows.

Kishushe Hay Self Help Group received the advisories mainly through barazas, brochures and local FM radio, came up with way of supporting the Cow Milk Value Chain. Prior to this the cow milk value chain faced the challenges of Low milk yield per cow due to poor feeding and inferior breeds, plus that of weak linkages between the value chain actors and markets.

Kishushe Hay Self Help Group was started and registered in 2013 with a membership of 25 (12adults and 13 youths). They engaged in harvesting and bailing of pasture in the plains after the rains. They started with a small hay barn in a place called Mkuro which is in a valley in Kishushe group Ranch which covers an area of 60,000 ha. The group members have been trained on best practice technologies such as mechanized hay harvesting and good storage practices of hay. The members were also linked to cow milk producers so as to enhance marketing skills.

They started by producing and selling 400 bales of hay per annum at Kshs. 100 per bales. Through support from USAID KAVES the group has constructed a hay barn while the County Government through its livestock department provided tractor on hire to the group to facilitate automated grass harvesting and hay bailing. As a result hay bailing increased from 400 per year to 7000 bales annually. The price of hay increased from Kshs.100 to Kshs 200 per bale due to demand leading to increased income for the group from Kshs. 40,000 to Kshs. 1,400,000 per year. The availability of hay has encouraged the cow milk producers to engage in making homemade animal feed rations (Total Mixed Rations) which has increased milk yields per cow from 5litres to 7litres per cow per day, through adoption of best practice technologies which include feeding with hay from the store as opposed to going for fresh grass every day.
36. Tharaka Nithi

Poultry production

Tharaka-Nithi County borders Embu County to the south, Kirinyaga and Nyeri counties to the west, at the peak of Mt. Kenya, Meru County to the north and Kitui to the southeast. The total area of the county is 2,662.1 km², including Mt Kenya forest which is estimated at 360 km².

The main Agro-Ecological Zones (AEZ) range from the Tropical Alpine on Mt. Kenya through the Upper Highlands, Lower Highlands and Upper Midlands in Maara and Meru South (UM2-UM3) to Lower Midlands and Lower Lowlands in the Tharakas. The county receives bimodal regime of rainfall where long rains fall in March to June and short rains from October to December with a rainfall range of 230 mm p.a. in the lowlands to 2,500 mm p.a. in the uplands. The temperature range is 20°C to 22.5°C and two cropping seasons experienced in a year. The county is predominantly maize/coffee growing zone with some dairy enterprises in the upper zones. The lower zones predominant land uses are dry land farming and livestock production. The priority value chains are bananas, cow milk and indigenous chicken.

PSP in the county started in MAM rains 2014 after training by the NPS and CARE international. The exercise started with a pre-survey countywide, which was done by several stakeholders. Among the interviewees included traditional forecasters who gave indicators of expected rains onset and how much rain was expected in a season. A workshop was carried out where a wide range of stakeholders were invited, went through the training, looked at the likely scenarios, prepared the advisories and translated them into Kiswahili, Kitharaka and Kichuka languages. The plenary then made a dissemination plan across the county. PSP exercise has steadily grown since then, with various stakeholders opting to do certain activities within the PSP.

Angaza Agri-services Ltd, an agricultural input supplier, had previously supplied its affiliated groups with farm inputs on credit where the producers would pay slowly. After the prioritization of the value chain in Tharaka Nithi (bananas, cow milk and indigenous chicken), Angaza immediately mobilized groups for indigenous chicken production and requested for capacity building to support its group leaders on chicken husbandry. The organization got an opportunity to have forty (40) group leaders trained, who came back as TOTs, and each leader came home with six (6) birds. Since the inception of PSP, Angaza has always been involved in the PSP workshops and dissemination of the advisories where the aspect of chicken survival has been linked to weather patterns.

Before PSP, chicken belonging to Angaza Agri-services Ltd network of groups used to lose their chicken at certain times of the year mainly due to disease outbreak and poor housing which were accepted as the normal situation. Chicken never slept in houses in Tharaka, but used to perch on trees in the evenings.

Phillip, the CEO of Angaza mobilized support from partners to train his network of groups on weather related vaccination schedule and benefits of proper housing for the birds. The chicken were successfully vaccinated and slept in chicken houses. They were also able to survive the new-castle disease which comes at particular times of the year. The general chicken diseases were also controlled.

The 40 group’s leaders continued to offer leadership not only in chicken production, but also practically sharing their experiences with their fellow farmers. Each leader sold 8 – 10 birds per month, translating to 320 – 400 birds @ 800 – 1,000/= per bird. That brings the incomes to 256,000 – 400,000/= per month for the leaders alone. The number of chicken per household grew from five (5) to ten and steadily increased as there was a ready market.

Angaza requested for funding support from International Fertilizer Development Centre (IFDC), which was utilized to support the capacity building and development of the ICVC producers. Presently, Angaza is in the process of partnering with Plan International – Tharaka, who together will pilot with one group and one public primary school, by fully supporting them for indigenous chicken production and later linked to markets. This has also brought on board Jufra Agro-strategies Ltd, who will provide quality chicken feed. Initially, Jufra came to ASDSP as an input supplier, but later started manufacturing animal feeds, thus aligning themselves with the Cow Milk and Indigenous Chicken VCs.

In the Angaza group’s network, there are 100 groups where the chicken have survived and about 1000 members of these groups with healthy flocks. These are the producers who now take indigenous chicken as business unlike earlier when it was a hobby or subsistence purposes.

County success stories at a glance
An old poultry house

New poultry house after training

A group member feeds the older chicken

Chicks in improved housing
Impacts of PSP & Advisories at the counties at a glance
Arid and Semi-Arid (ASAL) Counties
37. Baringo

Honey production

Baringo County is classified as Arid and Semi-Arid Lands (ASAL) with most parts of Tiaty, Baringo Central, Baringo South, Baringo North, Mogotio sub-counties being ASAL. Koibatek is the only sub-county that is found in a highland zone. The County covers an area of 11,015.3 sq km of which 165 sq km is covered by surface water, i.e., Lake Baringo, Lake Bogoria and Lake Kamnarok.

The County experiences two seasons of rainfall; the long rains start from the end of March to the beginning of July, and the short rains from the end of September to November. The rainfall is about 50 percent reliable and ranges from 250mm per year in the arid parts to 1500mm in the high altitude Timboroa area. The mean annual maximum temperature in the southern part is between 250 to 300C and 300C to 350C in the northern part.

The value chains prioritized under ASDSP include cow milk, honey and meat goat. These value chains are however impacted upon by climate change which has adversely affected their productivity, profitability and sustainability. To enhance resilience capacity of value chain actors to climate variability there was need for timely dissemination of accurate weather or climate information. This was achieved through Participatory Scenario Planning (PSP) and dissemination of weather advisories to value chain actors.

Rachemo Honey Marketing Cooperative Society is one of the value chain actors that benefited from PSP advisories. The Cooperative Society was founded in 2006 with a membership of 78 members (50 males and 28 females). It is involved in bee keeping, processing and marketing of honey. In 2014, the Cooperative received weather advisory that the rainfall expected was likely to be depressed. This informed members to put in place mitigation measure by providing bees with water during drought and this prevented the bees from absconding from the hives. As a result, the cooperative reported several key achievements:

- Increase in volume of honey processed and marketed, from one to six tonnes per year.
- Certification of the honey products by Kenya Bureau of Standards and this has helped them penetrate a wider market
- Reduced exposure to climate related risks as a result of the Cooperative constructing water harvesting structures. This has helped prevent bees from swarming away during dry spells.

Cooperative member displays Rachemo Branded Honey
38. Elgeyo Marakwet

Pasture production

The County covers a total area of 3029.9 Km² and border West Pokot, Baringo, and Uasin Gishu Counties. It is elongated in shape and has three distinct ecological zones. The highland plateau that rises up to 3350 meters above sea level at Cherangany Hills to the North, the steep steps and flat plateaus that comprise the escarpment, and the Kerio Valley which lies 900 meters above sea level. This variation in altitude causes considerable differences in climatic conditions; the Highlands are cold with temperatures that range between 15° C and 23° C, while the Escarpment and the Valley experience temperatures that vary between 17oC and 30°C. The amount of rainfall received in the three zones also varies with the highlands receiving on average 1500mm per annum, the Escarpment 1000mm and the Kerio Valley 850mm. The main agricultural sources of livelihoods are livestock keeping, mixed farming, horticulture and apiculture and agribusiness. The county’s priority value chains were dairy, Irish potatoes and maize.

PSP was introduced in the county in 2014 as a means of strengthening the link between weather forecasters and value chain actors to cushion the community against the vagaries of climate and weather. The forecasts and advisories were done for all the long rain seasons (March-April-May) and short rain seasons (October-November-December).

Rema Dairy Self Help Group was one of the beneficiaries of the PSP process. The group was formed in August 2004 by seven dairy farmers who were practicing semi zero-grazing. The membership grew to 25 comprising of 10 Men, 7 Women, 5 Male youth and 3 Female youth. The group members own on average of 2 dairy cows that produce an average of 5 liters of milk per cow per day. Each member has planted Rhodes grass for production of hay to be used during the dry season. The group markets their milk collectively to Iten KCC at a price of Ksh 30 per litre.

The weather forecast and advisories for 2017 long rains indicated that the rains would be below normal and fodder would be in short supply. Farmers were therefore advised to store sufficient feed for their dairy animals. The group received the advisories through brochures, posters, but said the most effective modes of communication were through KASS TV and KASS FM as well as from the county website for those who had access to the internet. The advisories were also shared during the Elgeyo Marakwet Dairy Farmers Association (EMCODAF) meetings.

Before the PSP advisories, members used to plant their pasture at the first signs of rain. There would often be crop failure when the rains delayed. The advisories have therefore been very useful in enabling the members make informed decisions. The advisories for the 2017 long rains assisted the group to store feed for their dairy animals which helped maintain the average milk production per animal at 5 liters per day as opposed to previous periods when production would decrease to less than 3 liters per cow per day during dry season. This was an extra Shs. 60 per cow per day compared to the previous years. The 2015 short rain advisories also enabled the group members to make silage from excess fodder produced during the El Nino rains. This was used in 2016 to sustain milk production.

PSP advisories have helped the group and the Elgeyo Marakwet County farmers to plan their activities according to the forecasted weather patterns. The farmers have been able to reduce losses and minimize damages due to mitigation measures taken on time. Most of the members have planted trees and installed water storage structures to assist during periods of scarcity.

Hay stored in Kibor’s farm in Tambach, Keiyo North Subcounty
**39. Garissa**

**Tomato production**

Ishmael Mohamed a member of Halwadag Group farm has been growing tomatoes on his farm along the river Tana. While some years were good and he received good returns, sometime the river would break its banks without warning and he would incur huge losses. Members of the group and the surrounding community also suffered the same fate. The losses included water pumps, irrigation infrastructures and disruption in transport and communication infrastructure.

In 2014, while listening to his radio, he heard the weather advisory for October, November and December. This information was new as before this they only received the weather forecast but were not advised on what to do.

In 2014 OND season, the Advisories received were;

- The rains were to be higher than our normal rains.
- Mt. Kenya region, the source of river Tana was to receive even higher rainfall.
- There was a high likelihood of River Tana to burst its banks and flood.
- Farmers advised to secure their pumps and farm implements.
- Mature crops – Banana, Mango and tomato were to be harvested before the floods.
- Farm tilling/ land preparation to be done away from on the flood zones.
- The land should be tilled when the floods recede.

**Participatory scenario planning advisories**

Participatory scenario planning was started in Garissa in 2011 to develop systems that address climate change adaptation and mitigation. Garissa is an arid County in the eastern parts of the country traversed by the river Tana in parts of its western boundary. The County receives an average annual rainfall of 275 mm and has two rainy seasons; the short rains season from October to December and the long rains from March to May. Rainfall is normally in short torrential downpour making it unreliable for crop production. Temperatures are on average high throughout the year and range from 200C to 380C, with a mean of 360C. The weather patterns result in an array of hazards that include drought, floods, Flash floods, pests and diseases all of which have adverse effects on agricultural production. Livestock rearing is the backbone of the county’s economy. The main livestock kept are cattle, goats, sheep, and camel. Crop production is carried out under irrigation on small scale along river Tana. The most important crops grown are banana, tomato and water melon.

The prioritized value chains under the ASDSP are Tomato, Beef and Camel milk. Tomato production is carried out under irrigation along the river Tana. The river’s catchment is the two water towers in the eastern highland, Aberdare ranges and Mt. Kenya. These areas receive high rainfall during the wet seasons of March to May and October to December which cause the river Tana to swell resulting in seasonal flooding in the lower parts of the river Tana drainage system. The floods often disrupt the agricultural activities along the river including tomato production.

Information on weather and climate is given high priority in the county. PSP advisories are developed by involving all the stakeholders in climate information, Climate change mitigation and adaptation, consumers of the information and policy makers. This means government agencies, NGOs, CBOs, Community members are involved in all the steps of the PSP, from review of the previous season to monitoring and evaluation. This approach has integrated PSP into the fabric of the community and other organizations. Through the government agencies, an early warning platform has been created to help in managing any hazard that might result from weather situation.

Garissa is a vast county and in order to reach all the value chain actors, a communication strategy for PSP is developed during the workshops. The most effective channels of communication have been found to be radio and TV news bulletins, bulk SMSe, posters and face to face communication during barazas. These are used on weekly and monthly basis to disseminate information on weather and the accompanying advisories.

The advisories have helped reduce losses to farmers along the river tana as shown in the table below.

The reported cases of floods disruption on tomato value chain in OND 2013 and OND 2015 together with estimated losses.
<table>
<thead>
<tr>
<th></th>
<th>OND 2013</th>
<th>OND 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total unit cultivated (Acres)</td>
<td>2150</td>
<td>2356</td>
</tr>
<tr>
<td>Units affected (Acres)</td>
<td>843</td>
<td>542</td>
</tr>
<tr>
<td>% Affected</td>
<td>48%</td>
<td>23%</td>
</tr>
<tr>
<td>Estimated loss/ cost (KES)</td>
<td>23,446,434</td>
<td>12,931,000</td>
</tr>
<tr>
<td>Access road affected</td>
<td>354 Kms</td>
<td>203.1 Kms</td>
</tr>
<tr>
<td>Estimated loss/ cost (KES)</td>
<td>165,454,100</td>
<td>95,452,500</td>
</tr>
<tr>
<td>Pump sets affected</td>
<td>138 pump sets</td>
<td>127 pump sets</td>
</tr>
<tr>
<td>Estimated loss/ cost (KES)</td>
<td>17,315,800</td>
<td>14,095,000</td>
</tr>
</tbody>
</table>

Sources: Garissa County Flood reports (Department of Agriculture) and Elnino floods Assessment report (December 2015)-NDMA

The advisories have helped Ishmael Mohamed and other farmers in the community mitigate the impacts of floods as:

- He now uses the recommended seed varieties, and has seen change in productivity. Previously, before ASDSP intervention he was harvesting approximately 600kgs of tomato in his 1 acre tomato farm (the group farm is about 360 acres), currently in a good season he can harvest over 1000kgs from the same farm.
- Losses from floods; both in terms of produce and farm assets have reduced.
- Income and profitability has increased – (No records), but calculation from the production can give a general income increment of more than 60%, all other factors remaining constant.
- Food availability has improved too.

The farmer expressed optimism in continued use of advisories but recommends that the advisories presented, 1 – 2 months before the onset of the season, to give the farmers more time to prepare and act.

Saka farm showing tomato crop destruction after 2014 OND floods

Tomato plant field located away from the flood plains in Hogoljo IFSAP farm was not affected by floods in 2014 OND floods.
Livestock marketing

Isiolo County covers an area of 25,336.1 Km² and has a population of 143,294 persons (2009 census). The county is known for her rich eco-tourism and diverse natural resources. The inhabitants mainly depend on livestock economy and agricultural production of food crops to a lesser extent. The main land use is large scale nomadic pastoralism.

The county has two rainfall seasons; the long rains in October to December, and the short rains between March and May. The average annual rainfall is 580.2 mm which is unreliable and therefore cannot support perennial crops. The mean temperatures range is 12°C to 28°C.

The prioritized value chains in the county are beef, camel milk and tomato. Access to timely and accurate weather information is important in development of the value chains. PSP and dissemination of advisories to value chain actors was introduced in the county in March 2014. PSP advisories are packaged as part of innovative technologies by the Environmental Resilience Thematic Working Group and are disseminated through partners.

Kinna livestock marketing group

The group was formed in 2007 and has 12 members (8 males and 4 females). The main activities are buying, fattening and selling the fattened cattle. The group received advisories through brochures and Baliti FM radio. The advisories were on expected amounts of rains and strategic actions to be taken by the value chain actors. The actions included selling of animals before drought period is experienced, production and conservation of fodder when normal or above normal rains were expected. This was a paradigm shift from the previous practices where beef producers would just hope there would be adequate rains and pasture.

Therefore the group registers minimal livestock losses during drought since members sell their animals before the body condition deteriorates. The VCAs for the first time, enrolled to livestock insurance, with 1870 cattle being insured in 2016.

Malka Bisan Adi fodder producer group was formed in 2004 and has 30 members (12 males and 18 Females). The main activity of the group is fodder production and conservation. They also sell surplus conserved fodder and standing pasture. Most of the fodder is sold to group members during dry season at reduced price.

The group got PSP advisory in 2015 OND season on the expected enhanced rainfall, dates for onset and cessation of the rains. They seized the opportunity and planted seven hectare of pasture which was later conserved for sale during the dry season. The group realized 720 bales of hay per hectare and an income of KSh 144,000 compared to 100 - 150 bales per ha and revenue of KSh 20,000-30,000 obtained previously. In case the forecasts predict that expected rainfall would be depressed the group plants reduced acreage of fodder and conversely plant more acreage when expected rainfall would be above normal. The group also stores previously harvested hay for sale during drought period when prices are good.
41. Mandera

Fodder production under irrigation

Mandera County is located in Northern Kenya and is classified as Arid and Semi-Arid region. It lies at an elevation between 400m at Elwak to 970 m above sea level on the border with Ethiopia. Temperatures are relatively high with a minimum of 240C in July and a maximum of 420C in February. The county receives an annual average rainfall of 255mm. Most parts of the county experiences long hours (approximately 11 hours) of sunshine in a day and this result in high evaporation rates. The main economic activities include pastoralism, quarrying, bee keeping and agricultural production along river Daua. The river is permanent running 150 Km along the county’s border with Ethiopia.

In the last few decades, the county has been experiencing prolonged droughts resulting to shortage of pastures and water and subsequently high livestock mortality rates. Pastoralists depend on livestock for all their basic needs and any losses undermine their economic and food security and therefore increasing the resilience of communities to manage the effects of drought is paramount.

PSP advisories arm pastoralists with recommendations to mitigate the effects of drought, for example, production and conservation of irrigated fodder. Following prediction of possible failure of the 2016 October-December rains, fodder producers were given grass seed in order to increase acreage of irrigated fodder along river Daua. About 300 acres is currently under irrigated fodder production.

The county government and partners facilitated the construction of 25 hay stores within production zones, each with a capacity of 8,000 to 10,000 bales. The county bought 135,000 bales of hay produced in 2015-16 and distributed it in January 2017.

42. Marsabit

Kale production

Marsabit County is one of the largest counties in Kenya, covering about 14 percent of the total area of the country. It is one of the driest counties in the country with the exception of high potential areas around Mt. Marsabit, Kulal, Hurri Hills and the Moyale-Sololo escarpment. The annual rainfall ranges between 150 mm and 1,000 mm. Temperatures range from a minimum of 10.10C to a maximum of 38.20C, with an annual average of 24.10C. The main source of livelihood is pastoralism in the lowland areas while agro-pastoralism is practiced in the highland pockets.

Crops grown include maize, beans, teff, cowpeas, green grams, kales, tomatoes and spinach. Crop production in the county is affected by erratic weather conditions and frequent droughts sometimes leading to total crop failure. There are five farmer cooperatives namely; Madoadhi, Khadheere, Kurungu, Songa and Log Logo engaged the production of kales. The cooperatives were formed to enable members to engage in the business along the kales value chain together, particularly procurement of inputs and marketing.
The cooperative started receiving climate information from PSP advisories and participation in the PSP workshop and dissemination in 2014. Since then, the groups have increased kales acreage from 250 ha to 450 ha producing 50 tonnes per year valued at Ksh. 3.5 million. This has improved household food security for members, generated over 1,500 jobs for youth and women and an estimated 4,000 production and marketing jobs.

A member of the cooperative harvesting kales

43. Samburu

Maize production under irrigation

Samburu County is located in the northern part of the Great Rift Valley. The county has fairly erratic rainfall varying significantly both in amount and distribution across the county. The southwest plains and the Lorroki Plateau receive between 500 mm and 700 mm of rain annually. The Nyiro and Ndoto Mountains and Matthews range, however, receive the highest amount of rainfall between 750 mm and 1250 mm per annum. The central basin and the plains east of the Matthews Range are the driest parts of the county with annual rainfall of between 250 mm and 500 mm. Temperatures range between 24°C and 33°C. This climate variability and weather extremes have a negative effect on county livelihoods and hence food security.

The Naruti self-help group was formed in 2014 during ASDSP foundation concept. The group is located in Samburu North Sub County and was formed for the purpose of producing maize to improve food security and reduce over reliance on relief food supply from the Government. The group has 42 members; 12 Adult males, 10 Adult females, 16 male youths and 4 female youths.

During the rainy season in October to December 2015, Naruti Self-help Maize producer group received the advisories and chose to plant Katumani and DH04 maize varieties which matures early and have low water requirement. As a result, the group harvested 300 bags (90kg) and generated a revenue of Ksh 900,000. The farmers in the area are no longer dependent on relief food and mill their own flour for household consumption.

Naruti Self Help group maize plantation
Harvested maize

Participatory Scenario Planning and Advisories for Climate Resilient Agricultural Livelihoods
44. Tana River

Pasture management

Tana River County is located in the coast region of the country and borders the Indian Ocean to the south, Lamu to the southeast, Kitui to the west, Isiolo to the north and Garissa to the northeast. It covers an area of 38,782 Km2 and had a projected population of 303,047 in 2016. The county has three main livelihood zones: marginal mixed farming, comprising 48 percent of the population, mixed farming, comprising 38 percent, and pastoral all-species, comprising 14 percent. The county prioritized beef, fish and mango value for ASDSP’s support.

The mean annual rainfall in the county ranges between 280 mm and 900 mm with long rains occurring in April and May, short rains in October and November, the later being the wettest month of the year. Average annual temperatures are about 23°C minimum and the highest being 41°C around January-March and the lowest being 20.6°C around June-July. The county experiences frequent droughts.

The PSP concept started in the long rains season of March, April and May 2014 with funding from ASDSP. The County Natural Resource Management Thematic Working Group held a planning meeting with 60 value chain actors among them traditional forecasters. The forecast from the meteorological services was corroborated with traditional forecasting after which weather outlook advisories were developed and disseminated to value chain actors and the general public through public barazas in all 15 wards of the county.

The Hola Bula women self-help group was formed in July 2013 by 21 adult women, with the aim of buying and selling cattle and small stock and retailing milk within Hola Township. Over the years this group has faced challenges of poor livestock body condition, low milk production and occasionally livestock deaths, during the dry season due to lack of adequate pasture and water. The chairlady and a few members attended a PSP baraza where advisories were being disseminated.

One of the livelihood advisories developed for pastoral communities in below average rainfall scenario was establishment of pasture during the rainy season and fodder conservation inorder to supplement milking herds that are left within the manyattas when other animals move out in search of pastures and water. The group approached the National irrigation board, Hola Irrigation Scheme, County department of livestock production, FAO and County livestock marketing council (CLMC) for support to establish a pasture farm within Hola irrigation scheme. They were granted 50 acres of land by NIB on which they planted grass seeds donated by FAO, harvested, dried and baled 1575 bales of hay. From this yield, the group sold 1000 bales at a Ksh 150 per bale and reserved 575 bales to be used in supplementing their milking herds during dry seasons. They have also harvested 200 kg of grass seeds part of which they sell to boost their household incomes and the balance stored for future use. The group appreciates PSP advisories as they have overcome the challenge of inadequate pastures during the dry season, earned income and increased household food security in addition to mitigating the effects of climate change on livestock keeping and their well being.

Group members harvesting pasture in their farm
45. Turkana

Maize production under irrigation

Turkana County is located in the North Western region of the country within Rift Valley region. It is approximately 77,000 km² and borders Uganda to the west, Sudan to the northwest and Ethiopia to the northeast. The county also borders West Pokot to the southwest, Samburu to the southeast and Lake Turkana to the East. Turkana county has an estimated population of 855,399 (2009 census). The County receives erratic and poorly distributed annual rainfall between 200 mm to 600 mm and temperature ranges of 21-40°C. The county experiences long rains season in April to July and short rains in October to December. The main livelihood is pastoralism, which accounts for 60 percent of the population. Other livelihoods include agro-pastoralism along the banks areas of Turkwel and Kerio rivers.

The Elelea Irrigation group was formed in 2013 under management of World Vision and Turkana Arid land Support Programme. The aim was to bring farmers together for organized vegetable production in Elelea irrigation scheme and joint marketing of the farm produce. Livelihood options for people in Elelea include; Pastoralism, Agro-pastoralism and trade. The scheme has total of 438 farmers; 123 males, 196 women and 119 youths. It is managed by three registered groups; The Water Users Association, Marketing Group and Environmental Management Group, each with distinct mandates.

The irrigation group started receiving the weather information in 2013 through the NDMA early warning systems and in 2014 they started receiving specific advisories from PSP workshops. The community members have since used the information received to make informed decisions; when to plant, what to plant and quantities to be sold and conserved for hard times.

In the past farmers experienced total crop failures due to unexpected flash floods and droughts. PSP advisories have assisted the farmers in the scheme to prepare adequately for every seasons; opening up canals, de-silting the water harvesting reservoirs, acquisitions of farm inputs. The group plants crops that have a high probability of doing well, based on scenario advisories developed for each season. This has improved production and even when drought is expected, farmers plant crops suitable for the weather condition.

Consequently, productivity of horticultural crops increased from 360 kg to 585 kg per acre. Farmers are now able to have 2-3 growing season per year thus facilitating steady supply of vegetables; spinach, cowpeas, watermelon and green grams. The households have attained food security; they are able to share with relatives and sell surplus to get income. Through vegetable farming household earn about Ksh. 3200 per week and this assures them of food security because they can buy the foodstuff that they do not grow.

Irrigated kale crop
46. Wajir

Water melon production

Wajir County is located in the North Eastern region of Kenya and covers an area of 56,685.9 Km². It receives an average annual rainfall of 240-320 mm, distributed in two seasons, the short rains (October to December) and the long rains (March to May) and experiences an average temperature of 27.9-36°C.

Majority of the population rely on livestock and livestock products like milk and meat for their livelihood. However droughts, livestock diseases and pests incidences adversely affect livestock development thus making pastoralist destitute. This has given rise to search for alternative livelihoods whereby growing of water melons have come in handy.

The Kukaley Watermelon Producer Group was formed in 2014 and has a membership of 92 (20 Adult men, 10 Adult women, 40 Male Youth and 22 Female Youth). The group began receiving PSP advisories in the short rain season of 2014. The specific outlook for October-November-December (OND) 2015 in the county predicted the likelihood of receiving above-normal rainfall (highly enhanced rainfall). The PSP advisories issued included early planting of melons to avoid seed rotting due to flooding and planting certified seeds. Since the introduction of the advisories, the group plants improved melon varieties and have achieved better harvests.

Group produce aggregated before transportation to the market

Mr. Maalim, a member of Kukaley Watermelon Producer Group previously used to harvest 50 tones from his farm which earned him KSh 565,000. He has consistently applied the PSP advisories since MAM 2014 season and this has contributed to increased productivity to 150 tonnes earning him KSh 1.7 million. His household food security improved since he could afford a variety of food stuff compared to the previous years when production was low. He has employed six (6) casuals to assist him in the farm thereby creating employment and source of livelihood for them.
Pasture production

West Pokot County is situated in the north rift along Kenya’s western boundary with Uganda. It borders Trans Nzoia County to the South, Elgeyo Marakwet County and Baringo County to the South East and Turkana County to the Northern. The county covers an area of about 9,169.4 km$^2$ and has a population of 512,690 (National Census, 2009). It is divided into four Sub Counties: West Pokot, Pokot South, Pokot Central and Pokot North and has three main livelihood zones: Mixed Farming (30.6%), Agro pastoral (36.8%) and Pastoral (32.6%)

The county’s rainfall is bimodal with long rains spanning from March to July with a peak in May while short rains fall from September to early November. Annual rainfall varies from 400mm in the lower drier areas to 1500mm in the higher areas. This however is usually unreliable in the lower areas. The county experiences wide variation in temperature with the lowlands experiencing temperatures of up to 38oC and the highland experiencing moderate temperatures of 15oC. These high temperatures in the lowlands cause high evaporation, which make these areas less favourable for production of crops. High altitude areas with moderate temperatures experience high rainfall and low evaporation and are of high agricultural potential. The main agricultural livelihoods of in West Pokot are livestock keeping and fruit production; mangoes, water melon, and oranges.

The Participatory Scenario Planning (PSP) process was initiated in the county in March 2014 by ASDSP in partnership with the county directorate of Meteorological Services and CARE Kenya. PSP has encouraged integration of community Indigenous Technical Knowledge (ITK) and conventional KMD forecasting in development of sector specific weather advisories. The initiative has improved the dissemination of the advisories to the value chain actors across the county with coverage of over 50 percent of the households. The main dissemination channels are local FM radio Kalya, public barazas, field days, religious and social gatherings.

PSP development is led by the Natural Resource Management Thematic working group (NRM TWG) with the following assigned roles:

- Community ITK experts- responsible for climate/weather forecasting based indigenous methodologies and indicators such as movement and position of the stars, direction of wind, shades of mountains, flowering of certain trees and sounds of some birds.
- CDMS- interpret the conventional forecasting, integrates it with the ITK forecasting and facilitates scenario development.
- Other sector partner – based on the developed scenarios, develop the sector specific technical advisories and choose appropriate dissemination channels. They also constitute teams to conduct communication, monitoring and evaluation activities.

The forecasts and advisories are disseminated in English, Kiswahili and Vernacular (Pokot) languages. The advisories are sector specific and tailor-made based on Livelihood zones and climate/weather forecast scenarios.

Dissemination of the advisories is carried out by the NRM TWG members together with the sector sub county officers by visiting the three livelihood zones in the county interviewing and talking to VCA in the respective areas. The team also evaluates the performance of the previous season in relation to the advisories disseminated and involves ITK experts, community opinion leaders, chiefs and VCAs.

Mr. Peter Kilem is a member of Simbol Self Help group which is involved in input supply. The group is located Pokot Central Sub County and is involved in production of pasture for their animals and sell the surplus. They also carry out land reclamation activities with the support of ASDSP.

In 2014 the group received the PSP advisory adopted pasture establishment recommendation as an intervention to provide feed for their animals during drought. They have established 50 acres of pasture and preserve the fodder as hay for use during drought season and income generation through sale of surplus bales of hay.