

# *Special* EVENT

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## CLIMATE CHANGE IMPACTS ON AGRICULTURE AND FOOD SECURITY: IMPLICATIONS FOR DEVELOPING CLIMATE RESILIENT AGRICULTURE PROGRAMS

AUDIO TRANSCRIPT

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CONTENTS

Presenters..... 3

Presentation 1, Panel 1 - *Designing and Implementing Climate Change and Agriculture-based Livelihood Vulnerability Assessments: ARCC Insights* ..... 4

Questions and Answers, Presentation 1.....24

Presentation 2, Panel 2 - *Uptake and Use of Vulnerability Assessments for Climate-Resilient Agriculture Programming: ARCC Insights*.....31

Questions and Answers, Presentation 2.....48

Presentation 3 .....58

Questions and Answers, Presentation 3.....63

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## PRESENTATION 1, PANEL 1 - *DESIGNING AND IMPLEMENTING CLIMATE CHANGE AND AGRICULTURE-BASED LIVELIHOOD VULNERABILITY ASSESSMENTS: ARCC INSIGHTS*

*Matthew Edwardson:* Great. It looks like pretty much everyone has taken their seats, so I'd like to formally welcome everybody to the Climate Change Impacts on Agriculture and Food Security: Implications for Developing Climate-Resilient Agricultural Programs Event. It's a pleasure to be with you all this morning. My name is Matthew Edwardson; I'll be MCing and moderating the panels. I'm working with the ARCC program and I'm an employee at Tetra Tech. So it's great to see all of you here today.

What we're going to do is have an outstanding morning. We have a couple of panels, we're going to have a lot of time for questions and answers, there's a lot of information in the back, and I think this is going to be a great learning experience for all of us, so I really welcome you and thank you for all taking time out of your busy schedules to join us today.

Before we have our welcome introduction I just wanted to briefly give you information about the two programs that are putting this event on. They're both funded out of USAID out of the, you know, the office here in Washington. So one of the programs is the African and Latin American Resilience to Climate Change program, known as ARCC. I'll just be referring to it as ARCC throughout the rest of the day, because I have a hard time saying that; it's a tongue twister for me.

So ARCC is a three-year project, it's been working in Africa, Latin America, and the Caribbean. It ends in November of this year. And for the last three years ARCC has promoted adaptation to climate change and integration of climate change adaptation considerations into economic investments in order to support sustainable climate-resilient growth. ARCC is an innovative program and it was designed to provide technical, analytical, and project assistance, as well as capacity-building to improve the ability of vulnerable populations in Africa and Latin America to respond to climate change impacts such as those affecting agriculture and food security, which is the nexus of our conversation today. And over that period ARCC's strengthened evidence-based approaches and local participation and decision-making processes. We're going to touch on those three broad thematic areas throughout the day.

In addition to ARCC, we're really excited to be working with Agrilinks today. I'm sure many of you are familiar with Agrilinks; they are an outstanding knowledge-sharing hub working for the Bureau of Food Security, their primary knowledge management tool. They have an unbelievable wealth of resources available at their website, Agrilinks.org. This event is being simultaneously webcast by them. We have a huge amount of online participants, and I'd like to also welcome all of you to the event. So all the information that you'll hear

about today's program will be available on Agrilinks as well as on the ARCC website as well, which we'll talk about in a little bit.

So it kick things off I'd like to introduce Rolf Anderson. He's the Director of the Global Climate Change Office at USAID. Before taking on this position, which he's had for about a year and a half, Rolf has been a dedicated foreign service officer, he led the USAID environment programs in the Philippines, he was in Mali for a good period of time, and he also led the economic growth office in Armenia. Rolf is going to come to the stage, he's going to provide us with a brief overview of climate change programming at USAID and frame ARCC and the work that ARCC has done within the broader USAID context and how it can be integrated across sectors. So, Rolf, please.

*Rolf Anderson:*

Well good morning, everyone. I'm so happy to be here. And actually I'm happier to have you here. It's so vital to have the interaction and your participation and actually a lot of the thoughts and creativity of the NGO sector, academia, the private sector. I mean this is a new enterprise; climate is something that we're all kind of learning by doing in an extremely challenging kind of process. And so I think these types of interactions are very valuable for us for our learning.

As one of my bosses, Eric Postel, often says, you know, in some of the sectors that USAID works, like agriculture, you have 5,000 years of practice and experience and certainly decades and decades of development experience in climate; it's a much newer, fresher field. It's a very exciting time to be actually in Washington in this office. I picked the right time to come here, I'll have to tell you that. The political wins are at our backs, you know, Carey has made this a major emphasis of his strategy and policy, and we're seeing it pop up in all sorts of places in terms of the QVDR and other strategies; it was the first policy statement he put out. More recently President Obama has really used the latter part of his term to emphasize climate, and that's having a significant impact on USAID as well. And those political wins I think are timely with the negotiations coming up both this year and next year and the hope for an agreement.

To contextualize things a little bit, for USAID we have actually been involved in climate in one realm or another for quite a long time. I mean we've done clean energy works since the '90s and in the '90s we also did a lot work on building the capacity to look at climate around the developing world. But this was really formalized with the global climate change initiative starting in 2010, and then as a result of that we also created a strategy, which it was very significant for us and it was approved in 2012; it's a four-year strategy, goes through 2016. It's a very open-ended strategy because it was a time where we really had to do a lot of experimentation and learning and finding out what people were doing and actually being fairly flexible as well, both for emissions, their programs, and the

developing countries, which are trying to figure out what they need to do in terms of climate.

So it sent out how do we advance – the strategy said, “How do we advance the consideration of climate change both in strategic planning, program design, and project implementation?” And it set up some very broad parameters for addressing climate change and development. In essence the strategy is try to promote clean and resilient growth. I like to think of it as better and smarter development, and nowadays we’re even saying it’s kind of the new agenda as we look at integrating climate through everything we do, and I’ll talk a little bit about that in a moment.

But we were trying to, one, accelerate transition to a low-emissions development. You know, this is in clean energy and how do we kind of have growing economies but with a lower emissions path. We were trying to increase resilience through adaptation and we were trying to strengthen our overall development outcomes through integration. So I think the strategy has been very robust and it’s been pretty successful, ‘cause it was a very flexible approach for different missions around the world and the programs to experiment and try new things and it was I would say a very inclusive approach.

And we made, as an agency, a lot of progress in terms of programming climate. You know, there was a big transition period where people were taking the work that they were doing in other fields, whether it was ag or whether it was biodiversity, and trying to figure out, “Okay, how do I take something I’m already doing and add a climate lens to it?” or “How do I add a component?” And now we’ve moved to a much different place, where people are really putting climate at the central objective of their programs and their programming. As I mentioned, this is really a process of learning by doing and experimentation, and I would emphasize that that’s why the ARCC program has been so important, because it’s been trying to look and gather lessons and test hypotheses and there’s been a lot of learning about practices as a result of it.

Overall, in terms of adaptation and integration programming in USAID, you know, the reason really why we’re doing it is our country partners are really asking for this. And I have to say, you know, I’ve lived and worked in many countries, and most recently I was covering not only the Philippines, but also 12 Pacific islands. And the impacts are really being felt on the ground. You know, there’s a lot of debate in the U.S. and much less so now, but as you travel around the world, as many of you know, there’s a demand for work on adaptation resilience, and how do we deal with these things, and mayors and governments are really struggling, “What do I do first? How do I do it? How do I make an assessment? Is it worth the cost benefit?” These are very challenging questions, and big costs, big risks for governments as well. So these types of programs are super-important.

I mean when you look at the Pacific, for example, king tides are swamping atolls, their water supplies are being salinated, they're having a variety of other types of effects in terms of the agriculture. I was in Ethiopia last spring and there changing rainfall patterns were affecting agriculture and having significant impacts on some of their most productive agriculture programs; they had to change the things that they were growing and it was affecting their incomes. And in Asia storms and flooding have had a tremendous economic impact; you just have to look at the Philippines, where in 2009 2.8-percent of GDP was lost in one storm and Thailand, where economic processes 'cause of flooding were stalled and people couldn't move goods.

The bottom line is it's about really serious economic effects, and I think that's a major overall transition that's occurring globally, but certainly in terms of our thinking. It's not just an environment problem; it's an economic problem, and as a result we're seeing a willingness for action, and not only in governments, but in the private sector, and people are sort of, they're moving with you or without you to try to make adjustments.

For us, and I think for the global community adaptation and integration have been very challenging. I mean there are just fundamental things though, you know, what's the definition of adaptation and when has it been successful, you know, do you have to be transformational, when is it transformational. And I think that some of the studies and reports that this program have done have explored those types of questions. For USAID adaptation and integration are very important because we look at it as how do we protect our development gains. You know, I mean there's a lot of risks out there, whether it's conflict or whether it's migration, Ebola, climate. So we want to be looking at all the risks that our programs face to make sure that they aren't reversed by those impacts.

More recently, as you are probably well aware, the President issued in September a new resilience executive order at the Climate Summit, and this is a very significant event I think for the overall U.S. government. I mean every international program, whether it's USAID, Trade and Development, OPEC, MCC, and many others have to look at their international aid programs and see what impact that – screen them, see what impact climate is likely to have and then take measures to protect them, and then we have to report on them. And so this is for the next couple of years going to be a really important transition for us as we try to kind of figure that out. In a lot of areas we haven't really thought as deeply as we need to about how do we make our programs more resilient. So I think it's a fantastic time, a fantastic opportunity and I think that that links to why the groundwork done by programs such as ARCC are so important.

So today's meeting is very important because it presents the highlights of the lessons learned from the ARCC program. This has been a three-year program focused on thought leadership and development of analytic techniques in climate

change adaptation. It's an example of how USAID is trying to push into a new area. We want to make sure to ensure that strategic decisions about climate change investments as well as addressing the climate change risk inherent in our sectoral investments are based on the best available evidence. This is a major issue that I see out in the field is, you know, people just don't have the data for good sound decision-making.

And at the time that ARCC was started a lot of the vulnerability assessments in the Africa region were focused more on perceptions of climate change and general conclusions, rather than real evidence. And there was very little work that was being done on climate change's expected impacts or actionable recommendations. You know, your partners in the field really are looking for stuff – don't confuse me, tell me what's sort of actionable that will make a difference that's important to peoples' sort of livelihoods or their communities.

And one example of this is that ARCC has been focused heavily on climate-smart agriculture, and that is before CSA was attracting as much attention as it currently is. So it was prescient that enough – it was lucky or smart on the part of the program, but it really kind of set the stage for some of the work that's now being done in climate-smart agriculture. And they did, for example, vulnerability assessments in Uganda, Malawi, Senegal, and West Africa in the Sahel, all with a major focus on food security.

So I think in conclusion I just want to say that I am looking very forward to today's panels, presentations, findings, and the overall discussions, and I want to welcome you and thank you for being here today with us. Thank you.

*Matthew Edwardsen:* Thank you very much, Rolf. That was a wonderful way to set the tone for the discussion, and we appreciate your kind comments about the program.

So I'd like to invite the panelists to come on up and take your seats. I'm going to quickly go through what you have in your registration packet and then we'll move right on into the event. So in that blue folder there's four documents; we're not going to go over them all at length here, I'm just going to quickly let you know you have bios of all the speakers, so please look at those at your convenience. There's an overview of kind of the core document which ARCC has produced, which is a compendium really how this whole process was undertaken and what we learn from it. It's a quick read; you can look at that and then get yourself geared up to read the much longer document, which we hope you'll be able to look over at great length.

And I just wanted to also note that you have a list of publications which I'll talk about at the end of the day, but today we're going to focus on four activities which ARCC undertook, and that's really the tip of the iceberg; there's about 65 different documents and they're all very thorough, they've all been peer-reviewed by multiple individuals and there's been multiple rounds of editing and

there's a huge wealth of knowledge. So just bear that in mind as you hear what we're talking about today and then think about what we have available. That's really one of the things that we want to make sure everybody understands, is this information has been produced and it's out there and there's a lot of it, and we really want to make it as accessible as possible to all of you.

So the last document you have is the agenda, and basically the agenda is all about the panel discussions. So what we're here to do today is to share the lessons learned from our – and especially those lessons learned that relate to agriculture and food security. And we also want to expose you to the documentation that we have on ARCC. And what we're going to do in terms of objectives is we've broken things up into two panels. So the first panel, which has just taken their seats, what they're going to do for about the next hour-and-a-half or so is talk with us about the key lessons learned from designing and implementing climate change and agriculture-based livelihood vulnerability assessments. They will each speak and then we'll have a lively question and answer. Then we're going to do a quick change where we're going to have a brief discussion about what we've done in terms of knowledge management.

There's not going to be a formal coffee break, so during that interchange, or even throughout the day, if you need to get up, use the restroom, get some coffee, please do so at your leisure. And then we're going to quickly move into the second panel, where we're going to talk about, you know, how these lessons learned were taken up, what was the uptake of these lessons learned and how were they utilized. So we're going to focus on the same, you know, four countries yet again.

So that will then be concluded with some closing remarks and then we're going to have a gallery walk and we're going to have lunch for everybody and there's a lot of information out there that I know you've already been kind of taking in, so, you know, there's going to be publications, and that will all happen at about 12:30. So that's the day, or the morning so to speak, and we'll wrap up around 1:30. So I'm going to move over to my seat and introduce the panel and we'll get going.

All right, so we all have like mics throughout here, so we've all been trained to not say anything unless we're supposed to be talking, because we can't turn these off. So just to quickly give you an overview of what we're going to do on these panels, as you can see I have four individuals next to me; each of them are going to speak for about eight to ten minutes. We're going to hold questions and answers to the end. There's two mics up and we're going to have online questions as well, and that's going to run for about 25-30 minutes. I'm going to introduce each panelist very briefly; you've got bios as I noted earlier, so please, you know, feel free to reference those. And everyone's going to be available at

the end of the day for an hour or so; you can definitely have a good chat with everybody at that point.

So the first place we're going to go to is Uganda and Trish Caffrey is sitting directly to my right. She was the team leader for the climate change vulnerability assessment in Uganda. She's also the ARCC Chief of Party. For 30 years Trish has been working in Africa and Latin America. She's a specialist in many things, amongst them climate change, working with vulnerable populations, working on civic engagement, and doing social and environmental assessments. So Uganda was the first CCVA that ARCC undertook, and it provided a number of important lessons for us. So Trish, please share those with us.

*Patricia Caffrey:*

Thank you, Matthew. Good morning, everyone. It's really a pleasure to be here. I'm glad to see so many people in the room. And I get to start out with the first assessment that ARCC implemented. There were a lot of lessons learned because it was the first assessment. It was very important that what we engaged initially with the mission in Uganda, and they were really what we call our initial champion. The second panel will talk more about how that relationship with USAID and USAID's role as a champion evolved to include many more champions so that they could take basically the results of these findings and use them to influence program and policy.

So my few minutes of my talk today is I'm going to focus just really on the lessons learned related to design, implementation, and stakeholder engagement, and I'll give a very, very top-of-the-trees overview of some of the major results. As I said, we work closely with USAID and it took us a bit of going back and forth to actually define the goal, the purpose for the assessment. It was focused really, as you see here on the overhead, our goal was to show how current climate patterns shape and how future climate patterns may influence key crop value chains and livelihoods of households in six Feed the Future districts in Uganda that depend on them.

Our analytical framework was really quite simple; we adapted the IPCC definition of vulnerability, which is a function of exposure sensitivity and adaptive capacity. And you can see how our three guiding questions really lead us in that direction. So in terms of exposure, we wanted to understand how will climate change impact those selected crop value chains, sensitivity, what impacts will climate change, and variability have on a representative range of Ugandan rural livelihoods. And finally, in terms of adaptive capacity, how will farmers adapt in response to climate change impacts on the study crops.

It was a very comprehensive and complex assessment. Here on the map you can see that we focused on six Feed the Future districts. That's quite a bit of agro ecological variation. For those of you who know Uganda, the altitude varies quite a bit and there are bodies of water, so in terms of climate and exposure and understanding that, it was really different in each of these areas, as well as the crops that were grown and the conditions. Even there were ethnic differences as well throughout the six districts.

I mentioned that we focused on eight of the major crops that peoples' livelihoods depended on and the six districts on the map. We also, when we looked at adaptive capacity, it's really important that, you know, people – the farmers at the household level are the ones who are adapting to these changes, so we looked at that level, community level, but also in terms of institutional capacity and ability to be able to build on, work with the farmers, and develop adaptive capacity. We looked at the local, district, and national levels institutionally.

The design, as you see here, was basically we had four analytical components. We had a multidisciplinary team, we had scientists who led up each of these teams, the climate analysis, value chain analysis, livelihoods, and the water. And our biggest challenge was really as we did our assessment and conducted our surveys was we had to come back together, and once again work on putting all the data together to answer these guiding questions. And so in design here it looks simple, but it was really quite complex, okay? We needed to get accurate, useful information that integrated all of the lines of inquiry. We had a number of lessons in terms of the process. As I said before, it was a very iterative process; we came back together frequently as a team and shared what we were learning. At the end we did cross-disciplinary integration, putting all these data sets together and making sure that the sum was really not the individual parts, but the whole of those different parts.

Stakeholder engagement was one of our biggest lessons here. To make sure that we were really conducting a study that would be useful and that would influence change, we really – we involve – we engage with stakeholders at the design phase, and that was primarily USAID gathering information from all those different levels that I was talking about from the different groups. And also people were very involved, the stakeholders were involved, key stakeholders in actually validating and generating the final recommendations. So we had stakeholder engagement all along the way. We wanted to make sure that the Ugandans who would be in the position to address these, what we found out would only *[audio cuts out]* the results. Okay?

We also incorporated local expertise and knowledge in the team and we worked very hard at communicating out in different ways our findings. Our findings, as I said, came together to basically answer these three guiding questions. In terms of

climate we did projections from 2015 to 2045 period, and we basically found that annual mean rainfall, the average will not vary that much over time, that period. But in fact interannual variability will be quite high; it has been high and will continue to probably be a challenge for farmers. An interesting finding was that we found that there would be an increase in precipitation during what is normally the dry season, which has impacts on post-harvest drying and storage of grains particularly. And there's been a historical trend of increase of temperature, and that will continue well into the future. So that's one of the bigger challenges of increasing temperature.

In terms of sensitivity, our value chain analysis and phenological chain analysis review show that Arabica coffee is probably going to be the most vulnerable to climate changes. Currently it needs fairly cool temperatures to grow. As temperatures increase it will probably need to move up altitude, and there's not a lot of land in Uganda to do that, and it will impact on the higher forests and the highlands.

In terms of the least vulnerable crops of the eight that we studied casaba was the least-vulnerable; it's much more tolerant to increasing temperatures and dryness. The report, as I said, goes into a lot more detail; this is just the top of the trees. In terms of household vulnerability, what impact will this have at the household level and what the farmers that are growing these crops, people are quite – there's a systemic vulnerability; everybody is dependent on these eight crops, and any change in food production will critically increase their vulnerability. They have no buffers against additional stress; very little.

In terms of food and security, for an average of three months over the 2011 farmer, the households were food insecure. Characteristics of the most vulnerable households, actually a very large sample of the 800 households surveyed, was considered most vulnerable is they have a lower proportion of able-bodied people in their household, less well-educated, they are less likely to sell their crops and more likely to consume them themselves, less access to loans, social capital, and earning off farm income. In terms of adaptive capacity income diversity was really the key in terms of being able to weather stresses. The households with greater adaptive capacity have basically managed more diverse agriculture portfolios, more crops, they invest in livestock, they also have some other sources of income that are not on off far as well.

The farmers, we did an extensive survey of farming practices to get an indication of adaptive capacity, their RDI, adapting practices in response to climate variability. And we recommend that future strategies build on these. They were planting additional crops and crop varieties, they were investing more in livestock and fruit trees, modifying their management practices by shifting planting dates, preparing soil differently, and changing their mix of crops. But that said, their short-term coping strategies are basically to sell manual labor for

rather cheaply or produce charcoal. Longer-term strategies we've found is basically migration and also investing in the education of their children.

I will – the second panel, my colleague Rita Laker-Ojok will be presenting in fact the results of this study, what the uptake was and how that has influenced policy and program since then. Since then I'll now pass over to David Miller.

*Matthew Edwardsen:* Yeah. Thank you. Thank you, Trish. Much appreciated for kicking things off and, you know, it's just definitely the tip of the iceberg; there's a lot more and we look forward to Rita talking about the uptake in the second panel.

So we're going to shift sides on the African continent and go over to Senegal now. So David Miller works with ACI VOCA. He's also the technical advisor for Africa on the ARCC program, and he led the Senegal CCVA. I'm not going to say Climate Change Vulnerability Assessment anymore, I'm just going to abbreviate with CCVA, because I see we are running a few minutes behind schedule and I want to save time. So David's been working for about 30 years contributing to sustainable climate change, environment, ag development strategies and practices. He's been a lead technical expert on numerous USAID and other donor-funded programs on food security and livelihoods, and he's been working on climate change and vulnerability and adaptation, you know, globally for a long, long time.

The Senegal presentation is going to talk about how the team collaborated to reduce uncertainty, and it's a wonderful eight to ten-minute discussion we're about to have, so, David, please.

*David Miller:* Thank you, Mathew. Everybody, I'm going to start with a little bit of advice; when you listen to my presentation think of it as sort of a movie trailer, okay? It's meant to titillate and suggest a much larger product and also don't expect too much of a plot.

As it turns out, predicting the future is not easy. Uncertainty is a significant challenge in all studies of human systems and change. This isn't any different for climate change vulnerability assessments for which we're trying to understand how to prepare people/us for the climate change impacts in the future. Not only is there uncertainty in climate change projections, but there's uncertainty in how people are going to respond to changes in climate, as well as uncertainty in how the larger context is going to change, our markets are going to change independently of climate, national policy.

In the Senegal assessment we piloted a quantitative approach to conducting a vulnerability assessment in exploring climate change vulnerability. I'm going to describe some strategies we used to enrich results that we produced and reduce

uncertainty around those results by integrating our design as well as relying on the active collaboration of the team members.

First let me introduce the assessment. Eastern Senegal; people in this region of Senegal practice primarily agropastoral livelihoods, however, in the more arid north, the lighter blue area, there is a greater predominance of people practicing herding livestock ownership as opposed to the more humid south. The objective of our study was to look at the – to compare the vulnerability of people practicing different livelihoods. We looked at livestock-dependent households, mixed system households, where the balance between cropping and livestock holding was a little more balanced, and crop-dominant households. To do this we developed a new approach in which we created indexes from the crop modeling, biomass modeling, and household survey results so that we could quantify these three components of vulnerability that Trish just mentioned: exposure, sensitivity, and adaptive capacity.

And then we use qualitative methods to enrich those results and provide some grounding for them. We had focus groups, interviews with experts, key informants, as well as a number of literature reviews. And we needed all these various complicated parts to fit together and make sure that everyone was pulling in the same direction, so we spent a lot of time working with the extended team actually creating the definitions that we were going to be using for exposure sensitivity, adaptive capacity, design the various products so the whole – all the pieces would contribute to the whole.

This is just – don't try and read those charts; it's just to give you an idea of a look at the range of different quantitative results that we produce, as well as on your right-hand side there, some of the institutions who were involved in the assessment. It was a complex, challenging coordination. And because we were piloting a new approach we used a large number of old methods that you'll be familiar with, as well as new methods to try and ground truth and flush out our findings. Here's sort of a motley list of some of them.

In modeling it's standard procedure to tune your software using observed data, known data. We do that, of course, in looking at our climate projects as well as our crop and biomass modeling, but we also carry this approach through into the analysis and actually into the presentation of our results. And I'll provide you an example of that later on. But now you can think of it in some ways similar to how we, in our focus groups, identified adaptive practices that people in this region were taking and then compared those, got a better understanding of those through a literature review of how people responded to climate change in the same region, in the '70s and '80s. In fact, the division of the study zone into two sub-zones was a way of helping us have a broader perspective of how people responded to climate change with the idea that the households in the south are experiencing some of the climate stressors that those in the north are already

experiencing, and in fact some of the climate stressors that might appear as a result of climate change, particularly lower rainfall.

There were a few critical adaptive strategies that people in the zone take to address vulnerability. For example, transhumance, moving livestock around to adjust to climate diversity and weather in different regions, and how people over time use the fact that they have two different forms of income, crop farming and livestock raising, how they use that dynamically over time to reduce risk. We weren't able to model those relationships, but through our focus group interviews in the same villages where we collected the survey study we were actually able to have an idea that those dynamics, because the focus group discussions were structured in the form of agricultural case histories, so over the last 20 years we got a sense of how people have responded to climate using these strategies.

And then finally our two national partners who are engaged in the design implementation analysis and presentation of the results, that not only grounded our results in local experience and knowledge, but also brought in a wider range of perspectives influencing our results and our conclusions.

So these are what I call the capstone diagrams produced by the study, and they can suggest a couple other examples of how in the Senegal assessment we triangulated, sort of used productive redundancy to flesh out and ground our results. They're the highest-level conclusions of the study, but of course there are lots of sub-conclusions that we presented in producing these. What they are is they're the result of our measurements of exposure, sensitivity, and adaptive capacity to those indexes we created. As you see on the top there's exposure, and on your right sensitivity – is that your right? Yeah, on your right sensitivity. And then the other two, resilience deficit and asset deficit, those are measures of adaptive capacity, they're basically the resources people have or lack of resources to respond to climate threats, climate change in the long-term.

Now if you look at it, the different colors represent the different livelihood types: green, livestock dominant; red, those mixed households; and blue, the crop-dominant households on one side, so northern half of the study zone and the southern side. And the larger the form the greater the vulnerability, okay?

So let's first look at the green shapes. You'll see in the northern subzone the shape is largest, whereas in the southern subzone it's the smallest shape, much different levels of vulnerability with the same type of a livelihood strategy. So in this case to some extent vulnerability differs by location. In fact, although it's the same livelihood it represents the two extremes of vulnerability in the study zone. And our focus group discussions supported this conclusion; livestock-dominant households in the south were found to be wealthier, they undertook fewer adaptive strategies, and in fact there was more aggressive invest in livestock holding in the south.

Now let's look at the two groups of diagrams, the two diagrams as a whole. As you notice how in general in the northern the vulnerability is a factor of exposure and sensitivity; the quadrangles reach more towards the top and the right, whereas in the south it's all based on assets. Vulnerability is a lack of wealth and a great – higher level of stress, lower resilience capacity. While the overall vulnerability in these two zones is roughly comparable, the causes are different. Again, other parts of the study helped us make sense of this. In focus group interviews, survey results, and an actual additional GIS mapping study of access to markets and roadways they clearly point out that in the southern zone it's much more isolated, fewer public services. So vulnerability is not simply a function of exposure to climate, but also capacity to respond to those threats.

In these diagrams we also see a way in which we improved our understanding of our finding concerning future vulnerability by relating them to known experiences. These diagrams you're looking at now are based on historical changes in climate actually between a 20-year period between the 1990s and the oughts compared to the '70s and '80s. In the assessment itself we present these diagrams next to a similar pair of diagrams, but in which we used the climate projects to 2050. In fact, the two sets of diagrams don't differ all that much and the projections indicate that climate conditions, as well as the model productivity of pasture and crops won't differ that much from the changes between now basically and the '70s and '80s, okay?

So by presenting our analysis in the context of historical change, we not only increase the sense of legitimacy of our results, but also helped ourselves and the consumers of our assessment better visualize what the conditions might be in the future, how to prepare for them. Thank you.

*Matthew Edwardsen:* Thank you much, David. I personally think there was a plot, so congratulations. Nice work. Very complicated. So we're going to now shift over to Western Honduras and Western Honduras is going to be presented by John Parker, who's up at Tetra Tech in Burlington. He is the team leader for the Western Honduras CCVA. He's an associate in the environment and natural resource sector up in Burlington. John's a land and water resource specialist; he's been working in development for a little over ten years, and he's got a lot of experience managing, implementing, and researching multisectoral policy and programming strategies that strengthen the resilience of social and ecological systems. And it's this lens of social and ecological systems that was applied to the Western Honduras assessment and, John, please take us through that process.

*John Parker:* All right. Thanks, Matthew. So this was a multidisciplinary study; the purpose was to examine the impact of climate change and climate variability on ecosystems and livelihoods in the dry corridor region of Honduras. As Matthew mentioned, the ecosystems perspective is perhaps the unique element of the study

and what differentiates it from some of the other assessments that we're hearing about today.

The dry corridor region of Honduras depicted in the map has among the highest levels of food insecurity, stunting and poverty in Honduras and Central America. Livelihoods in the region predominantly depend upon agriculture, principally maize and bean production and also coffee production. And small holders mostly cultivate very steep, fragile hillside agri-eco systems. It's a region that is regularly afflicted by seasonal droughts and floods and has high natural climate variability driven mainly by the El Niño southern oscillation phenomenon.

In coordination with USAID Honduras we defined three objectives for this assessment at the outset. The first was to understand the historical trends and the future projections for climate in the dry corridor. Secondly, to assess how those climate projections would affect ecosystems and livelihoods in the region. And third, to identify existing and potential adaptive responses that could be integrated into programming through the government of Honduras, USAID, as well as other donors.

This was a truly interdisciplinary assessment. We incorporated a wide variety of distinct, but interrelated analytical components. We looked at climate, we looked at ecosystems, considering ecohydrology, so the relationship between water and ecosystems on protected areas. We carried out a phenological analysis that looked at the sensitivity of key crops, so maize, beans, coffee, and horticultural crops, and how that might change depending upon changes in temperature and precipitation. We carried out value chain analysis, which looked at how climate might impact different stages of key crop value chains, and we also carried out livelihoods and institutional analysis.

So to weave these various analytical components together we developed a research framework that looked at climate change vulnerability through the lens of social-ecological systems. So the concept of social-ecological systems recognizes the interaction and interdependence of human and nature and the dependence of individuals on ecosystem services for their livelihoods. So this concept is particularly relevant in the context of the dry corridor as households critically depend on natural resources for food and livelihood security.

In terms of methods, we used a mixed methods approach. It used existing secondary data and climate hydrology, land use. We got the primary data through key informant interviews with local institutions as well as a range of focus group discussions with farmers. We adopted analytical methodologies and tools that had been previously developed under other arch assessments, including the Uganda vulnerability assessment that Trish presented on earlier. But we also developed new methodologies and some of these were quite innovative. We developed an ecohydrological vulnerability index for watersheds, which incorporated key ecological and hydrological variables, including water

production potential and permanent land cover to determine the sensitivity of watersheds in the dry corridor to projected changes in temperature and precipitation.

We integrated social variables into this index, including poverty, population density, as well as the human development index, to create an overall social ecological vulnerability index for watersheds. We also developed a climate envelope for ecosystems, which is displayed in this graphic here, which showed how the distribution of existing ecosystems in the dry corridor would potentially change from present temperature and precipitation scenarios to those projected by the IPCC for 2050. I'll further explain this graphic as I discuss some of our findings.

So what did we find? Our findings overall demonstrated how climate change affects ecological systems and the ecosystems services generated by these systems and how this in turn impacts agricultural livelihoods, and I'll provide a very high level overview of some of our findings. In terms of climate, we found that the dry corridor is likely to become a hotspot of climate stress over the next 35 years. Climate models predict that temperature will increase by between 1° and 2.5° Celsius by 2050. Precipitation is projected to decrease over this time period by between 10 to 20-percent. Normal years will likely be similar to current El Niño conditions, while El Niño years will likely exhibit even greater extremes in temperature and precipitation. And this will have profound effects on ecosystems in the dry corridor.

We can expect that overall water availability will decline, however, flood events are expected to become more intense. Projected warming and drying will shift the distribution of areas suitable for species and habitats, so returning to the climate envelope graphic, we can see that with this shift areas suitable for cooler, moister forest types, such as broadleaf forests, mixed forests, and pine forests will decrease, while areas suitable for cloud forests, which are essential for water production as well as for livelihoods, could completely disappear. This will result in a shift to ecosystems more suitable for dryer and warmer climates, which will likely increase the area of dry forest and shrublands. In terms of key crops, we've found that higher temperatures and more variable precipitation would likely result in decreased productivity and an increase in the prevalence of common pests and diseases. In the case of coffee, farmers will likely shift to cultivating in higher altitudes. And this behavior is already being exhibited to adapt to the impacts of coffee leaf rust. This will likely put even greater pressure on cloud forests and protected areas.

So how will these impacts on ecosystems affect livelihoods? As I mentioned previously, livelihoods in the dry corridor depend on natural resources in agriculture. So the impacts of decreased crop productivity, less available water, and greater pressure on scarce natural resources will have significant impacts on

livelihood outcomes, and this will likely be exhibited through increased food and nutrition and security, reduced employment opportunities as climate impacts are felt across the various stages of crop value chains, and reduced household incomes. And this will increase the potential for migration not only within Honduras to urban areas, but also to the U.S., which as many of you know, is already a very serious issue facing Honduras right now.

So what can be done? We've found that wide range of governmental, civil society, private sector institutions, but perhaps more importantly, farmers themselves are mobilizing efforts and playing critical roles to address climate variability and change. But we also found that the pace and scale of adaptation efforts is not meeting the challenge. Isaac Ferrera from USAID Honduras is presenting in the second panel about some of the efforts of Honduran institutions, USAID and the donor community, to scale up adaptation efforts in the dry corridor. And I'm just going to really quickly run through our five adaptation pathways that we recommended in our report to build the resilience of ecosystems and livelihoods in the dry corridor.

The first is improving the information base, and this isn't just climate information, but hydrology, land use, and soil. It's all the information necessary for local decision-makers to make informed adaptation decisions. Secondly, it's absolutely essential to focus efforts on building the resilience of water resources. This is both at the watershed as well as the on-farm level, and not just blue water resources, but also green or soil moisture water management. Third is strengthening the management of the protected area system and also critical ecosystems, including quad forests. Fourth is livelihoods diversification, both on farm incorporating more climate-resilient crops and improved varieties, but also looking at opportunities to diversify livelihoods off-farm. And fifth is to build the capacity of local institutions to help shift the institutional focus from disaster response to a longer-term vision of risk mitigation and risk reduction. Thank you.

*Matthew Edwardsen:* Great. Thanks, John, for those remarks and for highlighting a different, yet very appropriate approach to this level of an assessment. So we're going to close the last presentation on this panel before we go to questions, go back over to West Africa. Alex de Sherbinin from the Center for International Earth Science and Information Network at Columbia University in the Earth Institute will be presenting. Alex is the principal author of the Mali climate change – Mali climate vulnerability mapping effort. He's a senior researcher at CIESIN. CIESIN is an environmental data and analysis center, and Alex is a geographer and his interests are wide, but they focus primarily on the human aspects of environmental change at the local, national, and global scale. Alex's presentation is going to highlight the use of vulnerability mapping through the lens of the

IPCC vulnerability framework and how this process provides decision-makers with alternative tools for decision-making. So please, Alex.

*Alex de Sherbinin:*

Thank you, Matthew. So I wanted to say first off that this is really a measure – we measured the relative vulnerability within Mali; we know that Mali already is a highly vulnerable country. Now actually I looked at the world risk index and the climate risk index and actually slightly higher in terms of its ranking, in terms of overall vulnerability, but we know that the Sahel region in general is already affected by periodic droughts and other things that affect its vulnerability. So just to start out with a little bit of background on vulnerability mapping and why it's useful, first of all, it basically integrates two aspects; one is the biophysical and climate system aspects, the exposure, and the other is the human and economic system sensitivity. Basically we use the IPCC framework, as did the other studies, and we looked at layers that represent exposure, sensitivity, an adaptive capacity, and each of these is spatially differentiated.

Mapping can illuminate the key vulnerabilities within the system so it can kind of target or show you where to focus your attention. While it may tell you where adaptation may be required, it will not necessarily tell you what needs to be done and I liken vulnerability mapping to essentially a desk study, so you can sit at your computer, gather all the necessary data layers, compile them, and voila, after you do some somewhat complicated math, come up with a vulnerability index, at the end of that you still may need to go out to – you still need to go out to the field basically to see what the local dynamics are and find out what systems are most vulnerable and how best to design interventions.

Now visualizing – there's a number of benefits to this. One is visualizing how different climate stressors may interact with different sectors and portfolios, such as agriculture and health. You can target regions for more in-depth vulnerability assessments, and it can start stimulating discussion within teams. So in Mali, as it does in many other countries, the maps actually serve as a boundary object, people can come together around the table, look at the maps, and begin to identify how climate impacts may – climate exposure may impact their given sectors.

Before presenting the results I wanted to say a few caveats about climate vulnerability mapping. One is that vulnerability itself is a construct; it cannot be measured directly, it's what we call an emergent property. So when you have a sensitive system and you have exposure to climate stressors, basically out of that comes a vulnerability; it emerges from those two things. You can't observe it directly, but you can get data sets that often serve as proxies and they can point to the construct of vulnerability and you assemble multiple data sets into indices. In doing that you need good data, you need a good framework, but there are issues such as compensability; so a high score on one indicator may counteract a low score on another indicator.

There are other issues, such as the fact that we generally assume a linear relationship between the indicators, x degrees change in temperature may equal x number of percent changes in infant mortality rates. However, we can't say for sure that we know those relationships; there may be absolute thresholds beyond which – say a precipitation threshold beyond which certain types of crops can't be grown. So those are the kind of things that you have to – we make some heroic assumptions in order to produce the maps, but to do a more scientific or rigorous assessment you'd really need to know what some of those thresholds are.

Finally in terms of data and data availability, in many developing countries we know that data sets are relatively sparse. There's one issue, which is that you often have out-of-date data. In Mali there was a major conflict event in 2011, we could not capture that on our data sets. We had data sets generally that sort of ended around 2008 or 2009.

We often have low spatial resolution data. Climate data sets, for instance, can be very coarse grid cell resolutions, sometimes as coarse as ½ degree grid cell size. We were very fortunate in the case of Mali that we had very high resolution data from the Fuse Net project. We also had somewhat low resolution data for some parameters, such as infant mortality.

Finally, there are spatial and measurement errors. We know that there are problems with the validity and reliability of our data sets, so all of these things combined essentially increase uncertainty.

Okay, by this point you're probably saying, "Why do it at all?" right? But hopefully you'll see. So these four maps actually give you some indication of what went into the overall exposure component, just to say at the outset that the map scales here, everything that's in blue is basically in a 0 to 20 index range, so that means low vulnerability. Everything that's in red is in the 80 to 100 index range, that means basically high vulnerability, and we use that kind of consistent mapping representation throughout. And the yellows and the oranges are between those two.

We've eliminated – or rather removed, we didn't eliminate, but we removed from consideration everything north of the 17th parallel because these are areas that are very sparsely populated and which have very little economic activity.

So moving from clockwise from the upper-left, we had data sets for exposure; these are a sample of six data sets that we had total in the exposure category for average annual total precipitation, the inter-annual coefficient of variation and vegetation greenness, flood frequency, and long-term trends in rainy season temperatures, moving in that clockwise direction. The overall – what we did is we aggregated those all into one overall exposure component, and that basically

shows the south to north gradient of declining rainfall and increasing rainfall variability.

Moving to sensitivity, we had a number of data sets, including the demographic and health survey data on household wealth and child stunting, as well as data on things like conflict events and soil fertility. The conflict events actually did capture some of the more recent events in Northern Mali. This component reflects high rates of malaria exposure, infant mortality and poverty in the densely-settled southeast portion of Mali.

For adaptive capacity we also had DHS survey data on maternal education, which has been shown to be a very strong predictor of adapted capacity, health infrastructure and irrigated areas. This basically, the adapted capacity component showed a sort of gradient away from Bamako and get into increasingly isolated regions in the north and away from the Niger River, you find that adaptive capacity generally declines.

These were all combined into an overall vulnerability index, which you see here. So out of this exercise we learned some very important lessons. One of them was that these data sets, and Alex Apotsos will address this more in the later panel, were very heavily used by the USAID mission for programming decision-making. In fact, we sent high-resolution versions, a lot of the map inputs, as well as the outputs, the index layers, to a meeting that they held in October 2013. People with different development portfolios came together and they were able to kind of sit around the table and discuss what they saw on the map. So it became a kind of important point for discussion for exchange of ideas. It also assisted with geographic priority-setting. My understanding is that they decided to or opted to move into the Mopti region, which is one region that had slightly less presence of other aid agencies and also was sort of in that moderate vulnerability zone.

We also learned about the importance of full transparency and the methods and presentation of the results. So one of the things that we did, we very carefully documented every data set that we included in the assessment and we provided full metadata or data about the data, source information, what statistical transformations were used, and any uncertainties or weaknesses that could be documented, data limitations that were in the data. We also mapped the uncertainty levels that we had for a number of the spatial data layers and presented that, along with the final vulnerability map. And then we also used alternative methods, such as principal components analysis and sensitivity analysis to see whether the results differed heavily when you change the assumptions and the way you aggregate the data.

Finally I just wanted to say there's been considerable interest in vulnerability mapping a number of other countries. We held a training workshop for one colleague from the joint planning cell for the Sahel region last February; he left our offices and went off and produced two vulnerability maps, one for Niger and another for Burkino Faso. We've conducted a training under the ARCC project in our New York offices for eight professionals from West Africa, or all over Africa, I should say. In fact, they paid their own way, so that demonstrated their interest in their organizational interest in learning how to do this. And more recently we've been doing a vulnerability mapping in East Africa under the prepared projects. So thank you very much for your attention.

## QUESTIONS AND ANSWERS, PRESENTATION 1

*M. Edwardsen:* Thank you very much, Alex. A wonderful presentation and beautiful maps that you were able to produce.

I'd like to invite the audience to line up at the two microphones. We're going to have some time for question. If you do need to get up, get some coffee, anything else please feel free to do so as well. We're going to go for about 20 minutes here with questions, 15-20 minutes and then we'll also have some online questions as well. So if you would like to pose a question please feel free to make your way to the microphones. I have a question if nobody wants to volunteer, but I'm seeing, I believe, Ken from Winrock is stepping up. So as you do come up to the microphone please provide your name and your institutional affiliation and we're going to try and take a few questions at a time for the panel. So please. Ken, I'll let you go.

*Ken Andrasko:* Hi, I'll jump in just to kick things off and kind of warm up the crowd a little bit. I'm Ken Andrasko from Winrock International. Fantastic presentations, huge amount of information. I never heard the terms "private sector" or "government" at any point in any of the discussions so my question is since the benefits that you talk about are not monetized how do you end up financing this kind of work? Is it like to be a model of developing assistance forever into the future or do you have some way that you're likely to attract government roles so the government takes ownership of this or get the private sector angle so it's more sustainable financially over time? Thanks.

*M. Edwardsen:* Thank you, Ken. Anybody else? Or I can let the panel go and you can all think about another question while I'm doing so. That is something we'll talk about in the second panel for sure, but I saw Trish writing rigorously with some notes. So I could kick it over to you as a COP to take a first crack at that.

*Patricia Caffrey:* I'll start off. We actually, as many of us mentioned in our presentation we work very closely with local partners in terms of sustainability and transferring over capacity. The second panel will be talking a little bit more to that. To our learning from ARCC actually by the time we did our last assessment in Western Honduras I think we learned a lot more about cost effectiveness, and how to do these assessments in a rigorous manner, but using local expertise, building up local expertise, working a lot more with our local partners like the Met Services. I still think, though, because of capacity at the local level we're going to have to continue to invest in developing local capacity, particularly in the area of climate information services and continue working with agriculture research extension in making those investments.

I don't know if my other colleagues want to --

*John Parker:* I'll just chime in on the private sector engagement piece from the perspective of the Honduras assessment. And Isaac will talk a little bit about this in his presentation. But after the dissemination of the results of the vulnerability assessment in Honduras USAID actually had a request from melon producers in southern Honduras who are seeking technical assistance in terms of how to implement adaptive practices because they were already facing impacts. And that's the type of sort of private sector interest in these vulnerability assessments and wanting to receive technical assistance and finance it themselves. That's the Honduras example and there probably are others and other assessments that ARCC has done.

*M. Edwardsen:* Great. We could take one here from the floor and then we'll go online, please.

*Rodolfo Camacho:* This is Rodolfo Camacho from ARCC Associates. I have a question to the whole panel, I guess, if any of your work -- and this is very important work because it does inform decision makers to what to do in terms of climate change and climate variability. But one question that I have is if any of this work has been put to use by any planning organization, municipal, state or national in terms of actions that they will take on? Or who is doing the follow-up on this? Is it the missions? Is it government? Any details on that?

*M. Edwardsen:* That is panel two. Those are all very important questions. We'll get into a lot of those with each of the four speakers on panel two but if anybody wants to quickly touch on anything I'd welcome you to.

*Patricia Caffrey:* I think we'll leave it to panel two but when we did the assessments, as I mentioned, we really looked at several different levels in terms of gathering information and involving stakeholders. We looked at household, community level as well as the local level, including local government, district or municipal level, and the national level, looking at institutions and what they can do to respond.

*M. Edwardsen:* Great. Yeah, panel two, the bar is being set high, so study your notes. We'll maybe just take a few online and then we'll come to the floor. So please, in the back they're just kind of like the voice of God here is going to give us some questions.

*Webinar Facilitator:* Hi. We have 129 active participants currently on the web even and there's been a couple of interesting side discussions that have been evolving during your presentations. One area of interest has to do with stakeholder involvement. The web participants were wondering what were the challenges and the successes that you experienced in the countries where you worked, including challenges and successes that you had experienced when dealing with farmers. And on a related

question, whether or not you feel that the people that you worked with, the farmers in particular, really understand what climate change means.

*M. Edwardsen:* Would you like to put another one forward or should we tackle that?

*Webinar Facilitator:* Yeah, I think you can tackle that one.

*M. Edwardsen:* Great. So everyone might have a little to say on that. David?

*David Miller:* In the Senegal assessment we worked very closely with a couple of national institutions: the National Agricultural Agency as well as a semi-private agency called the Center for Environmental Monitoring, CSE in French acronym. And as I hinted at in my presentation there was a lot of benefit from this. Sometimes you're -- I mean we were Americans in a foreign country. And obviously we felt like we knew it pretty well but it was really nice to have someone who studied these or similar issues to ground and make sure we were on the right track. And as Mamadou will present in the second panel, carry forward some of our results and some of the methods we used.

So there were great benefits. Some of the challenges, of course, are not unique to climate change. These are not well-financed institutions. The staff, although extremely competent, is pulled in -- particularly the best staff is pulled in multiple different directions, coordinating our institutions here on this side of the ocean with theirs caused challenges too. I think in climate assessments we'll be working more and more with meteorological agencies in these various countries and that's a whole other basket of challenges, particularly in terms of financing but there are other challenges there. In Senegal, in fact, despite months of effort trying to figure out how we would work together, in the end we were not able to work with the Met Service in Senegal, unfortunately.

In terms of farmers and farmers' understanding of climate change, that's a whole other question. We conducted household surveys and focus groups, similar issues you would have in doing that in any other sort of study. It is an interesting question there, understanding of climate change that was in the focus of our study. Of course we've had conversations with farmers. And I think -- one thing I've realized is that we don't really give enough credence to the fact that farmers really have a very tight understanding of climate and they're experiencing it. It's weather, it's climate, but they have a much more detailed understanding than even our super fantastic data crunching projections can sort of create. Or our analysis of collected information from Met Services. Climate is very complicated, and for a particular location it's those folks whose lives depend on understanding, reading, interpreting signs, understanding what's happened recently, how a particular soil, a particular variety of a particular crop will interact with a particular type of rainfall, is really something that we cannot

model and we cannot understand very full, even through our elaborate scientific methods.

So on that level, whether it's weather, whether it's climate, on that level farmers really do have a grasp of it. And when we presented in Mali, for example, a response to some of the technical folks we presented our assessment to said, "Well you should go out and tell the farmers," I think from my point of view I think farmers, what they need to know is basically it's changing and it's going to change in one direction and it could be a lot worse. For all our details we don't have details that they can really use at this point. Anyways, those were a couple of ideas I have generated through this.

*M. Edwardsen:* Great.

*John Parker:* I'll just add one thing. So on the hunger assessment in our focus group discussions with farmers one of the questions was for them to think back over the last 20 years to identify the principle changes that affected their production systems and climate featured very strongly in the things that they were citing. There was some sort of difficulty differentiating from kind of natural climate variability, which features strongly in the dry corridor versus sort of anthropogenic climate change. But in terms of climate as a major driver of changes and kind of adaptive practices and so on farmers regularly reference that as an important issue.

*M. Edwardsen:* Thank you, John, and thank you, David. Please, step forward. I think we'll take a couple of questions, so if there's someone else as well.

*Gene Brentley:* Thank you. Great presentations. Really very helpful. There were two things I noted about the vulnerability assessment for Senegal that I thought were good examples, and I'm wondering to what extent they were taken up by the others, or if that wasn't possible during the timing, to what extent they've been taken up in your recommendations for the future. And those two are 1) comparing the future projection with historical trends, which is really helpful in terms of getting things in context. And the other is -- this may have just been left over, off of the other presentations. But the Senegalese Institute for Agricultural Research was indicated as one of the partners, and I think it's really important to be looking at adaptation of a species, a crop species that may be able to be more adapted to future conditions. So I'm wondering to what extent that was addressed in others. Thanks very much.

*M. Edwardsen:* Thank you. Sorry, your name and institution please?

*Gene Brentley:* I'm sorry, I thought I said that: Gene Brentley with RTI International.

*M. Edwardsen:* Thank you Gene. Please?

*David Nicholson:* Hi, my name is David Nicholson from Mercy Corps. One of the questions I have, one of the challenges I guess I face as an advocate for going through these kinds of processes internally is this question about return on investment, of going through this complex process and sort of ending up with perhaps broad adaptations, strategies that probably could be guessed at from the beginning and we still end up with a level of uncertainty, that means we end up adaptation pathways which are pretty broad.

So I guess I'm just wondering from hearing from the power here the perspective of, you know, going through this extensive and relatively expensive process. Can you talk a little bit about the return on investment that actually -- and I realize we're going to get to some of the implications this afternoon but just sort of coming out the other end of the assessment phase do you feel like you learned enough to really be worthwhile? I guess that's it.

*M. Edwardsen:* A very relevant question that we're all wondering and answering for. So ROI and how everything has been incorporated across the other CCVAs.

*Alex de Sherbinin:* The assessment was the last assessment we conducted, so -- and the approach of comparing historical climate change to projections was used only in that assessment and wasn't able to be adopted in future assessments. And for your second point about working with ISRA, national agricultural agencies, it wasn't taken out by other assessments but in Uganda I know we worked with the national ag agency NARO; in Honduras we worked a lot with municipalities. But it wasn't built in the design to have one specific institution. Isaac will talk about all the institutions that were involved during this sort of design process, as well as now on the uptake. But there's been very much a sort of local stakeholder involvement.

*Patricia Caffrey:* In terms of return on investment you'll hear in the second panel that a lot of the stakeholders we've presented at the local level are findings using different communication means so that people could understand. We developed scenarios that were actually in Uganda -- each climate future scenario was different in each district. And so we modified them for each district so when we went there we could talk about their particular situation. So I think communication was very important about these findings. And again, the second panel will talk about once they improve their understanding of what the implications are and what they were able to do.

At a national level there were quite a few other donors that actually were looking for this kind of information, and in every country where we did these assessments there was no other assessment that had been done like this before. And because

that was unique and it was needed, really, both the government at high levels, as well as other donor partners in those countries used the assessments to also inform their program plans, and in some cases policies. And you'll hear about that in the second study.

So we tried to reach low and work very closely with the communities and farmers, making that information relevant to them so they could act on it, as well as at national level.

*David Miller:*

We certainly had some trial and error in our development of our methods, and if we were to do this again we would hone in on the ones that were more effective.

On the other hand I think a lot of what we were doing was creating understanding and sharing methods. So in terms of the exact results we came up with in the end versus the amount of effort we put into it I'm not sure you get a happy equation there. But I really think that not only are our direct partners but a lot of the people we presented to and worked with really changed their understanding of climate change. And the fact that our work was rigorous lent a certain amount of legitimacy and creditability to our responses, and that much force in their understanding of climate change as a result of our work.

*Patricia Caffrey:*

David mentioned the learning. I'm making a plug for the compendium that you'll be able to pick up a copy or access it online after this meeting. I think we did a good job of really documenting and sharing our lessons learned as we went from one assessment to the other. It's not necessarily a manual on how-to, although we have some information in there on how we did our climate analysis and things like that.

I think we found, the ARCC team, that doing these assessments is really as much of an art as it is a science. And you know, those things you learn by doing them actually. Hopefully we can share those experiences and the rest of you can learn from it as well.

*M. Edwardsen:*

Thank you Trish, David. We'll grab one more question and then we'll shift. So please.

*Ben White:*

Yeah, my name is Ben White from Integra, LLC here in DC. This is sort of an observation/question for Alex. I noticed that in your climate vulnerability maps there was an increased usage of remote sensing and Earth observations, and I really liked that because once you have the methodology down it seems like it can scale tremendously throughout the region. So I was wondering how you perceived the evolution of your methodology throughout West Africa and potentially the continent at large.

*Alex de Sherbinin:*

Great question. So actually we run a NASA data center at Seasons so I can put in a plug for NASA. Our data sets are actually complementary to the satellite remote sensing data that NASA produces, so we produce population grids and infant mortality grids and malnutrition data sets that are useful kind of at global to regional scale analysis. But the point of doing that is to integrate the data sets across the disciplines and across.

So yes indeed I think there are certain things that can be measured from space. We use things like variation in NDBI, or greenness; we used soil carbon based on modis retrievals, and rainfall and proxies from satellite measurements like TRIM. I do think there's potential there, still, measuring the social vulnerability aspects requires generally household surveys. Increasingly there's novel data streams such as call data records and things like that that can locate people in real time. But yeah, I do think that the potential for remote sensing in this area is expanding and will be important for that kind of synoptic coverage for large regions.

*M. Edwardsen:*

Great. Well I'd like to thank the panelists. That was a wonderful job. I compressed my information in a very short period of time so thank you very much for your active participation.

## PRESENTATION 2, PANEL 2 - UPTAKE AND USE OF VULNERABILITY ASSESSMENTS FOR CLIMATE-RESILIENT AGRICULTURE PROGRAMMING: ARCC INSIGHTS

*Leif Kindberg:*

Do a quick transition here and bring the other panelists up. What I'd like to do is just share with you a little bit about what we have learned along the way in terms of communicating the results of these studies, these Climate Change Vulnerability Assessments. We've found that there's no one-size-fits-all approach to effective communication because the level of knowledge on climate change varies across different countries and across different contexts. It's instead necessary to really customize the communication strategy and develop tools that help different levels of expertise understand uncertainty and the other complex findings that are part of these studies. Therefore, we've found it particularly useful to understand our audience, know who we're trying to communicate, and develop a layered approach to communicating to those different levels of audience.

While the Climate Change Vulnerability Assessments themselves are very deep and intense and have many annexes as well as the recommendations and the approach to designing these assessments, they're often too complex for a lot of users to really effectively utilize the information. And so we also developed a series of briefs and shorter executive summaries that really help people like policymakers and others who need a more rapid overview of the key findings from these assessments to capture those in these.

Although it may sound like a no-brainer, translation of these materials is really critical. It's often perhaps thought of as an afterthought, and it's really critical to build that in. Furthermore, simple tools like maps, climate envelopes, and other simplified communication materials have proven very effective to working with local audiences to understand how climate change is going to impact specific sectors and livelihoods in those communities. And then finally we of course found a great deal of value in presenting the results, giving back to the communities where we've conducted these assessments through presentations and materials where we bring the team members but also engage and involve the local team members as well in communicating the results and recommendations from these assessments.

So where can you find these and some other useful recommendations and lessons from our experience? One is, as Trish mentioned, we've captured a lot of this information in the compendium, which is going to be soon available on the ARCC portal. Our online home is the ARCC portal on Eldis Communities at [Community.Eldis.org/ARCC](http://Community.Eldis.org/ARCC). That's our online home for the Climate Change Vulnerability Assessments, the technical papers, and workshop reports. We also have, as I mentioned, the summaries and other summarized information on that, and our lessons learned including the compendium.

Here are just a couple resources that I hope you'll note down. These resources – although not everything is currently available on the website, it soon will be, by the end of November. And this website will last after ARCC closes down in November.

So with that, why don't I invite the second panel up and we'll transition to the panel on uptake and to Matthew?

*Matthew Edwardsen:* Thank you very much, Leif. I personally do not understand how Leif manages all of this information so effectively. He's done an outstanding job and he's definitely been the brains behind this entire event. So my own gratitude is immense for all that he's done. He's done an outstanding job and I really do hope that all of you will have an opportunity to go to the website and review these documents at your leisure.

So as indicated earlier we're going to have a second panel. I know a lot of people have asked us questions already about what this panel is going to do, and this is really I think going to get everything that people here are really interested in knowing about. It's like how is this information used and that whole process. So in terms of format we're going to do the exact same thing as we did on the first panel, a couple of, you know, eight- to ten-minute discussions followed by Q&A.

And I guess I quickly want to tee up this panel by providing you all with a few terms that we've been using in regards to uptake, and I guess initially I'll just mention as to, like, what does that mean, uptake. So for us, when we say that, we're talking about how the findings of a CCVA inform policy and programming and how that process occurs. So that's the uptake that we're talking about. And we've found through ARCC that there are several attributes that can increase uptake occurring. So there are three words here: credible, legitimate, and salient.

So when we refer to credible we're talking about the product of the CCVA and its perceived technical quality. So credible is really about the product. When we talk about legitimate, we're talking about the process that was undertaken for the CCVA and the level of acceptance of the findings as accurate that that process was able to ensure. And then when we mention salient, we're talking about the relevance and the timeliness of the information that the CCVA produced.

And to ensure that there is that uptake and that the results are utilized, we need two sets of individuals to take part in this process. One set are knowledge brokers, and those are people who make the information more accessible and they interpret the design and the findings of the CCVA, and that's outside of the individuals who are actually conducting that process themselves. And then we

also need champions, and those are people who are credible, and they may very well be decision makers or individuals who have access to decision makers. So those – I just wanted to provide those definitions because those five terms are about to get thrown around by all of the different panelists, and you just kind of take that into consideration as you hear from them.

So we're going to follow the exact same format in terms of countries, and so we're going to start things off with Uganda. And it's my pleasure to introduce Rita Laker-Ojok. She's the chief of party for the Uganda Ag-Inputs Feed the Future program. It's a new assignment, so congratulations. And before this Rita was a value chain specialist for the Uganda CCVA. She's a Ugandan expert; she's been there for nearly 30 years working in agriculture and agribusiness development programs, and in Uganda she's been working with many of the Feed the Future implementing partners to integrate climate change adaptation into the program activities. Her presentation is going to focus on how in fact the CCVA was taken up across the development community at large, not just USAID and the government of Uganda. So, Rita, please, the floor is yours.

*Rita Laker-Ojok:*

Thank you very much, Matthew. As Trish mentioned in her earlier presentation, the design of the Uganda Climate Change Vulnerability Assessment, which was the first one that was done, really focused on the objective of being able to guide USAID-Uganda in its programming decisions as it was designing its Feed the Future responses.

But there was also an objective to provide an evidence-based information set that would be of use to the entire ag sector in Uganda. And in order to achieve this, what they did was to design a very participatory and iterative process. As Trish mentioned, this participation started all the way from the beginning, at the time of the scoping mission. It progressed through the data collection in terms of focus groups, key informant interviews, stakeholder reviews. There was an active process of scenario development to apply the results to the local situations at each of the pilot districts, which was then validated during the options analysis. And all of this was not only to disseminate the results of the findings, but to really validate and engage the participants in the discussion of what is the implication of these findings. How is it going to change our standard operating procedures? How is it going to change the way we think about agriculture, the way we think about development?

And this process then was already engaged at the time of the options analysis, which was in January of 2013. That input greatly impacted on the results that came out in terms of the national and local level recommendations that we eventually published in the Climate Change Vulnerability Assessment report, which came out in roughly August of 2013.

At that time then, there was a conscious decision on the part of the mission in Uganda to bring these results back to the districts where the data originated. And these are just some of the photos of the engagement that took place with the key stakeholders in order to really get them to start thinking about implications. And this was done at a series of meetings not only with district officials but with all of the USAID implementing partners across the various sectors – not just agriculture but also health, education, and the other areas in which USAID is involved. So through this participatory process and the promotion of local champions, the vulnerability assessment was really able to inform and inspire a wide range of climate change adaptation interventions across a broad spectrum of stakeholders and institutions.

So just to sort of summarize the way in which the CCBA was able to have an impact, the vulnerability assessment results informed USAID programming as was originally expected and were built into the whole design of the Feed the Future project activities in Uganda, but it went beyond that point. It was able – it was taken up as baseline information which was involved then and used in the design of new project interventions from other donors, including GIZ, the World Bank, DFID.

It also informed national policy formulation. It provided a sound evidence base on which the national climate change strategy and implementation plan was based, and was then built into the most recent national development plan, which is the next five-year development plan for Uganda. And at that level, the National Planning Authority and the Climate Change Authority drew up guidelines for the mainstreaming of climate change adaptation into the district development planning process and budgeting. It's also been taken up by various research institutions, including the FAO, IITA, and the National Agricultural Research Organization for purposes of reviewing the portfolio of existing agriculture interventions, identifying gaps and research needs for prioritization of climate change moving forward in the design of future research activities.

And this whole process, as Matthew mentioned, was really affected by this issue of salience, credibility, and legitimacy. These uptake activities were reinforced by these perceived policies. In terms of salience, the timing of the Climate Change Vulnerability Assessment was very important. It came out at a time when climate was really on everybody's radar, and therefore the donors were actively looking for solid information on which to base programming decisions. The government was looking for solid information on which to base policy decisions. And because this study was undertaken by credible scientists working closely with local institutions, especially the Metrological Authority and the National Agricultural Research Organization, there was a credibility to the results that came out. This was the first high-quality climate change analysis to be done based on 60 years of weather data, which was downscaled into these six regional

models, so that there was a strong empirical foundation for the results that came out. And this was then strengthened by the large-scale livelihoods research that was done. And then the participatory process by which various institutions were involved in the analysis and recommendations that came out at the national and local levels really created a legitimacy for the process.

And as Matthew has also mentioned, the knowledge brokers and champions were very key to this whole process. The ARCC team themselves, the members of the various organizations that came together to carry out the vulnerability assessment, were the frontline in terms of being knowledge brokers. They had a very important role in translating a very complex study with various components into information that was accessible to the local population, to be able to make the results clear, to understand the implications as well as the uncertainties, and to really engage the community in dialogue about where things were going to be going.

In terms of champions, in Uganda Hadash Kushnir, who happens to be here in the back – thank you very much for coming – within USAID she played a critical role in being able to convince the mission of the importance of the vulnerability assessment, to be able to translate the results of the vulnerability assessment into specific program design, and putting together a very effective portfolio of interventions within Uganda that put climate change in the forefront, in the forefront in terms of enabling environment, marketing, access to agricultural inputs, access to weather information, and access to training and educational systems. It was also important that she was the co-chair of the donor forum on climate change and therefore was able to bring the results of the vulnerability assessment to the attention of the other international donors and institutions and encourage them to make use of the findings.

But rapidly the role of champions was then devolved, initially to the Feed the Future project activities, and then consciously through the Feed the Future activities to other stakeholders within the government institutions. And I just want to quickly run you through an example of how this process took place.

Initially it was USAID and the Enabling Environment Activity, which is one of the Feed the Future projects, which shared the results of the vulnerability assessment. They then went on to engage with the Ministry of Agriculture, the Ministry of Local Government, and the Minister of Water and Environment to do local level sensitization on the importance of mainstreaming climate change into planning and budgeting. The next stage was to involve the Ministry of Finance and the National Planning Authority in carrying out trainings of trainers for champions, local level champions in mainstreaming climate change in planning, and using the planning tools of the government to incorporate climate change.

These champions then went back to the communities to train the local planning committees, and then the Ministry of Local Government was able to come on board and really take ownership of the process and include climate change indicators in the national district assessment tool. And this created a carrot, because how much resources the districts get from the central government depends on how well they perform on the district assessment tool. So by incorporating climate change criteria, it really added a financial incentive to the districts to be able to mainstream climate change in their planning and budgeting, and lastly to involve the Office of the Prime Minister, who has the mandate under the climate change strategy to carry out monitoring of impacts. So this was the process of devolving the champions from being within USAID to really involving various government institutions.

The process also evolved geographically. It started out in the six pilot districts, and then in collaboration with FAO was rolled out to the areas which are primarily in the livestock corridor – because USAID dealt more with crops; FAO is dealing more with livestock livelihoods – and then into all of the Feed the Future activities, which are the various shaded areas. And of course under the National Planning Authority it's now being devolved into incorporating climate change at the national planning level.

So in summary, through a participatory process the vulnerability assessment was able to influence direct procurement decisions on the part of USAID, project design from other donors, capacity of existing local government institutions rolled out into national and local planning, and capacity building for other key stakeholders in terms of research, NGOs, and private sector players. Thank you.

*Matthew Edwardsen:* Great. Thank you very much – very informative. And, you know, one thing I'll just highlight is that these CCVAs have taken place over time, so the scale of uptake as you go through the various presentations will be different. We've had a little bit more time in Uganda to see how it's been picked up, and you will note that, but that's very impressive and it's wonderful to see the applicability of the results.

So moving over to Senegal, it's my pleasure to introduce Professor Mamadou Baro. He's a faculty member in the Bureau of Applied Research and Anthropology at the University of Arizona. When he's not doing his day job he's working on various assessments such as the Senegal CCVA, where Mamadou was the field research coordinator. This is a great presentation and through this presentation we're going to really see how the stakeholders were engaged in the uptake process. So Professor Baro, please, the floor is yours.

*Mamadou Baro:* Thank you very much, Matthew, and this is really an exciting time as Ralph Anderson said in terms of being able to do something that people are going to

use, because – and that’s why the title of this communication is Design Assessment to be Used, something that’s actually going to be taken to the communities and something going to be done about it instead of just having the assessment sitting on shelves.

So it’s interesting, actually, what David said about setting the groundwork for the work to be actually used in development planning, and a lot of work went into actually making the context – understanding the context and also making sure that at the end of the day the information is going to be used. So we tried to bridge the gap between the results and the...in development, and the keywords here in terms of salience, credibility, and legitimacy are critical. And in Senegal we tried to use reputable and credible national institutions such as ISRA, which is the Senegalese Agricultural Research Institute, and CSE, which is the Ecological Monitoring Center. These two institutions are key in terms of helping us get to not only credible information, because that’s important – I mean, my colleague Alex mentioned earlier on about the wonderful maps, the great job that was done in Mali, and sometimes, you know, you can produce interesting report and interesting maps, but what comes in as information, the data you get in, has to be good data. So that’s why credibility is very important, and being able also to have institutions that are credible and in them also researchers who have a good reputation helps really build the ground for making sure that at the end of the day the information is going to be helpful.

So the active collaboration with local institutions also increased the relevance to decision makers and the salience of the finding, as...the participation of government and donors representative in the scoping mission and in the later phases of the assessment in which options were discussed and prioritized. And here I would like to insist on – because we usually talk a lot about participation and we talk about capacity building, but sometimes, you know, it’s not done in a systematic way. I mean by that involving the stakeholders at the beginning of the process, in the middle, and also at the end of the process, and this was key in Senegal. And it was interesting to notice that people were very excited because they felt like, well, this isn’t just something that they have to follow because somebody’s funding it, but they...interest on doing that. And the timing also as I said was very critical in the sense that everybody – the communities were facing serious issues that have to deal with climate change and the impact on farming and on livestock raising and things like that, but also the institutions were trying also to come to a – to grasp those things and to be able to provide some useful recommendations.

So the collaboration with national research institutions along with the participation of government...helped to strengthen the legitimacy of our findings by taking opposing views and stakeholder values into serious consideration. The ...of having also opposing views – sometimes, you know, I mean, there are

different sides to a story, and we tried to get people who had different perspectives on these issues, to have them argue and test them, the...that they have. And we also focused a lot on getting the best available evidence at the moment, and that was very interesting. At the end we were able to get some kind of consensus. So this participation at the beginning and also at the end of the process was critical.

I would like now to insist on the role that, you know, the champions and the advocates and the brokers played. We believe this attention to producing a result that has salience, credibility, and legitimacy has resulted in greater uptake of our findings. It not only strengthened the quality of the assessment findings and recommendation, but it also strengthened our process through shared expertise. That was very interesting because we had different people with different level of expertise, but all that was shared, expertise that built the capacity and involvement of the...brokers and advocate for those results.

USAID-Senegal plays an important role in all this. I mean, they were at the forefront and they helped us be in touch with credible institutions and organizations, and they have a good memory of research in Senegal, so that was very interesting. Also the role that CSE and ISRA played also was critical to the – in terms of being able to make sure that you believe now, you know, the results would be used.

But I also would like to – before presenting the evidence of uptake let me first say that the Senegal assessment has only recently been finalized. It's still early to expect evidence of its impact on governmental and donor strategic planning and policy. What I can present here are the indications, as reported to us by a representative of CSE, ISRA, and local community leaders of how people intend to use the assessment results.

The process was a long one. As I said, from the beginning all the major stakeholders, including representative of civil society and the private sector, were involved in the process. And so we had exit meetings, you know, with the communities, went back in the field and tried to share the results of the work with the community members that were there, and they were very excited about it because – and it was exciting actually when we were talking to them and they would say, well, people actually come back to us and to – you know, and to share the result of the studies that did it. So this was very interesting.

And the response to our presentation to the assessment result to stakeholders in Dakar suggested that they are on target and will be used. Eighty percent of the participants who represented the government donors and NGOs feel that the presentation increased their understanding of climate change adaptation, so they – and that's a very high percentage. And 88 percent reported that they would use

the assessment result in their work. These percentages were the result of an exit survey conducted in Senegal.

The most direct client of the assessment, USAID-Senegal, might in the long run be an important knowledge broker as they integrate the result of the assessment into the development program for Senegal. The mission indicated interest in using the assessment to inform not only any potential investment in Senegal, but they also asked ARCC to apply the research finding to other parts of the country, noting that it is expected to inform the next country development cooperative strategy. A champion of the assessment by USAID-Senegal provided a brief of the assessment to the authors of the ECHOAS regional investment plan, who indicated that they would include it as an annex to the plan, so that is also an important element in terms of uptake.

The staff of the two Senegalese research institutions that collaborated on the assessment with ARCC, CSE and ISRA, are likely to play the role of champions of the study as they use and transmit their approaches to the study findings. Both institutions, ISRA and CSE, are planning to use the assessment report as a background document for new program initiative on climate change adaptation in Senegal. They also independently noted that these findings will be used from Senegal next climate change adaptation communication now being written.

I came back from Senegal about four weeks ago, and they're actively working on the – you know, the CSE and ISRA and also now IPA to – you know, all the three institutions trying actually to see what – how they're going to be implementing the process in the long run. And then the individual staff members of the institutions have also declared their intention to transform the report for the assessment into journal articles and have all the members of the research team also do that. One...in the US has also presented result from the assessment to a sample...at the University of Florida.

IPA, which is Initiative Prospective Agricultural, one of the biggest think tanks in Senegal, has been inspired by the study and plans to add some of the findings to their debate on public policy and agriculture and rural development in West Africa. CSE, ISRA, and project representative...so that's also very interesting to see now, these institutions now collaborating on the same topic.

Finally one of the most important ardent consumers of the assessment results appeared during the presentation of the study, both are the local community leaders – when we went back to eastern Senegal we had meetings with community leaders. We had representatives of civil society and we shared the results with them, and they are now planning to take the information and to integrate it into the next strategic plan at the local level, which is very interesting. Participants were very engaged and vocal. They requested copies of our

PowerPoint and insisted that the results should be shared widely with the community consent, and their plans are right now being made to make that information available to those communities.

Somebody said earlier that when we do the assessment it's sometimes more art than science, and that's really true, because we learned from the experience in Uganda and we improved that in Senegal. And the idea now also is then to use artists from the eastern part of Senegal. Baaba Maal, who's a very well-known artist in that part of the country, who is now an advocate and plans also to use that information to be in position actually to raise awareness about some of the impact of climate change and to also help communities deal with those issues.

Thank you very much for your attention.

*Matthew Edwardsen:* Great, thank you very much, Mamadou. So I'm just curious, are there going to be any royalties associated with Baaba Maal using a CCVA?

*Mamadou Baro:* I don't know.

*Matthew Edwardsen:* I was really excited to see Baaba Maal picking this up. He's an artist that I really enjoy listening to.

So we're going to quickly move over to western Honduras. So Isaac Ferrera is with USAID in Honduras. He's the global climate change program management specialist at the mission, and when the assessment was going on he was the principle mission staff member working with the team that John Parker outlined earlier in the morning. Isaac is an academic by training. He's since left academia to work with USAID. He's also taken a number of fairly prominent roles in Honduras dealing with climate change. He's a member of the delegation to the UN Framework Convention on Climate Change, and he's an associated member of the Climate Finance Advisory Service for Developing Countries. We're going to have a good discussion on how broad governmental engagement occurred through the CCVA process. So, Isaac, please, the floor is yours.

*Isaac Ferrera:* Thank you. For at least 20 years Honduras has been identified as one of the most vulnerable countries in the world. In 2013 the Global Climate Risk Index ranked Honduras as the most vulnerable country based on per capita human and economical losses. Drought and floods are common every year and put the country at high risk. This year, a typical ENSO year, Honduras went from a drought that affected more than 100,000 families, to flooding episodes that had negative social and economical impacts in the north, south, and west of Honduras.

The Honduran government has made efforts to...mobility, especially through the creation of an institutional framework. In 2010 a national strategy on climate change was approved by the government. The same year the Climate Change Directorship was created, and this started two main instruments that are being used by the government to promote adaptation and mitigation actions in the country. And in 2013 climate change law was passed by national congress.

Since 2010 several stakeholders, including USAID, have been working together to promote adaptation and mitigation actions in Honduras. However, most of what has been envisioned and prioritized needs to be targeted, investments have to be made, cultural practices changed, and regulations enforced, a starting point to provide good information for good decision making and – which is probably one of the most common challenges that are identified in documents that are written on this topic, and that is why this study is relevant.

Not many climate vulnerability and change studies have been carried out in Honduras. To my knowledge this is the first multidisciplinary study addressing the impact of climate change on livelihoods and ecosystems, especially in the rural areas where poor people depend heavily on natural resources and environmental goods and services.

The report has introduced new concepts to the stakeholders, such as the socioecological vulnerability and climate envelope for ecosystems. This report also has provided some findings that are not new, but they confirm things that we already were aware of and make us more confident about our programs. Some other findings are new, for example the one about cloud forests. According to the study, because of changes in temperature and precipitation, cloud forests will become gradually a new type of ecosystem and...then affecting the capacity of water capture and then to make this water available for the population. Currently thousands of communities in southwest and east of Honduras depend heavily on water that is generated in these cloud forests. This is an example of a finding that is actually a threat that requires action.

For our mission, this study had three objectives. The first one was to learn about these midterm climate projections, the second one was to understand what would be the impact of these climate projections in livelihoods and ecosystems, and the third one was to identify existing and potential responses that could be integrated into USAID...Honduras and other donors' programming. The study was completed just a few months ago; however, it has already achieved some positive impact by encouraging more attention to climate vulnerability and change, both internally within USAID and externally.

Externally this study has been presented to at least key multi-stakeholder platforms. The first one is the Alliance for the Dry Corridor. The Alliance for

the Dry Corridor is an initiative that is led by the government of Honduras but is based on our experience and our approach in the...future activities. Five donors and the government of Honduras are working together to increase nutrition and to reduce poverty in one of the poorest and most vulnerable areas in the country. After this study was presented, the Alliance for the Dry Corridor and the government of Honduras decided and took the position to make sure that our climate projections and concerns should be taken into consideration...projects. The study helped to put back into the agenda a concern that we as a mission already had, and that has been very important because now we are expecting to see a more interconnected work between the agricultural and the natural resources sector in order to increase the resilience of the population. More investments on water – on water capture, on water management and water distribution are also expected.

The other platform where this study has been presented is the Agricultural Committee on Climate Change. In this case, this multi-stakeholder platform that is led by the Ministry of Agriculture and Livestock, but universities, donors, NGOs, and other stakeholders are part of it, they are – what they want is to promote a more resilient agriculture...Honduras. And what they are doing now is that they are drafting a new strategy on how to integrate these climate concerns in the work that is being done by the directorships that are part of the ministry. And this is the starting point for more work that will be done on climate...agriculture in the country, and one of the key documents that they are using as a reference is this vulnerability assessment.

Similarly, this study has been – or is being used by private sector and other USAID projects as a key reference. But maybe we can talk later about – with more details during the break or during lunch regarding this.

I just want to mention as well that the document has been very useful for USAID because it has provided a new element on how to integrate climate concerns into our strategies and programs. Now, because of the findings, we are taking a closer look to this no-regret, lower-regret adaptation measures such as the conservation of critical...systems, especially water research areas, things like how to scale up climate-smart agricultural practices, how to make climate information available, increase the technical capacity to address climate risk, diversity incomes through off-farm employment. These are just examples of things that we have to take a closer look at.

So I would say that this study has come really at a very good time because heavy investments are being designed on the...agricultural sector. Our mission recognizes that there is a lot to be done regarding adaptation to climate vulnerability and change. We recognize that our cooperation and efforts should be based on the best available information. But our contribution to the country

begins with increasing the understanding of the impact of this climate vulnerability and change, not only for our agency but first and foremost for the general public and for the decision makers in the country. Thank you.

*Matthew Edwardsen:* Great, thank you very much, Isaac, for that informative discussion. And it's really wonderful to hear that just a few months out there's been so much progress made.

So the last discussion on this panel – we're going to head back over to Mali. It's my pleasure to introduce Alex Apotsos, who many of you know. He's here at USAID in Washington as a climate change advisor in the Africa bureau. For the last couple of years Alex has worked very closely with ARCC, in particular on the West Africa Vulnerability Assessment, of which the Mali mapping effort was a very important component. Alex is going to go through the uptake process which occurred with the Mali mapping tool and communicate how that was passed on to stakeholders, and also talk about some of the limitations that such a medium of communication may have. So, please, Alex, it's all you.

*Alex Apotsos:* Thank you very much, Matthew. And I invite you all to take a deep breath, going through seven through presentation – you have one left. We're almost done. But before I begin I also wanted to really put credit where credit's deserved for these. It really goes to Alex for creating the maps and then our colleagues out in the mission in Mali who have really been at the forefront of putting this forward. I love these talks. I get to sit up front and take some credit sometimes for work that other folks have done.

We've now presented these maps at a variety of different fora, both within our mission in Mali as well as to an event we held in Bamako in September, where we had 80 different Malian stakeholders come in and view all the different aspects of the vulnerability assessment that we've conducted for the country. And pretty much across all of those fora we've had a very positive, enthusiastic response around these maps. People have been very interested to figure out how they can use them in their planning and begin to understand what is the underlying analytical foundation behind them. And our mission director in Mali even came up to us and said, "You know, these are really the kind of decision making tools we need. We need more of these tools." And he had his staff print poster-sized maps to put up on the walls in one of their conference rooms because it really was something that they wanted to us as they thought a little more strategically about how to develop programming in Mali, and I think there's a number of reasons for that.

The first is that these maps are so simple and so clear. You can put the maps up and you can see so quickly, even if you don't have a technical background in climate change, that red is bad, blue is better. And so you can quickly see that

there's higher vulnerability in the north, there's less vulnerability in the south, and specifically around Bamako. And what that does is it helps you get past some of that nuance of those discussions. I mean, what you've heard today is how complex and how technical and how detailed some of these assessments can be, and what this does is really help you with a visualization and communication tool.

So we've already used it in a number of different manners. The first one was to work with the mission in the development of their climate change program, and essentially as Mali was coming out of sort of their issues around the coup and the conflict in the north, they wanted to develop very quickly an 18-month program where there was high vulnerability of climate change but also where there were people. So what we could very easily do was we could take this map that shows vulnerability to climate change and where all the people are, and you can quickly identify areas geographically where you have those two intersecting. And so it wasn't – and it wasn't just for us to make those decisions, but we went to the leadership to help explain to them why we had chosen a certain geography to help them see very quickly that, yes, we're in an area that has high vulnerability, but we also have the potential to reach a large percentage of people, because we don't necessarily always want to develop our program where the vulnerability is the highest if there aren't people there necessarily to help.

I also wanted to elaborate a little bit on a point that Alex made in his talk, is what these maps really also allow us to do is have a common framework with which to start discussions with folks in other sectors. Oftentimes we've – or at least I have struggled within AID to have conversations with people outside the environment sector because folks in health, folks in democracy, folks even sometimes in ag have a very different culture, they have a different vernacular, and they have a different technical way of speaking. And sometimes if you start with that technical conversation, you struggle a little bit and it's difficult to get people's interest. But essentially if you can start from a similar framework where we have our map of climate vulnerability, they have maps of what the indicators most important to them – malnutrition rates, child stunting – you can quickly identify areas within the country where those overlap. And then through that discuss you can get people actually interested and involved with understanding how climate change might impact their programs.

And for Mali this was specifically important because at the time they were developing their resiliency strategy, which requires or encourages them to layer and sequence their programs. So in certain geographies you want to have your health, your climate change, your ag programs all working towards a similar goal, which is sort of reducing that longer-term humanitarian caseloads, and so these maps really allowed us to engage in those discussions.

And then finally the mission also was starting to think about their next mission-wide strategy, their country cooperation and development strategy. And what we could do was we could take our map and we could lay it down next to where their current programs are, and that allowed us to do two things. First it helped us identify within their current portfolio where were the programs that were most likely to be impacted by climate change, and that helped us start the discussion of perhaps to achieve your objectives you're going to need to consider climate change. We weren't trying to change their objectives; we were trying to get them to understand how their objectives that were important to them could be impacted on climate change. It also helps in the larger discussion around how do we think about developing a new cooperation and development strategy within the country, how to strategically align programs depending on what those higher level objectives are. And so these maps really did allow us a very easy framework to begin discussions with a wide range of people in the mission, and I really feel that they were more eager and more engaged with us in terms of climate change because we were more easily able to relate with them through these maps.

There's a number of reasons that I think the maps also actually allowed that, and the first one really is credibility. And I think these maps add a large amount of credibility for two reasons. The first is that you put...name next to something and they more or less some of the best in the world at what they do, and that adds an instant air of credibility to a map. I think the second thing that really made these maps credible is that they didn't contradict what people already believed. People already assumed that people were more vulnerable in the north, less vulnerable in the south, and when you reinforce people's perceptions, that tends to add credibility to that.

And I do want to comment on the question that the gentleman from Mercy Corps made this morning. I think even though we were reconfirming what people already perceived, what this did is it allowed us to have an analytically rigorous product that we could take to people and say, "Yes, people perceive this is true, but we've also shown analytically it is also true." And we noticed within our mission discussions that having that analytical document made – carried much more weight than just the perceptions alone. What will be curious going forward is if we start to produce maps that contradict what people think, how that affects their views of credibility around these maps.

The next one is salience, and a huge shout-out goes to Alex and his team here. We literally gave them a very short timeframe. We said, "We're going to Mali in October. We need to have the maps before then." Alex and his team did a heroic effort to literally e-mail us the maps as we were flying to Mali. And I will say that if we didn't have those maps then, Alex could've produced maps that were ten times better but a month later, and they wouldn't have had a fraction of the

impact because some of those key discussions and those key decision points would've passed, and it would've been much harder to go back and try to get the maps integrated into those discussions.

And so that brings us to legitimacy, and I think here is where we had a little strategic balancing act. Because we needed salience, because we needed those maps at the time we needed them, we didn't necessarily have the time to go out and really do a lot of the local context and really engage a lot of the Malian stakeholders in some of these discussions. And we have had people come back to us and say, "Well, have you considered this?" or, "Did you engage this stakeholder?" or, "Have you ground-truthed it?" And I think for this map it wasn't so much of an issue because it was sort of a targeting map, a wide-scale map. I think legitimacy will become much more important as we try to take these maps and refine them down more spatially so you're getting down to a city level or a community level. And there we'll have to think a lot more strategically about how we balance these three different pieces that really allow maps to be useful.

And then, because I've always been taught the key to retention is repetition, clarity and simplicity – if these maps weren't clear and they weren't simple, none of this stuff else would matter. They really have to be clear, they really have to be simple, and we were constantly told by the mission, "We want one map. We want one map. If you give us three maps, we'll just start to get confused. So give us one map that you are confident is the best map you can produce."

I say that because this is a wonderful tool. It's a very good communication and visualization tool. Sorry, I have a hard time with really long words; I shouldn't have put as many in here. But it's just a tool. And the reason that's important is – and Alex hinted at this earlier – is like any tool, it's only good as what it's based on. So these maps were only really as good as the data and the analysis that goes into them. If you put garbage into them, you're going to get garbage out of them. The challenge with maps is even if you put garbage in and get garbage out, you're still going to have a very pretty map, and so it'll be very difficult for a decision maker to say, "Well, is this very pretty map good, or is this very pretty map not good?"

And so that really suggests two things. First, it's really a reason for people to actually push for these countries to collect these data and make them useful, because if they want tools to make decisions off of, they need to provide the data. And secondly what it is, is it's really where the knowledge brokers and the champions come in. It's the knowledge brokers' role to really understand that analytical foundation behind the map so they can work with decision makers to ensure that the maps are being used in the most appropriate manner. And then the champions come in not so much to get people excited and jazzed about the

maps – I mean, that happens naturally; people just like maps for some reasons. I love maps. And what the champions are for is to say, “Now that I’ve got you excited about climate change through this map, now let’s look at the rest of the vulnerability assessment where all that nuance is in there. We know the where; now let’s think about the what and the how and how we can start integrating climate change into your other programs to help you achieve your objectives.” And that’s actually worked quite well in the mission, and I think without the maps our champions wouldn’t have been as effective of getting other people interested in the Climate Change Vulnerability Assessment.

I’m going to try to take us full circle here, if I can get the button to work. And so essentially what ARCC has also done is they’ve created all of these foundational documents. And so for people who are interested, they actually created a nice foundational document that talks a lot about creating these maps and these indices so you can create those champions and those knowledge brokers who can actually understand what’s behind these maps, because oftentimes it can be quite confusing and you can see very quickly what the limitations are and you can very quickly be able to take and decide is a map appropriate for what I’m trying to do, or is it not. Thank you.

*Matthew Edwardson:* Great, thank you very much, Alex, and thanks for the plug to one off the publications that ARCC has produced. That publication along with many others will be available for you all to grab in a little bit. But before we do so I’d like to invite members of the audience here to step forward with any questions that you may have.

## QUESTIONS AND ANSWERS, PRESENTATION 2

*M. Edwardsen:* I'd like to invite members of the audience here to step forward with any questions that you may have. We'd love to get a few in before we move to our final event. And we'll also field some questions from the online community as well. So great, we've got three individuals so please state your name, affiliation. Maybe we'll take all three of these questions and then we'll go cede to the online community. Please go ahead.

*Mosha Michodri:* Morning, my name is Mosha Michodri. I'm from the World Resources Institute and very much enjoyed your presentations. My first question is regarding establishing credibility, salience and legitimacy, and I wanted to know your experience with establishing these very core components of an uptake-ready CCBA. Was it a complementary experience? Was establishing credibility helpful for you to establish salience and vice versa? Or where there tradeoffs between credibility and salience where you were able to establish salience but had a difficult time establishing credibility.

And my other question relates to communication which I think is absolutely critical in terms of connecting science with decision making. And Alex, you alluded to the fact that maps really helped you communicate what was part of the CCBA. But it's really about not just what you communicate but how you communicate and how you communicate uncertainties in particular. And I'm wondering if you could expand on that based on your experience of how you translated uncertainty into the decision making realm. Thank you.

*Anita Campion:* Hi, my name's Anita Campion, I'm with Connexus Corporation. We're the ones that organize the annual Cracking the Nut conference. And this upcoming year we're focusing on, you know, dealing with issues in rural and agricultural markets amid climate change. And first of all I want to thank you. I think this was a really helpful framework and gives some really good detail into how we need to integrate this kind of language and thinking into our work. I was at another session here at USAID a week ago with rural and ag development and finance specialists and it was clear that we hadn't really thought that much about what the implications are of climate change.

So my question, because we're going to be doing this conference and we do a publication hoping to have an influence on getting the message out on how important it is to integrate all this thinking into the way we do our work. What should we be considering in terms of the different types of stakeholders that you all tried to influence, you know, is there a certain order of stakeholders to convince, you know, and then what types of alterations in the ways that communications need to happen in order to make sure that the message is heard and received and that the information is being used and acted on.

And in particular, as Isaac mentioned, the private sector role: what kinds of information is particularly useful to the private sector, any sense of what they're willing to pay from, what they're interested in and how do we bring them into this discussion as well. Thanks.

*Moffat Gogip:*

Moffat Gogip from the Bureau for Food Security here at USAID. Thank you so much for this opportunity. I really think that this kind of an exchange and all the work that ARCC has done really is worth a lot of uptake. So looking forward to that. I have specific questions -- a question for Mamadou. As we heard from Rita there was sort of that government-wide and sort of multisectoral kind of adoption of uptake.

And I think David mentioned that in Senegal there was a problem, or there was the meteorological folks didn't really get on board. So what kind of advice would you have in terms of making sure that all the critical stakeholders come on board? Because the Met Service, for instance, is a critical part, and what are some lessons learned specifically? What were the changes with the meteorological group in Senegal? Can you comment on that? Thanks.

*Niv:*

Niv from UC Davis, Humphrey Fellow. My question is about the women's vulnerability in facing climate effect of climate change. As women and girls are differently, or certainly more severally affected by the effect of climate change, and for different reasons, including social norms, including the fact that they have less access to resources, less access to incomes, and are weaker too in food security. We know that women play major role in food security if improving the livelihoods at their...level.

So my question is how the vulnerability assessments take into consideration the women's vulnerability, the needs of women that are different from men's needs. Thank you.

*M. Edwardsen:*

Great. Thank you. Those are four sets of very good questions. Someone actually took my canned question; I didn't feed it. So I appreciate that being asked. And I guess also that last question there may be some individuals on the first panel who were more involved in the methodology who might want to add on to that as well so I would invite them to add. I guess maybe I'll just put the tradeoff question out there in terms of salience, legitimacy and credibility and tackle that one first and then move through them. Anybody want to look at that one?

*Rita:*

I can jump in briefly just to say that I think that they're very interrelated, and that in the Ugandan case I did not come across any contradictions between them but rather the taking all three into consideration in the decision of the study and in

the communication and dissemination process was very important. But there wasn't really a tradeoff, one against the other.

*Male Panelist:* The only thing that I would add, I think the process to get legitimacy and credibility can be quite long, and so I think if there isn't a distinguished end point at which you need documents or the information then I think they can be very complementary. I think where you start getting into tradeoffs is where we had -- we had a very sharp decision point, and therefore then you have to strategically think of how -- do we maintain salience and sacrifice credibility and legitimacy? Or the other way around? And so I really think it depends on what your key decision making point is. If it's open-ended there's probably not a lot of a tradeoff.

*Mamadou:* Yeah, I would just add that it really also depends on the context, you know, just talking about the case in Senegal I think it requires also patience sometimes because it takes time to establish a good rapport with the institution. First of all, I mean they have to -- they seek you out too, I mean they try to understand what you're trying to do. So it's a long process.

And also when you try to build capacity, which is also an important dimension, you have to understand also not only the capacity within the overall institution but also inside institution also you have to get the best researchers. So it's really a time-consuming process.

But I think in the case of Senegal we were lucky to have Caesar and Isabel and they all also are on board also in terms of the fact that this is something that was needed right now.

*M. Edwardsen:* Great. Thank you very much. We had some communications-related questions, one talking about how you communicate uncertainty to decision makers and another in terms of I thought stakeholder prioritization and distilling of information and how you engage those various audiences and just some reflections on those two broader points on communications overall from the panel would be great.

*Male Panelist:* I can start on the uncertainty. I think with the maps it's a huge tradeoff. We worked with Alex to really understand the uncertainty. And so Alex, like Alex mentioned, he produced several different maps using different analytical methodologies. They did a sensitivity analysis. So we as the knowledge brokers really had a great sense of what uncertainty was under those maps. There's also ways you can plot them on the maps.

The challenge is the more information you put on these maps the more you lose the simplicity and clarity of them. So you really have to balance that. That's

where the maps become dangerous. If you put the maps out and you don't caveat them -- and Alex is very good at that -- sometimes he undersells himself in terms of all of the issues with the maps -- you've really got to balance that. And I think what you need to do is make sure that the analytical rigor is there and then you just have to let people know this is a construct, it is one way of looking at it. But oftentimes that's to the level the decision makers want. And then you can work with them to figure out what levels of uncertainty they want.

The challenge comes is once you release the map out into the ether and it gets away from those knowledge brokers then you're in the little -- more of a dangerous situation where maps can begin to be used by people for reasons they shouldn't be how to do and I still think that's a very ongoing discussion in the world around creating maps of how do we ensure that once they get out there and they're away from the knowledge brokers that they're still used effectively without overcomplicating them with all the nuance.

*Isaac:*

Thank you. Regarding uncertainty I think it's a very good idea to creating partnerships, since the very beginning that we are working on these issues. And the people that participate in this process should be clear and understand that our understanding of climate risks and how effective other adaptation measures will be will be changing over time, that our knowledge will be increasing through time, and this has to be clear since the very beginning.

In the case of Honduras, in the case of this assessment in Honduras what I saw is that because people really participated in the focal group discussions there were lots of people that are key informants, including both within the government and in the private sector and NGOs and other sectors. I saw how people after, when we presented the document, they really believed what the document is saying. And the other thing is that when you have good partners such as us with key and high level technical people this provides more credibility to the studies.

I also want to talk a little about the private sector question. I think the first thing we need to do is to make the private sector aware of this climate change. Very often this topic is being seen as a natural resources problem, not as an economic and a social one. So the first thing that we need to do, I think, is to speak clearly about the issue and to keep it simple to avoid using these very complicated words that sometimes also the climate change people use. Once someone told me that nobody was understanding what I was saying because I was talking about resilience and I was talking about adaptation, mitigation, no regret, low regret, win-win actions. So what is that? So we need to keep it simple so people, especially private sector, can understand what we are talking about.

The second thing is that once that they understand the problem they will start to demand information -- and this is something that has happened not only in

Honduras but in other countries. They are interested in knowing what are the climate reagents, where they can find information about precipitation creations, for example, or temperature.

And as John was saying, in the case of Honduras melon and watermelon producers are now demanding this information, and the third thing that I would recommend is to take the opportunities. In the case of Honduras this study was released almost at the same time that we were in the middle of the drought, and so this created a very good moment for getting people's attention to the study and to think a little more about the problem, not only seeing today's problem but to see that this problem will be an evolution, will become more and worse over time.

*Male Panelist:*

One thing I want to add to this is in terms of how to communicate. I mean it has to do with -- I mean two things: one thing has to do with who communicates and how to communicate. And there's where also the issue of credibility comes on and legitimacy because -- just to give you an example, like one thing that I -- some of the stakeholders in the field, I mean local community members, you know, village chiefs and women's representatives like was to talk in terms of -- to look at the forecast in terms of something that they already knew in the past, you know, like linking the unknown future to some kind of known elements in the past. That was very interesting, you know, in Senegal when we tried to look at -- to make people just to -- through the feedback we were able to get and that was something very, very interesting.

So the idea of being clear, having a very clear message but also being able to have credible people actually would come and communicate that information to the people is very, very important because let's face it the reality also is that sometimes we have different interests and we know -- issues of conflict sometimes happens, you know, so it's very important to be credible to the communities and, you know, have somebody who can be known in the community or in the country for being really there for the people and trying to do something positive about increasing resilience or getting people out for legitimacy and things like that. Thanks.

*Rita:*

I'd like to also address the private sector question. In my presentation I focus primarily on the ways in which uptake was being taken forward on a governmental and donor level. But one of the other important focuses of the whole USAID Feed the Future activity is strengthening private sector relationships, strengthening market linkages between farmers, traders, exporters, as well as the input supply chain. And part of our effort, then, is to really look at how the climate change projections are expected to impact in the agricultural sector, on the private sector players and the relationships up and down the value chain.

And this, then, is feeding the demand for agricultural research to be able to present climate smart adaptation technologies and recommendations that can be taken down to the farmers through the various value chain actors. And so the traders themselves and their agents who link the traders with the producers are a very important channel in the long run for the dissemination not only of climate information but of adaptation response options. So that's a really important future direction for the involvement of the vulnerability assessment results.

I'd also like to comment briefly on the gender issue. There are so many nuances and layers in the analysis and the data collection that we have not talked about, and the whole analysis of gender impacts is an important part of the findings that came out of the Uganda study. There were very clear indications that adaptive capacity was lower and vulnerability was higher for female-headed households, households with fewer adults in the household mix with higher dependency ratios, etc.

And all of this really played an important role in the analysis and looking at the options that are available to different types of livelihood groups, different types of categories of key stakeholders.

And so there's a lot more that can be said about that and a lot more information that's available in the various publications.

*M. Edwardson:*

Great. Thank you very much. One more trailing question, very Senegal-specific in terms of Mali and Senegal...and their engagement in other key stakeholders; is there something that could have changed in Senegal that would have improved that process, Mamadou?

*Mamadou:*

Yeah, I think, you know, if, as I mentioned earlier, that some of the stakeholders we partnered with are planning to take this to a next level, and in that they're also thinking about -- they're talking with the meteorological services so hopefully the next time they will be involved; it won't be only the ones that we work with because of other institutions and we're in the process.

But I know the projects are hard, you know, to get all the relevant institutions on board, but it just did not work out this time; hopefully next time it will.

*M. Edwardson:*

Great.

*Male Panelist:*

I also wanted to add one comment about the issue of women. I think in eastern Senegal what came out so very strongly was that -- I mean women talk about -- the ones that we talked to were actually helpful in terms of being able to do something with the negative impact of climate change in terms of resiliency.

And for instance gardening, being able to develop some kind of a water harvesting techniques, you know, with the bit of water that comes in, and having like some new crops, you know, they are trying to --- actually to grow. I mean these are interesting things.

But the issue has to do -- I mean they have two problems: one has to do with land, which is something that they mentioned, you know. So we need also to think about how to improve land governance, how to make land available to women, that's very important.

The other issue linked to that also is the issue of water. Because irrigation could be an alternative in terms of actually the land is there, I mean it is good, it can grow a lot of kind of things, but getting the water from the ground, you know, to the land is an issue. So I think that's something that might not be too costly that can be done, I mean that can significantly improve the living conditions of women in those areas but they might also have some kind of tough decisions in terms of policies like, you know, it might require some kind of changes in the land tenure system and things like that.

And that's where also I think, you know, our advocates like USAID and others can push for, you know, some kind of changes because some of the issues are subtle issues and you also need to have policy changes at some level to make access to land more available to more women in some places.

*Male Panelist 2:*

Yeah, I just want to add one quick point to that, sorry, be real quick. We actually had a study done in Mali that look looked at how gender affects this stuff and what we found is that you can't just look at gender. I mean there was actually big differences between old women and young women and old men and young men. And so I think it becomes a lot more nuanced than this. And I think Rita's right: I think if you look back in through a lot of the research that we've produced you really begin to see that a lot of this stuff it's at the high level but you really need to get down into the community and understand the dynamics between the different families, the different individuals, the different households to truly understand how vulnerability differentiates between itself. And so I think it's a great question but there's a lot of nuance there.

*M. Edwardsen:*

Once again I'll plug the reports. There's a lot of information and then everything is going to be available -- all the data sets are also available. So you can definitely get into that analysis. I think we'll take some questions from the online community please.

*Webinar Facilitator:*

We have about three questions. I'll ask the first one and then my colleague will ask the second two. The first one's kind of a consolidated question that came out

of the side discussion that's been going on on the internet back here, having to do with mainstreaming climate change.

You've talked this morning about some of the characteristics of the CCBA that are needed to improve uptake, credibility, salience and legitimacy. But we wonder if you could talk a little bit about what happens next, the next step. For instance, how the messaging for mainstreaming might differ from one group to another or from one country to another. We wonder if you could talk a little bit about the nuts and bolts of your experiences working with USAID and governments to take the findings from the assessments and mainstream them into policy programs and actions.

And related to that have you seen any changes in actual political will that has occurred as a result of these assessments.

*Webinar Facilitator 2:* These next two questions are a lot more specific than that. The first one comes from Patrice Hakizimana from USAID Rwanda: Are CCBAs providing climate change adaptive solutions that are understandable and affordable at the district level?

And this next question comes from Sid Hamilton, and ORISE Fellow at Oak Ridge National Labs in Tennessee: How can cloud forests be conserved in the face of climate change? Is there a negative ecological feedback to be tapped into as a solution?

*M. Edwardsen:* That was great, three very clear questions. Isaac, do you want to take the specific cloud forest question?

*Isaac:* Yeah, thank you. For sure. Well, we won't change these projections about temperature and precipitation. And of course this will have an impact on any ecosystem. It's not just cloud forests, this is just like the ecosystem that we care a little bit more because they are sources for water.

I guess what we have to do regarding this type of forest is to restore what has already been under degradation and to create a stronger framework of governance that could protect better what the cloud forest that we have already in the country. This is one solution for the conservation of the cloud forest and this type of forest.

But this has to be linked with other investments on water management. We need to increase the capacity of the society to manage water, to distribute it, to conserve water, to store it, and then to train people on how to use it efficiently in their agricultural sector, industrial sector and of course at the domestic level.

I think conservation is a very important part of the solution, however we need to see the water management as a whole if we really want to have an impact on the resilience of the population.

*M. Edwardsen:* Great. Thank you. In terms of the messaging of findings and changing of political will I mean we've touched on that a little bit.

*Isaac:* Yes, well in our case once again the study was carried out at the right time because as I said before this is an ENSO, or an El Nino year, and we already were having a lot of problems regarding the lack of precipitation and enormous economic losses in the agricultural sector. So that helped to provide more attention to the findings.

What I would say is that once again it is very important to create partnerships, to see, in our case, we cannot work without the government, and with the government of Honduras. And what we have seen is that the government is very interested in learning about all these new findings, and even when uncertainty's there they are trying to promote this adaptive management in which we are trying to promote, through this Alliance for the Right Corridor, measures that make sense on what is going on today, but for sure will allow us for incremental change in the future.

So the fact that all these stakeholders, the private sector, the NGOs and the government are being affected by floodings and droughts in the case of Honduras, this helps us to have a better environment to promote adaptive capacity. And we understand adaptive capacity as first to make information available and to make people aware of what is going on; second, to create these social platforms such as the Right Corridor Alliance or the Agricultural Committee on Climate Change, and third to create the regulations and the guidelines that will help us to promote then the adoption of adaptation measures in the field.

*M. Edwardsen:* Great. Thank you. We're running a little bit on time here, and Rita if you want to comment and then Mamadou, maybe if you could briefly talk about the local experience because I know you really got into that, and that may be able to help our colleagues in USAID Rwanda, you know, reflect a little.

*Mamadou:* Okay. I think how to change the political will is an important question, and it has to happen at two levels: one would be from the bottom and also from the top. When I say the top it means from USAID, the topmost level possible with the government. But also I believe also more change happening at the level of the communities. Because when we – I...spending the time, you know, nights and days in the field talking to the women and farmers and I see some kinds of people saying, "Well business is not going to be the same like before. We won't accept

certain things. We want things to happen." So there is a need really to get down to that level and share that information with those people. We did some of it but I think more can be done in terms of -- I mean the idea I was going to translate the finding into local languages and when we mentioned Baaba Maal, the idea was also we talked about getting organized some kind of festival to look at success stories in dealing with negative impact of climate change in eastern Senegal where we have interesting cases where people using solar energy to irrigate fields and stuff like that.

So I think that kind of action needs to happen at that level, combined with some action also at the top. Those two things would lead to something very positive. And maybe there is also a need for some kind of debates at the national level where you have different stakeholders being involved in private, civil society but also the private sector altogether and people can come up with -- I think the debate has to get down to the level of the people, and that's very important.

The other thing is also to develop some kind of effective partnership. People talk about partnership but I think it's more about the quality of the partnership: who are those people getting together, and who have some kind of shared vision in terms of doing something very positive. So I think that's also something that I would like to emphasize.

And then third we really see -- when I look at those areas I would like to stress again the important thing, role of women in this space, what they are doing right now. It's really very -- more of them are there, they do more work and they're involved in all kind of things and they -- the hope is within them. I mean they do microcredit, they do gardening. So I think we have to be looking at getting down to that level and being able to communicate the information at the grassroots level, and I'm going to stop here.

*M. Edwardsen:*

Okay, well I know our last speaker is here and I think we're going to need to conclude this panel. But I really do appreciate all four of you and taking the time to answer those questions and your presentations, doing such a wonderful job. Thank you very much. And the panelists will very much be available afterwards, so please feel free to engage them during lunch.

## PRESENTATION 3

*M. Edwardsen:*

So just to wrap things up we're going to have a little bit of forward thinking perspective. And to help us through that process the chief scientist for the Bureau of Food Security, Robert Bertram, is going to come up to the stage. He's been with USAID for 20 years and he comes from a plant breeding genetics background. His bio is available for all of you to read. His career has dealt with building stronger research ties with U.S. community and others elsewhere. So please, the floor is yours. We look forward to your insights.

*Robert Bertram:*

Thank you and good morning, or I guess good afternoon everybody, and thanks especially to Tegan and the organizers for inviting me to share a few perspectives from the Bureau for Food Security.

You're probably aware that in the U.S. government our global food security agenda is called Feed the Future. Since it was established about five years ago the central focus -- or it has three cost-cutting objectives. One of them has been climate change, but I would put to you that that has been primarily focused on adaptation.

Actually I think that underscores the relevance of today's discussion in terms of understanding just what our vulnerabilities may be because those probably most acutely impact adaptation before they get maybe to issues around mitigation which have more of a global aspect to them.

I think the climate's been perhaps most visible in the research portfolio, which was created to look ahead. And we knew this was going to be (and already is, frankly) one of the great challenges we're facing.

The positive thing about this in the context of food security and R&D take us that direction is that this is not a distraction from today's problems. Most of the communities that Feed the Future is working with, especially in places like sub-Saharan Africa are already climate challenged, or weather challenged, whatever you would like to call it. I mean often we're dealing with smallholder farming in uncertain climates, droughts occur with regularity. Other kinds of weather shocks occur. So while these aspects may worsen over time they're already there.

And so figuring out how we deal with them now is a first step towards taking us towards the future. This is true in most cases; I think in a few cases we've gone beyond that, I would say, especially in the area of heat tolerance. I'll say a little bit more about that.

One of the other challenges we face, frankly, is as we look at climate models -- and I know you all know far more about this than I -- they are clearest poleward,

and then as you approach the equator the clarity becomes less in terms of what's going to actually happen with say precipitation patterns. And I gather there's been some discussion of this this morning. But that's something where we will be continuing to seek advice about, you know, just what is the science telling us? What's our best estimate of the impacts we'll be facing?

We are already, as I said, dealing with climate, but also climate change. South Asia and the Indo-Gangetic plains is one of the key focus areas in terms of global food security and Feed the Future. The onset of early heat in say the February/March period is already having huge effects, just different from 20-30 years ago. So we're seeing it there. We also know that higher nighttime temperatures are threatening rice fertilization and the harvest of rice.

So we're already, in a sense, dealing with climate and weather as a central aspect of how we're trying to achieve food security, productivity growth and nutrition improvements as well. So I think the key then is to figure how can we build on the steps we're already taking, and that's where the work you're doing I think really comes in to the discussion.

We have, as I said, focused a lot on heat tolerance because that does seem to be one area where there was actually a lack of leadership. A lot of other investments in drought tolerance, some in salinity tolerance but heat tolerance not as much. So we've been very happy to partner with a whole range of partners in the university community on heat tolerance but also on drought.

We have new innovation labs, we call them, Feed the Future innovation labs working on climate resilience in chick pea, poultry, cow pea, millet, sorghum, wheat, small-scale irrigation is a major thrust for us -- I'll say more about that. And I was glad to hear the discussion of water just now. And our overall theory of change for smallholders is something we call sustainable intensification, which is all about trying to manage risks of all kinds, but to do it in a way that builds resilience, much of which depends on managing resources efficiently, and particularly trying to enhance the amount of biomass in the system so there's a whole sort of climate both a resilience and potentially a mitigation approach there.

We're also working with the private sector, companies like Ceres, DuPont Pioneer, Arcadia Bioscience, Monsanto and others to leverage the cutting edge science that has drought tolerant maize on the market in the U.S. this year. Farmers can purchase drought tolerant maize. We're trying to leverage that same science into the kinds of technologies that are available to smallholders in the developing world.

Now I mentioned sustainable intensification as how we're trying to put everything together and it's not just technology. Yes it's biomass, yes it's nitrogen-fixing legumes, it's climate resilient cereals. But it's also about resource management and efficiency, small-scale irrigation, soil cover and a whole array or risk reduction efforts around information, the consideration of things like index insurance against drought. So all of this is to try to build resilience now, but hopefully it's a good basis, then, on which to go forward into the future. And that's why the dialog and the analyses that you all are doing can help us in terms of considering that going forward.

On the matter of water, particularly in Africa, the situation with the hydrology that we're seeing in the last couple years is really quite promising for sustainable expansion of irrigation. The key, like everything else we're trying to do is how do you put smallholders at the center of that? We're not talking about big irrigation schemes the way we've seen in South Asia but we'd love to see smallholders.

Now the problem then that we run into with that is that you are also talking about increasing carbon footprint. So this is they the recent advent of the climate smart agriculture, then global alliance that was just launched last month in New York. The idea there is often around the triple win. That's increasing productivity (and hopefully profits), increasing adaptation but also mitigation.

So we know that we have some opportunities to do that and we will pursue them. We know about farmer-managed forest regeneration in the Sahel, evergreen agriculture in parts of southern and eastern Africa, western Africa. More efficient handling of fertilizer. But we also know that in many cases if we're going to achieve our objectives around poverty and undernutrition we're going to have to settle for a double win.

Now there's a silver lining. Many things we're going to do to increase adaptation also increase mitigation. They involve carbon, and carbon storage on farm and soil fertility, and getting more organic matter into the soil, getting more perennials in the system. So there is a plus side, and what we can look forward to is increasing the -- reducing the greenhouse gas footprint per unit of productivity.

We know in South Asia, for example, this is work coming from our partners in CCAFs and elsewhere in the CGIAR, we can get yields while reducing energy 46 percent, the energy use. Reducing irrigation just by switching sometimes from rice to maize which enjoys a strong market -- 71 percent savings on water. And we can get real profitability increases because partly out of productivity growth, but partly out of saving energy and saving inputs and using them more wisely.

So the whole conservation agriculture agenda, the diversification that goes along with that, precision agriculture, that -- we're going to go forward with that and again, the better we can understand what lies ahead -- and I know it's not easy to predict with certainty but the vectors matter, right? I mean we can't be precise when we're talking, 10, 20, 30 years out, but vectors matter. So I encourage you to help us think through that approach and how we can best inform our efforts to build the things we're on the hook for, which are poverty reduction and nutrition in a world that's going to be increasingly challenged by climate.

Finally, I think we don't want to wait before we start showing that we can be responsive to the climate challenge. And Administrator Shah, for those who have dealt with him, know that he has "We don't want to wait" just about everywhere when he talks about -- whether it's health, agriculture, environment I'm sure it's the same. It's like, "What have you got for me now, today?"

So we are really pushing hard for -- to scale up technologies like climate resilient maize but there's a caveat: we have a new emerging disease in East Africa, very serious: maize lethal necrosis. So the point here is yes, we can bring in the improved climate resilience, the heat tolerance, the drought tolerance, the low nitrogen tolerance. But we still have to have the other factors that people care about, whether it's quality or in this case disease resistance.

Drought and flood tolerant rice -- going forward with that in both Asia and sub-Saharan Africa. Heat tolerant wheat -- we're working hard to anticipate both the diseases we face now but also some that may emerge in the future. There are some, like potato late blight and bacterial wilt of various crops that worsen with higher temperatures. So we have to think about what will pests rising up in East Africa, going to higher and higher altitudes, what will that mean? It's a huge issue in agriculture; it's a huge issue in health. Again, that's another case where the work you're doing is important.

Finally, I don't want to miss that particularly when we're talking about the resilience and staying ahead of what we're going to be facing going forward, the work we do on policies and institutions. That's across the board but it's certainly a major thrust in food security. The ability to build the capacity in countries to do the analysis, to have the data, to then use that data to make wise decisions. If we're serious about being country-led that's the idea that we are following the lead of our partners, not telling them what to do.

One of the ways we can do that is to give them the best analytical capacity that we can provide and the most relevant analytical capacity, whether that be through regional, continental or global approaches. But I do think that that's a really essential piece of building the resilience that you're all looking for in the long-term and that we all need to really be successful and sustainable in our efforts.

So those are some thoughts that I wanted to share with you all this morning. I don't know if anyone else is speaking but I'm happy to take a question or two if that's on your agenda. Thank you.

## QUESTIONS AND ANSWERS, PRESENTATION 3

- M. Edwardsen:* If there are any immediate questions we can take a question or two if anybody has any. If not, we will have the gallery walk and you could take that as an opportunity as well.
- Ken Andrasko:* Hi, Ken Andrasko from Winrock International. So this has been an incredibly rich conversation; lots of great ideas. A huge amount of work, giant data sets. So how do we move forward to decision-making at the two scales that are implied? One is the national or regional scale, where there might be the resources to actually deal with all this data. And the second is the scale of the farmer on the ground. So how do you find a way? What have you learned from the work that you're doing so far that enables actual decisions to be made from this overwhelming, massive information?
- Robert Bertram:* That's a really key thing to do: to connect the more global analysis to what's happening on the ground. Some interesting things we see emerging: the real-time weather data that's coming out of some of our investments in others that not only are short-term but tell us something about when the rains are likely to arrive. There is work underway to really test and make that kind of information available.
- I think the cell phone is a huge tool for reaching local communities, and increasingly the satellite information we're getting can be pinpointed. It used to be that a farmer in northern Ghana, she might have to listen to the weather 85, 90, 100 kilometers away in Tamalay. Didn't tell her much very useful. That's changing. So that's one example.
- I think the longer-term piece is it's almost like the same kinds of challenges we're facing in our own country, although perhaps with greater urgency because of the poverty. So taking into account models when you're trying to make decisions about public investments, for example. That's why I came back to that point of institutions at the end. I really think that some of the decision that are going to draw on that big data are going to be at that larger level -- and I think you were referring to those. They do have import for what happens on the ground. But I think you're absolutely right that we've got to be looking for ways to connect those two things. Could be, for example, an extension system and the kinds of information that they're getting, where we have new technologies around crops that we think are going to be better adapted. What's the way we get them out? I mean there's so much work going on on that now -- we have the whole Alliance for the Green Revolution in Africa working on this
- The social science piece of this -- I don't know how many of you heard the Agrilinks presentation from Louise Sperling a few weeks ago. It's on the website

-- and Julie March -- really work listening to. But I think there's going to be ways that some of the larger policy objectives that are drawn out of that data can then be translated on the ground. But we're open for ideas too.

*Clare Nelson:*

Hi, thank you. I'm Clare Nelson, Institute of Caribbean Studies. Is there any plans for USAID to work in the Caribbean? The islands are very susceptible to climate change. We are at very great risk. We already are importing almost 99 percent of our food, and the crops that we do grow are exported for cash. So if nobody's paying attention to research needs of those regions because we're so small how can we get attention paid to island economies?

*Robert Bertram:*

Yeah, that's really been a dilemma for us in Feed the Future. I think in the research side a lot of what we do is relevant across the globe, including in non-focus countries, including in Latin America, parts of the Caribbean, some of the traits we're working on. I don't know that I have a great answer for you, frankly, in terms of how to best leverage that science. But it can be done. Of course Haiti is one of our focus countries, so we are looking at opportunities there. But that's a special case in the Caribbean; I understand that.

I think the information piece, for example on our environment side of the house there is what they call severe -- the weather service -- I don't know if that was discussed today but that is already providing real benefits to Caribbean countries and countries around Central America in terms of managing climate risks, recovery post storms, etc.

There are also a lot of things I think we could do in the area of tools around remote sensing that can be helpful, and those can be not just biophysical but also looking at things like infrastructure, access to markets, what are the constraints that open up the question of whether or not something makes sense.

One of the things that I would like to see happen going forward, and it's kind of a little bit of a wish at this point is there's something we call the -- it's the Yield Gap Atlas. It's the idea that we globally need to be looking at -- and this would include the Caribbean -- what is the potential? We can learn a lot by looking at what happens in one environment and looking at homologues elsewhere around commodities, around weather variability, around weather trends and vector shocks. And I really hope that when we do that we'll find a way to do it globally, and so that regions like yours will gain. But there might be others that could answer your question better than I because I don't deal much with the Caribbean but I do think that a lot of what we're doing is going to be relevant there.

*M. Edwardsen:*

I'd like for us to thank Robert for his time and catch him afterwards with that last question. We're running about 15 minutes behind but thank you very much for the remarks and the questions.

So you've been a fantastic audience and thank you also to the online community. It sounds like there's been a very active dialog. We're wrapping up. I'm sure people are hungry and we've got food. So we're going to solve that problem.

One last piece of information before we formally close is I've seen a lot of you and some of you with many publications so you've picked up that there's a lot of them out there and I'm glad to see everybody grabbing them. I've got a copy of the compendium here if anybody can't find one outside I'll give this one to you. But in that packet you got you'll note that there's a color-coded table. And just quickly up here; I'm not going to read these off but you can see the color-coding. Basically if you want to report on any of these topics just go to the table that has the associated color out in the foyer. Authors of the reports will be there along with panelists. They're happy to talk to you. We have this space until 1:30 so with that I'd like to thank you once again, thank our panelists, thank our speakers who opened and closed the event and our online participants and invite you to grab a sandwich and continue the discussion. Thank you very much.