SUSTAINABLE FOOD SYSTEMS: HOW BETTER NATURAL RESOURCES MANAGEMENT LEADS TO BETTER FOOD SECURITY

PRESENTATION AND Q&A AUDIO TRANSCRIPT

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Julie MacCartee: Hello, everyone. We're just about to get started. I just wanted to do a quick audio check and see if a few people could let me know that you can hear my voice coming through clearly. Thanks to everyone who's been introducing yourselves. It's really wonderful to see people joining from all over the United States and all over the world. It's so exciting. All right. A few people say I am loud and clear and that you can hear me well. That is what I like to hear. Excellent. All right. We are just a couple of minutes after the half hour, so I think we'll go ahead and get things rolling.

Julie MacCartee: Good morning, afternoon, and evening everyone. Welcome to our Agrilinks webinar on Sustainable Food Systems: How Better Natural Resources Management Leads to Better Food Security. We're really excited today to have several examples from the field on sustainable food system approaches and to engage all of you in a conversation on these topics. Before we get started, I just wanted to introduce you to the webinar and get some things rolling. First of all, my name is Julie MacCartee. I'm a knowledge management and learning specialist at the USAID Bureau for Food Security. I am the activity manager for the Agrilinks platform. For any of you who are joining us for the first time, Agrilinks is the main technical knowledge sharing website or platform for the Feed the Future initiative. It's a really great place for Feed the Future implementing partners and anyone in the agricultural development community to share your work and to learn what others are doing.

Julie MacCartee: As part of Agrilinks, we hold typically monthly webinars, and so this is our webinar for the month of January. Let's see. So you'll see on the left side of your screen we've got a few boxes I want to call your attention to. First of all, you are welcome to download today's slide deck in the file downloads pod. We also have the link to the Agrilinks event page for this webinar and that is where all of the post event resources will be going. But by virtue of joining the webinar today, you will also get an email in a week or two time with a whole bunch of post-event resources such as the recording, the transcript, and a few other recommended items.

Julie MacCartee: On the right side of your screen, you will see the chat box. Thanks to everyone who has been introducing yourselves and making use of that already. The chat box is your main way to ask questions today. So please don't hesitate at any point during the presentations. Please go ahead and put in your questions. We'll be pausing after each of the speakers to answer a few questions and then we'll collect more to answer at the end. So yeah. Keep using the chat box just like you're doing.

Julie MacCartee: Last but not least, I wanted to call your attention on the left to the webinar agenda just to keep us on track. You can see we've got the main agenda laid out. Right now is to welcome from myself and Emily Weeks who I'll introduce in just a few moments. You can scroll down in that box to see that next up will be Sara Scherr from EcoAgriculture Partners. Then Pete Pearson from World Wildlife Fund and Faisal Hossain from University of Washington. So we're excited to have these three speakers with us today.

Julie MacCartee: All right. I'm going to go ahead and introduce Emily Weeks who will be giving a broader introduction to the topic and to the other three of our speakers. Emily is a senior policy advisor with the USAID Bureau for Food Security. She advises on natural resources management, water, land, and resilience for the Bureau and has been leading on our sustainable food systems month for Agrilinks. She is the activity manager for policy research and capacity building across Asia and Africa for responsible land-based investments in Malawi and for integrated boundary water management in Southern Africa. So Emily, I'll pass the mic over to you. Emily, I can't hear you yet.

Emily Weeks: Can you hear me now?

Julie MacCartee: Yes, you sound great.

Emily Weeks: Great. Thank you. Thank you and welcome everybody. Thank you for joining our webinar today. This topic has increasingly become a topic of heavy debate and discussion and it seemed appropriate to kick off the new year with a discussion around sustainable food systems. I wanted to give a bit of a background around why the Bureau for Food Security chose this topic based on some of our goals and objectives outlined in our Feed the Future initiative. So our Feed the Future and this initiative aims to help and solve problems of ending global hunger and creating sustainable longterm change in our approach to food production. Through our global food security strategy, which guides our current programming, one of the main objectives is to increase the sustainable agricultural production. This includes improved efficiencies and sustainability throughout the entire food system and also designing interventions that adopt a system's wide approach inclusive of assessments of environmental conditions.

Emily Weeks: As we are all aware, there is continued pressures placed on our natural resources due to increasing population and ever-growing demand for food. Along with this changing dietary patterns and consumption patterns, which is leading to changes in land use change and also increasing pressures on our natural assets through this land use change. To add to this, we have climate change that brings added challenges to meeting our food security goals and also

to our longterm goal of sustainable food production. Our most vulnerable communities, including small holder farmers, pastoralists and fishing communities are effected by these impacts. So we now are at a stage where we need to respond to these challenges by looking at transforming our existing agricultural practices and reducing our pressures on natural systems and the services they provide.

Emily Weeks: So to address this challenge today, we have the privilege of engaging with some of the top experts who are indeed working towards finding a solution. By bringing together these speakers, we have the unique opportunity to discuss this across the entire food system. We'll begin our session with addressing how to transform our approach to agricultural production looking at the entire landscape. Then move to the other end of the food system by addressing the importance of reducing food waste. Lastly, provide examples of how innovative approaches can implement technologies to improve our resource management. So we look forward to and encourage questions and discussions around this topic. Again, thank you for joining us and a big thank you to our speakers for taking time to be here with us today. Thank you. I'll pass it on to Julie.

Julie MacCartee: Thank you so much Emily. I will just quickly introduce our three speakers and then we can get rolling with the content. So first up will be Sara Scherr with EcoAgriculture Partners. She is an agricultural and resource economist and a prominent voice globally and promoting restoration of degraded lands. She'll be speaking first. Next up will be Pete Pearson with World Wildlife Fund, who is the senior director of food loss and waste at WWF. Helping businesses and communities understand agriculture's impact on wildlife and habitat conservation. Last but not least, we will have Faisal Hossain from University of Washington. He'll be covering smart technology solutions to feed Asia. So I'll pass it off to Sara Scherr first.

Sara Scherr: Well, thank you very much then. This is Sara. It's a pleasure to be here with all of you. I'd like to thank Agrilinks for the invitation. I think this whole webinar reflects a growing consensus that food security depends on sustainable management of the natural base and at the same time sustaining biodiversity and ecosystem services depends on how we manage our agriculture and our food systems. If we take this seriously, we need to think about action beyond the farm and community scale and even beyond our supply chain to look at how we're going to co-manage our agriculture, food systems and ecosystems. The organization I work for EcoAgriculture Partners is an international NGO that's been working since 2002 to see how we can transform landscape.

Sara Scherr: So I'm going to try to take you through that a bit today. To start with, I think it's really important to recognize this issue that the entire sustainable development goals are actually contributing to food security. We're talking today particularly about zero hunger, about land and water resources, about sustainable production and consumption and climate, but the other components are really key. We're talking about a global shift to inclusive green economy in which the natural resource assets are supporting this as well as being supported by it. We need to achieve the SDGs in every place, every landscape. I'm using that term landscape here to mean a socio ecological system of natural and human modified ecosystems with their own unique characteristics. These landscapes may range from tens of thousands of hectares to millions of hectares depending upon the context and the people in them.

Sara Scherr: Yet despite this interconnectedness, we live in a world where most of our institutions are being managed in different sectoral silos. I like this little picture that shows a landscape in which part of the landscape is led by the water ministry and another part by agriculture. So these ecosystem connections and social and economic connections are really not very well addressed in this system. We need a new approach. This approach is emerging around the world. We are calling it as an umbrella term integrated landscape management, which means longterm collaboration among the different groups of land managers and stakeholders to achieve all the goods and services that they need from the landscape. In other words, to meet all of the sustainable development goals, not just to 2030 but for the future across generations.

Sara Scherr: Indeed, this approach is being used in many parts of the world. I'm going to briefly give you a couple of illustrations. In North coast of Honduras, that's a very humid agro ecosystem which is the most important agricultural export area of the country. Also one of its most important areas of both terrestrial and coastal biodiversity. You're seeing a huge growth in population as well as a huge growth in export agriculture. A number of years ago under the convening of international NGO, the oil Palm producers, the cocoa producers, the biodiversity managers, the water managers, the municipalities, the tourist actors all got together on a single platform to develop a vision for the future of this area, that would transform it from a trajectory of quite serious resource degradation and impoverishment for many of the people living there to one that would be a sustainable development strategy.

Sara Scherr: In a very different place, in the barren tracts of Bangladesh, this is an area that is very dependent on irrigated rice and it's facing huge challenges for climate change adaptation as well as loss of biodiversity. Local organizations and government agencies have come together to try to develop a water-centric type

of landscape management strategy across this whole large region that will try to align the efforts from different sectors to move towards a vision of climate adaptation.

Sara Scherr: Again, a very different kind of context is in the dry lands of Northern Kenya in the County of Laikipia, which is like a province. In this area led by county government, there's an effort to address food security of vulnerable groups by looking not only at the kinds of food assistance programs that which were originally there, but to look at the driving factors of vulnerabilities, food insecurity. And look at the natural resource base, improving lands, health, improving markets and stabilizing the water resources in an integrated way that will address this issue. This kind of partnerships are arriving not only in these three places but EcoAgriculture Partners together with a number of our other research partners did a series of study between 2013 and 2015, documenting these integrated landscape initiatives that had an established platform that we're working on agriculture and environment and livelihoods in development at the same time. At that time we had documented 428 of these large landscape initiatives. The numbers now are actually much higher.

Sara Scherr: One of the interesting things is many people think about landscape initiatives as having a very strong environmental focus, which they typically do. But you can see that if you look at the priority objectives and impacts of these landscape initiatives a very high proportion of these nearly half have as major objective and achievements, significant increases in agricultural yield and improve profitability of farming. If you go down to the livelihood impacts that many of them report, you have in South and Southeast Asia, 70% reporting that these landscape partnerships have successfully improved food security in the work that they're doing. There are actually many different communities of practice that are working in these fields. I've counted more than 97 different words that are used for integrated landscape management. But all of these have five key features that show that they are working towards integrated landscape management.

Sara Scherr: The first of these is collaborative community and engaged processes. So that you can have dialogue among stakeholders, negotiation, common visioning, planning and an action. These are usually voluntary. They may be convened by a variety of different kinds of agencies, but they are characterized by being voluntary and inclusive. A second major feature of these kinds of initiatives is that the groups do negotiate shared or agreed landscape objective. These are generational objective, not just short term objectives that the groups will commit to taking actions that are aligned with this vision. The third feature of this landscape initiative are the commitment to align field practices, agricultural

practices, forest practices in ways that benefit multiple landscape objectives. Farmers know that they're playing a critical role in watershed management, that they're playing critical role in biological corridors. By the same token, environmental agencies and NGOs recognizes that the actions they're taking for biodiversity conservation need to provide food security and to support the farming actors that are in the communities.

Sara Scherr: The fourth area is that land uses across the landscape are managed to achieve synergies and to reduce conflicts. This may be upstream, downstream relationships in watershed. It may be devising new market relationships, speaking part of the landscape so that biodiversity friendly products can benefit conservation of forest, etc. Then the final piece that characterizes these landscape, part effective landscape of partnerships and initiatives are that instead of being siloed, market development considers the impacts across the range of landscape objective. Policies are aligned and mobilization of finances aligned to address the full set of objectives in these landscapes. Now, what is the process that is used being used to pull these stakeholders together? This is not an easy process. It's one that requires investment, time and effort. But the pretty much experience around the world is now suggesting of the ways in which most of these initiatives develop are those important pieces the multi-stakeholder platform, sometimes that's formal, sometimes it's informal, but those are the groups that drive the process.

Sara Scherr: We're definitely looking at trying to achieve national and global goals but really basing that on the priorities of local people. These are locally driven landscape initiatives and other actors need to restructure the way they're providing support to these local actors and information within them. They moved from that to a process of shared understanding. Everybody's got their own perspective about landscape. They may be a little different and they need to really understand why others have this. They need to move to collaborative planning and design visioning to design. Then effective implementation including financing and monitoring. Now many tools that have been developed to do this and there's now a new initiative that we hope that some of you may want to join in the future for scaling up people locally led landscape transformation. I called a thousand landscapes for one billion people. I look forward to talking with you all more about that. Thank you.

Julie MacCartee: Great. Thank you so much, Sara. A few questions came in during your presentation that I thought I would toss out to you. First up, Andrew Klein asked, "With one third of the world's soils degraded due to erosion, do you have any thoughts on cost effective measures being taken to address this in the implementation of ag development projects?

Sara Scherr: No. That's a big question and I think essential question. It's also one of the questions, I think that the soil issue is one that brings together stakeholders in a way that many others do not. Farmers care about it, climate activists care about it, watershed managers care about it. So I think it's receiving a huge amount of long and delayed support for doing work. But I think at least I've seen a number of extremely exciting initiatives to mobilize soil restoration. I think these landscape initiatives bring in stakeholders beyond just the farmers and give them support by doing everything from having labeled agricultural products that are determined to be from sustainably managed soil and resources, to programs of voluntary carbon emission credits that are being used to fund longterm programs or soil restoration with farmers. I think there's actually have been a huge growth of efforts to support farmer organizations in the work they're doing around soils by providing both financial and technical support from watershed management organizations. Anyway, I think this is actually one of the big growth areas in this field I think.

Julie MacCartee: Great. Thank you so much. A clarifying question came in from Christopher Boden who asked, "Does anyone monitor and check that the commitments are being upheld in the examples that you shared?"

Sara Scherr: Yeah. When I was going through that little process, and I very quickly went over the piece on monitoring and evaluation. This is an outgrowth of something that many of you may be familiar with in collaborative of adaptive management, which came out of more of a community level of natural resource management. The monitoring piece is actually critical. The landscape initiatives that are successful are the ones that at least every year pull the group together to assess where they are against the objectives that they had defined. Sometimes this is done in a qualitative way. There's a wide range of new monitoring methods that are really reducing the cost of this kind of monitoring. Some of these initiatives are now moving toward more comprehensive landscape impact assessments that they can again use not to punish those who don't do necessarily what they're doing, but to make it very transparent and to have a learning process. And to sustain the effective collaboration where people actually have trust.

Sara Scherr: There's new tools such as land scale, which are being developed now for impact assessment of the landscape scale. But I think the most important things is that people review the commitments they've made every year and determine if they're have having problems reaching their commitments. They have a discussion about whether maybe other stakeholders can do things that make it easier for them to achieve their commitments. Very central piece of these kinds of initiatives.

Julie MacCartee: Excellent. Thank you. I think we'll do two more questions before we move on to the next speaker. Let's see. One came in from Sarah Carlson who says, "How does the integrated landscape framework deal with the very real trade offs that exist when accommodating different sector goals? For example, some species cannot tolerate disturbance such as specialist species with narrow habitat requirements. It may not be feasible for communities to adopt environmentally friendly behaviors in the short term."

Sara Scherr: Yeah. I mean, Sarah, your question is central to the whole rationale for integrated landscape management. We have decades of efforts to try to make the same things happen in the same landscape through very different decision making and implementation processes. The point that I was making earlier about process of doing shared understanding of the landscape is often central. Most agricultural development agencies actually don't understand this issue of, for example, very sensitive habitats for particular landscapes. There are things that you can develop as solutions at a landscape scale, they're not possible to do at a community or a local farm level. This is about doing collaborative planning and actually if there are losses that need to be incurred by certain actors within the landscape, what you're finding in these initiatives is very creative ways of compensating them for that. Providing additional say land resources away from the very sensitive areas that they are going to be allowed to use. That other landholders will allow them to use. So I think that what this does is make very explicit to trade off and provides a very concrete process for negotiating the outcome. Not the expensive an individual farmer, but looking at this as a collaborative commitment.

Julie MacCartee: Great. Thank you. I'll ask you one more question and then we can hold some more for the end of the presentation. Let's see. So kind of a compact but somewhat challenging question from Emily Herata. "What are the disadvantages and challenges to the integrated landscape management approach?"

Sara Scherr: I often start talks that I give by saying that, if you don't need to do an integrated landscape approach, you shouldn't do it. If they're not really serious potential conflicts and complementarities between what different people in the landscape are doing, it's not worth doing the institutional investment that's required for integrated landscape management. So I think the question here is more if you do have the situation where you're trying to build a biological corridor through an agricultural production area. I'm not sure that there is actually an alternative to doing integrated landscape management. Emily, basically not just relying upon only government agencies to solve this problem or only relying upon private certification programs to do this. Or only relying on

local NGOs to make these things happen. But actually find some ways that these groups can align and explicitly deal with their conflicts and their concerns in a controlled environment and under a convening process that in which people have some trust.

Julie MacCartee: Thank you so much Sara. And thank you to all of our participants for putting your excellent questions in the chat box. We are collecting them all and we'll continue to ask a few more after the other two speakers. Of course I encourage all of you if you have answers to each other's questions or suggested resources, please do post those in the chat box.

Sara Scherr: Thank you.

Julie MacCartee: Oh, great. Thank you. For now we'll move on to Pete Pearson with World Wildlife Fund.

Pete Pearson: Thank you so much. Am I coming through okay?

Julie MacCartee: Yes. I can hear you.

Pete Pearson: Okay. Wonderful. Well, it's a real privilege to be able to speak with everyone today and excited to present some work that we're doing. So again, I am the senior director of our Food Loss and Waste Strategy for the international network. Just a quick recap for what World Wildlife Fund does. I think most would be familiar with our brand and what our mission is. But we're a science based organization. We work a lot with companies and communities. The big thing is we strive to meet the needs of both people and nature. We see these two things connected and we have to do both. In terms of our reach for one of the largest conservation organizations in the world, we have presence in over a hundred countries, about 80 offices plus globally. Then we also have built a huge amount of momentum with people all around the world. About 6,000 people are members of World Wildlife Fund. Or over six million, sorry. A little over a million just in the US alone. So a little bit of context about who we are.

Pete Pearson: When you look at what we do, you can imagine what you would expect, right? We work in areas like forests, oceans, wildlife poaching and crime, climate, freshwater, but the one that most people don't know about is the work that we do within food systems.We focus in on three fundamental areas. We focus in on sustainable production, so really looking at zero conversion landscape certification programs. We work on eliminating loss and waste, which is the program that I lead. Then there's this whole area of sustainable consumption. Which could probably fill another webinar by itself when we really look at

standard diet and sustainable consumption. But the reason why? So since about 1970 about a 60% decrease in populations of mammals, birds, amphibians, fish, and other vertebrates.

Pete Pearson: When we look at the reasons why we see these biodiversity losses, one of the biggest culprits is food and agriculture, right? It makes a lot of sense when you connect this. When you lose 70% it's estimated because of food production. It's because we're expanding agriculture's footprint, right? We continue to use habitat and convert habitat, and that's what wildlife and biodiversity needs. Now, when we look at the impacts of food, it's not just land conversion, but we have greenhouse gas emissions, high chemical usage, the use of freshwater. It's the largest user of freshwater on the planet. Then we have this issue of the loss of top soil. All these things factor into why World Wildlife Fund is really focused on the issue of food and food systems.

Pete Pearson: So what I thought would be good is the exercise that we have in front of us. The way we view this is is there's sustainable development goals that they're very interconnected and linked. If we're out to meet the needs of both people and nature, we have to address sustainable development goal too, which is ending hunger. Now the challenge is to do this in a way that also doesn't reduce biodiversity on the planet any further than it's been reduced. So those are a SDG goals 15 and 14. How do we meet the needs of reducing and eliminating hunger while also maintaining biodiversity? We would contend that one of the imperatives for doing this is is making sure that you are addressing SDG 12. Which is responsible, consumption and production. More specifically SDG 12.3, which is reducing food loss and food waste.

Pete Pearson: Now critical elements all come together and we try to do this by freezing the footprint of food, right? We want to ensure that that encroachment on biodiversity and habitat loss and the zero landscape conversion is achieved. We can really only do that by addressing food loss and waste. I'll talk briefly about our overall global strategy on food loss and waste. It covers many different segments. These five. We look at the hospitality industry, we're working with restaurants and food service. We work with grocery retailers globally. We're working on farms. We also just launched a really great program that looks at schools and universities in the United States and we're expanding that globally hopefully. But what I'll do today is I'll talk primarily about the work on farms and the work within the hospitality industry.

Pete Pearson: So one of the things that we did about two years ago is, we want to start collecting more primary data for what type of loss we see on farms. Quite literally what we did is we started going out into fields and measuring loss that

we saw in fields. We did this on five or so different types of products. We started a series that we're calling No Food Left Behind. So one of the things that we were not only just the quantification of how much loss we see certain crops, but we also wanted to understand why this was happening. Our focus in this report in series right now is on the United States. What you start uncovering is there is huge opportunities to make sure that we can rescue and make more food available from our harvest. But we have to address the market considerations for why this food isn't being taken out of field harvested, transported, right?

Pete Pearson: This is a market issue and the No Food Left Behind series really tried to address how we can start to develop solutions to do that. I think this is really pertinent for any type of development strategy because, what you want to do is have development that addresses food loss and waste up front. And make sure that one of the primary goals of development is to fully utilize everything you're growing and ensure that no loss and waste is happening in the system. In a country like America and the US, it's difficult because a lot of these systems are already entrenched. So you're having to work backwards to retrofit or to change the way you do things. I have high hopes in places that are developing. You can actually start to design the food loss and waste out of the system up front so that you never even realize it in the future.

Pete Pearson: The other thing we're doing is, we go to the opposite side of the supply chain, towards the consumption end. We've been working with hospitality and tourism quite a bit. In 2017 , World Wildlife Fund launched a platform called Hotel Kitchen. This is working with some of the largest hotel chains in the world on trying to reduce the impacts of consumption and loss later in the supply chain. We take a very prevention first approach to this. So the entire goal is to not even create food waste to begin with. It's not to create a compost pile. We do not grow food to compost it or to deal with it in an anaerobic digester. What we want to do is maximize the utility of that food and make sure it gets to people. Again, this is that linkage to SDG 2. We want to make sure that globally the hospitality industry, restaurants, hotels, are taking seriously their commitment to donate food when they can to local communities and make sure that local communities see that food and that it gets to people.

Pete Pearson: Obviously too, we want to make sure diversion is moving away from landfills. We do not want to see food waste in landfills as it adds another environmental burden of greenhouse gas emissions, and it's just a poor use of a great resource that can be turned actually back into food. Either as animal feed or as nutrients and compost for the soils. So where I think this all comes together is in one particular area. We are now working both with post-harvest loss research and

also working with the hospitality community in an area called Kaza in Sub-Saharan Africa. Kaza is an amazing place. It has five countries bordering this region which represents a huge wealth of biodiversity. Some of the last remaining really solid spots for biodiversity left in Africa and we want to protect that. We feel we can do that by really addressing how the food system is designed and where it needs to be 10, 20 or 30 years from now.

Pete Pearson: So this work we've been doing is analyzing both loss on the farm side, but then also making sure that when we look at consumption within hospitality, grocery chains, and even in homes. That we're able to design food loss and waste out of the system and fully utilize everything in the supply chain. So I'm really excited about this work in Kaza. It really represents a culmination of how we want to use all the tools we've been developing and see what type of future we can bring to a place like that. It's ultimately trying to answer this important question, how do we meet the needs of a growing planet, both in terms of population and to fluency? How do we ensure that we don't completely lose all the biodiversity in the ecosystem services in the process? Which in all honesty, we know we need that biodiversity in order to be prosperous on the agricultural side. So I'll leave it at that. Happy to take questions and to explore this with the group. So thank you very much.

Julie MacCartee: Wonderful. Thank you so much Pete. A few questions have come in during your presentation that I'll throw out to you. First one from Christopher Boden. "How did WWF choose the five or so crops to address farm-based waste in your example?"

Pete Pearson: Great question. Well, we wanted a diversity so we chose leafy greens, we chose potatoes, tomatoes, peaches. The reason why we did that is each one represents a really different type of both harvest and the process for planting and growing. So one's a root crop. One's a leafy green, one's a tip fruit. What you start to see are some patterns around how that whole harvest and distribution can change and be different. So it gets a little difficult. There's 200 or so different types of fresh fruit and vegetable commodity, so we can't do them all. So we tried to be smart about what types we picked by just the way that they're characterized in harvest and in growing cycles.

Julie MacCartee: Great. Thank you.

Pete Pearson: Really quick. I saw on the [inaudible 00:39:10] why not cereals were chosen. That's actually something we're doing right now. So we're taking on the idea of corn or maize, soy, and some other larger commodity crops. Which typically are going into more feed systems, but that is something we're looking at as well.

Julie MacCartee: All right. Another question from Emily Herata. "How has the nutrition community been involved in the dialogue with freezing the footprint of food? For instance, if plant based diets are less harmful to the planet and may slow those footprints, how has the nutrition community or industry involved with those efforts?"

Pete Pearson: I think it's really important. We're obviously an environmental organization, so nutrition is not our specialty. But we are continuously running into, I think opportunities to partner with nutrition organizations and to explore this linkage between nutrition and environmental trade-offs. It's not always as black and white as you would expect. Sometimes even plant-based diets and items have environmental impact as well. One that I would point to right away would be the avocado, right? I mean, we know that the avocado is a great alternative for plant-based diets and something that's gaining huge popularity, but it does have environmental trade-offs. There's butterfly habitat that can potentially be impacted in places like Mexico and Latin-America. So I think we have to be really, really aware that there is no black and white answer to all these questions. I really liked what Sara was talking about when she says collaborative engagement for development and having these collaborative approaches to shared landscape objective. I think that is extremely important. My contention is, let's make sure to build food loss and waste into every single one of those collaborative engagement. I think it's that critical.

Julie MacCartee: Let's see. I think I'll ask you one more question and then we can come back to a few more at the end. An interesting question from Golong Liang. "Is there a specific example or just a theoretical example that you can share about how to reversely designed farming systems with the goal to reduce food loss? Have you seen that in international development context doing a reverse design as a way to reduce food waste?"

Pete Pearson: Yeah. I think in every single instance there's one thing that rises to the top of importance. And it's making sure you build measurement and monitoring of food loss into the system upfront. So maybe one example of seeing this as it reversed strategy is to make sure that place like Kaza, as you have five or six hotel chains that are exploding, more tourists are coming, the community is getting bigger, as they're purveying more food, having your buyers working with the farmers to make sure that loss is measured, understood so that you can develop longer term contracts. A more shared responsibility across the whole supply chain, I think is critically important. For the most part, loss is not a function of farmers doing poorly. It's a market function. I think the more we can connect buyers to those farmers and create an ecosystem of shared values, that's that reverse engineering that we want to see. Where we're trying to build

loss and waste out of the system by having a shared value approach. That collaborative engagement. But measurement is critical to all of that. We have to be measuring this constantly and everywhere.

Julie MacCartee: Agreed. Thank you so much. All right. It is such a time we will move on to our third speaker and then come back with a few more questions at the end. So I'd like to pass the mic over to Faisal Hossain from University of Washington. Take it away.

Faisal Hossain: All right. Hello, everyone. I want to thank you at Agrilinks for organizing this excellent webinar. So today I want to talk for the next few minutes on how we could grow more food with less, in this case, less water and use some technology solutions as do it apply to Asia. So let's quickly look into the water use productivity that we have in some of the more populous countries of Asia that have similar climate but grow all to the similar type of food. What do you notice from this slide is that China's doing pretty well for every unit volume of water and growing the major crops. India is a distant second and Pakistan is quite at the bottom, which is the same story you see on the right the mouth. That color red indicates the amount of irrigated water you're using to grow the same kilo calories of food. So given this wide of variability and the fact that you can actually get more from the water use in a similar climate, the question that we can ask ourselves is, can we grow with less water?

Faisal Hossain: So I want to share some experience we've had starting with Pakistan. Then we'll go further East to India and then Bangladesh. In Pakistan, you have the Indus River system. You have the world's largest irrigation system. What you see in this slide is five rivers joining in the middle to become Indus River. The colored region is the command area of the irrigation system where the water is brought to farmers through a series of crisscrossing canals. Each color represents the cropping patterns. So where you see purple, it means that you will only be growing cotton alternated with wheat. It's a very centrally planned system where you would see vast tracks of this same crop being grown. In other words, you have very little heterogeneity in the crops.

Faisal Hossain: However, if you look into the history of such a irrigation system, it was designed almost a hundred years ago for just one crop a year for which the surface water was sufficient and food demand wasn't so high. But the reality today is is it's being used two to three times more its designed limit. For which obviously you don't have enough surface water. So what the farmers are essentially doing is they're pumping the additional water that they think is needed for irrigation from the ground at very unsustainable rates.

Julie MacCartee: Faisal, sorry to interrupt. We've just had one request for you to speak up just a little bit.

Faisal Hossain: Okay. Thank you. I hope I'm louder this time. So for example, let's talk about rice. Rice in any irrigation system will comprise the lion's share of your irrigation water requirement. In the case of Pakistan, it's the same. If you pick a province like Punjab that's somewhat humid, in one growing season, you would need about 600 millimeters. That will be the crop water demand and somewhat in dry province, it's a little more. But if you see how much farmers are applying, they're applying at least two to three times more on the farm. Which obviously means it's a lot of excess, which means the ground water table is going down and costlier pumping each year. But more importantly, I think this results in loss of crop productivity because the nutrients in the root zone leach further below making it unavailable to the crops.

Faisal Hossain: So the problem we were trying to solve is, how do we change the farmers' mindset that they don't need to get so much? And how can the solution be sustainable and affordable? So the idea we came up with was we have these low hanging fruits, these two low hanging fruits. One is you see in the upper right these earth observing satellites, which there's a collection of them out there that take a pulse of the earth surface and atmosphere. Using that, you can predict or observe current and past weather conditions, especially rainfall. But you can also predict current and past crop water demand. You also have these atmospheric models at the bottom, the global numerical weather prediction models that assimilate satellite data. But they can also predict current and future rainfall as well as they can be used to predict or forecast future crop water demand as well as current crop water demand.

Faisal Hossain: So what we can do essentially is we could do a demand and supply analysis and figure out when the farmers need to irrigate, when they don't. We could fire those messages to the farmers phone because almost all farmers either have a flip phone or a smart phone. You tell them to irrigate when demand is more than supply and vice versa. So here, demand is your crop evapotranspiration and supply is the rainfall. So we implemented such a solution and it would look something like this here. In Pakistan, you see a snapshot of the messages in Urdu. There's a translation for you in English. We added a forecast based advisory later on. We began this in 2016 and it's scaled up pretty nicely from 700 farmers to currently it's serving about a hundred thousand farmers.

Faisal Hossain: We were also able to do a quantitative impact evaluation. The results that came out from that is that it's saving about 40% of irrigation water. That's all pumped groundwater that would have otherwise been lost. Just to put a perspective on

this number in volumetric terms, that's about two and a half cubic kilometer. Which is, a large dam can hold about 10 to 15 cubic kilometer. So what this means is that if you can have the system running for about 10 years or so, you can save about one to two large dam worth of water underground. So you're giving the groundwater system some breathing space to build up its stock.

Faisal Hossain: Also, the usage is quite high. We have anecdotal evidence of farmer income increasing by virtue of the yield also increasing. However, if you go further East to India, India, the situation changes a little bit. First of all, you don't have one major national irrigation system in that country. You also have way more farmers, 140 million to be precise. Most of them are marginal, 65% farm size and 80% with a plot size, less than one acre. And you have tremendous variability on the cropping pattern as you can see in these pictures on the left. Any coarse resolution system like the one I showed you before in Pakistan just will not work. So we need something that's finer resolution.

Faisal Hossain: So the idea we came up with is to use these technology of the day, which is IoT or internet of things and this low powered wide area network. Basically, it's a low bandwidth WiFi. What you see in this slide on the left is like an environmental sensor that's very cheap. They run on two AA batteries for a couple of years, hardly needing any maintenance. They would record an environmental parameter, in this case you see water level. They won't store it, but they will relate to the router that you see in the middle that will be hanging from a tower. The router won't record it either. It will push it to the cloud, the internet. The router itself is very low power so it can run on a solar panel.

Faisal Hossain: Essentially, you're not having to send any people to go collect data every time. These sensors are working 24/7 just for a couple of AA batteries for a couple of years. So this is how our system was born, called PANI, Provision Of Advisory for Necessary Irrigation. Some of you may know this is the local vernacular for water in South Asia. So essentially, it uses the same coarse resolution system and it combines it with these IoT sensors you see in the upper two plots. Then it tries to provide something much more meaningful at the plot level for the marginal farmer.

Faisal Hossain: This is how the advisories would look like on the farmers' phone. You have this weather advisory, you have a little bit of the irrigation advisory. This is of course in Hindi. On the left side if you see, we also have to customize the message in a way that the farmers understand. So typically, farmers use finger as a unit for irrigation. Also, we run the numbers and the cost that came out for PANI in rural India and in the Northern region is about $5 a year capital cost. So we think it's pretty affordable. We piloted the system and it's still running since 2018. The

results that we got, here you see a sample of the farmers that we interviewed, about 150 or so. The general summary is that 85% of the people find the system quite useful. But what's interesting is the yield. We track the yield and we found that the wheat yield, I mean, that time they were growing wheat, the yield was about 4,000 to 5,000 kilograms per hectare.

Faisal Hossain: Now government reported yield that side is quite less. We believe that this increase in yield is because of the unnecessary irrigation that they avoided, the excessive irrigation, which of course lowers the yield. As we speak now, the system has expanded further East to Bangladesh. You can go check this website. Here you see a map with the numbers that indicate the number of farmers that are kind of trialing the system right now. It's a public-private partnership and what makes PANI very interesting is that in addition to being a poster child for climate change in the coastal region, the naturally occurring water on the ground or underground is brackish. So it cannot be used for farming. So the only time they get fresh water is from the heavens, from the skies during the monsoon season. Which means that if these farmers would grow anything during the dry season, they actually would have to harvest the rainwater and that's what they do.

Faisal Hossain: So these farmers actually came to us and told us, "Hey, we'd be interested in this system, PANI, because we really want to avoid unnecessary excessive irrigation during the winter season because we have preciously harvested the rain water." So we'll see how that goes. But we do have some impact results that we surveyed the farmers. We got some impact assessment. Similar story you see here, close to about 80% of the farmers, mostly marginal would find it useful. There is room for improvement of course for the remaining 22% or 20% or so. But I think what's interesting here is that recently, there was this cyclone that happened in end of November called Cyclone Bulbul. A lot of the farmers told us that the forecast for rain really helped them protect their crops, especially vegetables. Because those farmers who were not getting this advisory, they actually had watered their vegetables and after the cyclone came and they had additional rain, it just washed their crops out. So obviously, during these natural hazards of calamities, this kind of an advisory turns out to be additionally useful.

Faisal Hossain: So I want us to end with three take home messages for the audience. One is of course we have these low hanging fruits, satellites and atmospheric models, which are not being used as much as they should be, at least in developing world. I think they should be in Asia if you want to grow more with less water. They should be the cornerstone of any technology solutions to make them affordable and sustainable. Second is of course if you want to feed Asia, we

have to be giving the marginal farmers a voice and give them solutions that they can adapt to. Third is technology that's precise and smart. Does not have to be expensive. So I'm going to end right there and happy to take questions.

Julie MacCartee: Wonderful. Thank you so much. We've had a lot of good questions come in during your presentation. So I'll kind of rapid fire ask you some of them before we come back and ask some additional ones for Pete and Sara as well. Let's see. So first up from Christopher Boden, how reliable are the crop evapotranspiration rates estimated by satellites? Would the resolution be good enough for small holder farmers?

Faisal Hossain: So that's a good question. So in the Pakistan's case we didn't need a very high spatial resolution. We essentially did not use the satellite so much. We used the numerical weather prediction model outputs. They were validated compared with the local agency that we've been working with. It's Pakistan Council for Research and Water Resources. They had a couple of lysimeters and they came out pretty well, the trends. You had to do some additional calibration. Now, for high resolution of evapotranspiration or crop water demand estimates if for say small plots where weather variability getting it at the right scale is important at least to scales of say 500 meters to one kilometer, I think you would have to use these additional sensors, these IoT sensors.

Faisal Hossain: If you just rely on just the satellite or the weather prediction models which are at scales of 10 to 25 kilometers, it will just not be sufficient. Many weather patterns do not change so much like temperature, wind speed. They vary at scales of maybe a kilometer or so, but you would still need to use those. So my answer is probably not. You would still have to use some localized information to downscale it and make it very representative at the plot scale.

Julie MacCartee: Great. Thank you. Let's see. Another question came in from both Andrew Klein and Polly Belita who both wanted to know if the notification service is free to farmers. If they're paying for it? If so, is this sustainable over time? And also some curiosities about whether it's sent via an SMS.

Faisal Hossain: Right. So the messages right now are all SMS. They're extremely simple because you may know that a lot of these smart ag applications, 90% of them fail because I believe we make it unnecessarily complex. So it is SMS based. In the Pakistan's case, it's the federal government that's running the system as a service for the farmers. But there are talks with Asian Development Bank and just Telenor Pakistan to commercialize it a little bit in a manner that's a little affordable. In India's case, you have seen the business model. It's $5 a year and they're more than happy to pay that. In the case of Bangladesh, the private

sector is already engaged with the public sector right now and figuring out how much they're willing to pay. But we haven't figured out the business models. But yes. The bottom line is eventually, such a system or service will have to be sustainable, not just technologically but also financially. So farmers would be having to pay a very modest amount that they can really afford and the benefits are I think way more than what they pay.

Julie MacCartee: Great. Thank you. Let's see, a question from Golong Liang. "Apart from satellite estimated ET, what other tools are or do you think should be implemented in the estimation system?"

Faisal Hossain: So just a quick correction, the ET is not just using satellite data, it's also using the weather model data. But we could also be using, and we should be using a lot of this satellite imagery on the crop type. You can also predict crop health. You can also predict any kind of crop canopy or crop age or growth stage. So those are very useful because depending on the crop type and the growth stage, that dictates the ET. But you can also use a lot of the satellite data or localized information on the soils. In fact, any information on soil wetness helps because that will actually help you tweak or fine tune the ET estimates that the crops have. Because depending on how much you have in the soil will dictate how much the crops need, additional water that the crops need. So yes. There are a couple of other things that we could be using to fine tune and make this service even more, I would say, accurate and relevant to the farmers.

Julie MacCartee: Great. Thank you. Just a general question to pose to you. A couple of our participants have asked about whether the tools and lessons that you've shared would be applicable in other contexts such as central America. Or has some interest in knowing if they could pilot this project in their country, etc. Just what general suggestions do you have for people who are interested in either broadening this work or knowing how it's applicable elsewhere?

Faisal Hossain: Right. So my answer is yes it is because it's a fairly simple system and the low hanging fruits are all publicly available. The next country we're expanding this to is Nepal, but certainly in South America or Southeast, it can be done. I would probably point to a couple of resources that Julie, I can give to you where there is an extended talk with some literature on how one might be able to go about and implementing it themselves. There will be probably some assistance needed on getting the data, but they're not very difficult. So my answer is yes. It can be done and I would highly encourage that it'd be implemented. Because the core of the data that it's using is freely available.

Julie MacCartee: Great. Thank you. Yes. A reminder to all of our participants, we will be sending out an email with the post-event resources including the recording of this webinar. So that could be a good time, Faisal, for you to share some additional resources that we can include in that post-event email. Let's see. I'll throw out a few more questions for you. We've had a lot of them come in, which is really great. Let's see. A question from [Jalili Adabi 01:01:20], "Could you please perhaps mention some demographics that might have felt that the program was not beneficial to them and their underlying reasons?"

Faisal Hossain: Is that applied to me, Julie?

Julie MacCartee: Yes.

Faisal Hossain: Okay. Yes. So great question. You've seen this pattern of 15% or 20% of the farmers not finding the system useful. So we looked a little bit deeper into that and there's a little bit more affluent, well-to-do farmers, better educated, and they actually did not feel like there was a lot of value in this system and they're doing pretty well. They wanted something more. What we figured out is that if we were to address those 15%, 20% on the farmers, we run the risk of making the system too complex and alienate the other 85% or 80% who found the system very useful in the first place for its simplicity. So I think there's a sweet spot, aiming for 100% is not possible and you have to leave it at some point. If your goal is to aim for economy of scale, 80% is a good number. So what we know is that a lot of these farmers, the ones did not find it very useful, are much well-to-do. They have pretty good farming income and much better educated that they were not motivated enough to use such a system.

Julie MacCartee: Thank you. Let's see. I think I'll throw out a couple more questions to you Faisal as long as we have you on the line since I know that you need to drop off a bit before the webinar ends. One question that is certainly a classic that I think people always wonder is from Don Molder, "How do you make this project sustainable? What is your exit strategy?"

Faisal Hossain: So all these systems, we're not running them anymore. We're in the business of getting out of the business. That's what I always like to say. I couldn't show it in my presentation. But in each of these countries, they're actually stakeholders who are currently running and owning the system, managing it from their own infrastructure, manpower. In the case of Pakistan, the federal government opened a permanent budget line to hire someone and run this system and also the other hardware infrastructure. All we did is we co-developed the system and provided them to training. In India's case, some private sector and institution were already involved and they're running it right now. In Bangladesh

case, it's also the same story. So we are already sort of in the exit mode. We have basically provided the idea, the recipe, and shared our knowledge. So that was the goal, is to be in the business of getting out of business from the get go.

Julie MacCartee: Great. Let's see, one last question for the moment. I'll reserve the presenter's right to ask a question of another presenter. So Sara Scherr wanted to ask you, "Are there ways that the other water user groups such as agro-processing companies, municipal water utilities and environmentalists could help farmers scale up these irrigation innovations?"

Faisal Hossain: So I think that's a great question. We've never thought about it like that because most of the application in South Asia has been in rural regions but certainly, it could be tried out. I mean, right now, I wouldn't know how to go about that, but if the local utilities and other sectors want to play a role, it could be done. I do know in the case of Bangladesh, we are reaching out to the agricultural extension office, which is an arm of the agriculture ministry and they'll play a role. But other sectors like say the transportation or the cities, we haven't really figured that out yet.

Julie MacCartee: Wonderful. Thank you. Thanks again to our participants for posting so many excellent questions in the chat box. I think we might circle back to you again Faisal before you need to go. But I thought we could also come back to Sara and Pete. Let's see. So we had a few questions come in earlier. I'll go down or go back to a couple that came in for Sara. So Diane Russell mentioned that, "It's really important to discuss asymmetrical power relations in "landscape management approaches and how to work in situations of low trust in government and weak civil society. [inaudible 01:06:08] had a question related to that. Wanting to know if the limitations of integrated natural resource management approaches are higher at the governance level versus the farmer and individual level.

Sara Scherr: Sure. Those are two really easy questions to answer. I don't at all underestimate the challenges of doing integrated landscape management that require these kinds of longterm relationship building negotiations and, and planning around trade-offs and synergies between different stakeholders. It's only that you can't actually achieve objectives without doing those things. So I think it's really about addressing the power of relations. I think there's two dimensions of the power relations question. One of them is within landscapes between people with low power and larger power. And that when you're defining the longterm vision and priorities for action within the landscape, are the concerns of some of the less powerful groups taken into account? I think in fact, a well facilitated landscape partnerships makes those things much more visible. It's not going to fully

overcome the power differences, but it's going to make it very transparent and create opportunities for discussing alternative ways of implementing production, consumption markets, etc. that will address their issues.

Sara Scherr: So I think there's a lot of facilitation tools that have been developed to help those conversations work more effectively. To organize stakeholder groups whereby for example, groups that maybe are less powerful, less literate, work in different languages, actually have pre-meetings before the main meetings of the partnership so that they're well prepared and can articulate what they need. Making things very transparent by using a lot of visuals and maps. Not depending on written reports but rather on other means of communication that will involve a lot of other people. There's some really interesting innovations around the use of WhatsApp and other things to bring in other voices, and some really excellent work that's been done on trying to improve a women's voices within these landscape partnerships.

Sara Scherr: But I also wanted to mention there's another dimension of this, that when I started working and observing and learning from landscape partnerships back from since 2002, almost all of the early ones were very locally driven. They were 15 communities around a water resource that the water was no longer flowing year round. They realized they all needed to do watershed restoration in order to try to get that water running together and they needed to modify their agricultural practices, et cetera. What's happening now is that the power of these collaboratives to address these issues in an integrated way for the SDGs, for the climate agreements, has actually peaked at the interest of national governments and international organizations. There's now a lot of money flowing into landscape partnerships where the shots are being called really by those higher level actors who are not really embracing the idea of locally led landscape strategies. I think that's the other aspect of dynamics that bilateral organizations like USAID, international NGOs like WWF and others need to also be looking at not only how they're handling it within the landscape but also between the two.

Sara Scherr: The trust issue, in places where there's no trust in anybody is pretty hard to do these kinds of landscape partnerships. The issue is to really find those institutions that are institutions of trust that can be the initial conveners such as sometimes it's faith-based organizations, sometimes it's local universities and others that are well respected. Allow them to be the conveners and facilitators and spend that early time around conversation and shared understanding. Because if you don't have it, you can't really move forward beyond that. If the trust isn't there, you can't do these things.

Julie MacCartee: Excellent. Thank you so much, Sara. Faisal, if you're still on, I know you have to drop off soon so perhaps we'll just throw out one last question for you and then we can always follow up and make sure that you've at least seen all of the questions that have come in. Let's see. Well, I do think Christopher Boden's clarifying question was a good one. "Where did PANI get their yield data from to compare with the government's previous values?"

Faisal Hossain: So when we piloted PANI in India, it was in Northern India. So we were already serving the farmers after the end of the growing season of winter wheat of how much they got, the yield for wheat. So that's where we got the data from for that PANI sites. Now, we not monitoring the yield data before that and we really didn't have the money to do a randomized controlled trial. So then for the government deal data, I think it's not that hard to find. If you'd Google, there's a government ag website ministry where they report the yield for wheat as a function of different provinces and the regions and you get it down to I think even irrigation districts. I will mention that, just to keep in mind, wheat yield in general in India has been going up the last 15, 20 years because of better seeds and fertilizer. So it is on the upswing by virtue of I think minimizing irrigation waste, it's probably improved a little bit more. So we got it from the government website data. The government reported that, yield data. For our site, we monitored them.

Julie MacCartee: Great. Thank you so much. Thank you for posting those links and resources in the chat box. I think those will be really helpful to our audience. All right, so I'll officially say farewell to you, Faisal. Thank you so much for joining and for your really excellent presentation and answering of the questions.

Sara Scherr: Thank you so much everyone, Emily, Julie, and of course Adam and the audience and our esteemed speakers. Thank you so much. Bye.

Julie MacCartee: Thank you. Let's see, we do have up to 15 minutes left to continue answering some questions. So I'll come back to a few questions for Pete. Let's see. First up, Pete, Robby [inaudible 01:12:51] asked if you have seen silos of knowledge and work that you've identified in reducing food loss and waste in farms, particularly in developing countries? I'm assuming that they are asking like if you're seeing places where communication is not happening properly or different segments are not speaking to each other that should.

Pete Pearson: I mean, yes. We World Wildlife Fund have conducted some of our own post-harvest loss surveys and research on farms, namely, I know our South Africa office has done quite a bit. I've seen research out of our Zambia office. I think overall in Africa, post-harvest loss has been a big topic and a big focus of

research. Where I think we could do better is taking it out of the silos that exist and really start looking at this from a system level. Start including buyers and sellers together and start looking at a better food system design with the intention of having food loss and waste built into that design. Then also having biodiversity as much habitat conversion as possible not done. So I think that's how we get out of the silos, is we start to expand this to a larger system level conversation really in line with what Sara is saying on collaborative engagement for development.

Julie MacCartee: Thank you Pete. Let's see. Another more general question. There were a few questions and comments about hospitality and food waste. So we thought perhaps we should address that a little bit more. On how the hospitality sector can influence food waste and what their role should be.

Pete Pearson: Sure. I just think it's a fascinating intersection. I mean, you have tourism in a place like Victoria Falls just booming, right? They're building an Avenue airport. There's just a huge volume of people that are now flooding to areas like this. For the most part, they're there to see the biodiversity and to see the wildlife and the landscapes. But what the connection that is not made is that the reason why we're losing that maybe it's because of the buffet they're sitting down to eat at the hotel, right? So I think hospitality is a great intersection for us to not only do this work within the supply chain, the buyer-seller connection, post-harvest loss. But it's a unique opportunity to get consumers aware of what's going on with the food system and the true impact that food has on habitat, on biodiversity, on water, on farming. So that's why it's really unique to me. I think it represents this unique intersection where we can try to do as much as possible and build that consumer awareness as well.

Julie MacCartee: Thank you, Pete. Let's see. I think that as we're continuing with our questions, we're also going to bring up some polls for our participants, since we know that some people may need to drop off a bit early. So we'll bring up some polls for you to answer as you are heading out to let us know a bit more about how we can continue to improve these webinars going forward and whether this contributed to your learning. So please take a moment to fill those out. Let see. All right. Another question for Pete from [Madewell Bekele 01:16:43], "How are we talking about food loss and waste management in areas that don't have access to infrastructure like roads, enough energy, market access? How does that kind of change the conversation?"

Pete Pearson: It's definitely important, not only transportation but refrigeration. What it requires is that you have to start looking at investments into those technologies, into that infrastructure and that's two parts. It's working with private sector. So

working with buyers like hotels, retailers, restaurants, to make some effort to invest in that. But then it's also going to take some really serious work with governments to see that they're also making that investment into infrastructure. What I will say is there is growing momentum to build loans and to have major, major institutions start to provide loans for this type of work, this infrastructure development. But it's going to be both private sector and governments that have to step up and to make those investments.

Julie MacCartee: Let's see. Great, thank you. Let's see. Pete, as long as we have you at the mic, I'll ask one more question for you from Jonathan Casey, "Has World Wildlife Foundation also looked at losses linked to pest and diseases and the impacts on biodiversity from the use of pesticides and fungicides?"

Pete Pearson: Yeah, absolutely. I think one of the studies that we did, I believe in Zambia, did look at pest mitigation. Especially on the storage side when we're storing crops and subsistence farmers storing things in local villages or communities. So we have looked at that. Overall, one of our biggest calls to action is just to reduce the amount of inputs into the farming system, right? Reducing the amount of pesticides and herbicides that we're using. One, there's potentially a great ROI for farmers, right? When you're reducing your input costs, you're potentially increasing your margins and your profitability. But then we're also advocating for biodiversity, right? We need to come from a place of regenerative agriculture where we're trying to build up systems and more natural systems and to always approach it by saying, "Let's go out and in the process kill bad bugs."

Pete Pearson: But then kill the good ones in the process. So I think these start to all interlink together. The nice thing about food loss and waste as it gets out on the farms, right? It gets us in the systems and measuring and trying to figure out how we address these problems through measurement and scientific data.

Julie MacCartee: Thank you, Pete. I will come back to Sara for a moment. Sara, I know that we wanted to have you talk a bit more about the roles of private companies and about how finance can be mobilized for both the enabling and the asset investments that you spoke of.

Sara Scherr: Sure. Thanks very much. I just want to say that if you all will remember seeing that map that showed the 400 and something, 38 or whatever landscape partnerships that we had documented for a while. One of those things that was notable when we were doing those reviews is that only about 25% of those landscape initiatives had private companies as partners. This was really surprising because they were all agricultural and agriculture is basically a private

sector activity. So we tried to look into that a little bit more deeply and identify the number of barriers on both sides that were preventing private companies from becoming partners of these landscape partnerships.

Sara Scherr: One of the things that's happened in the last five years has been a quite notable growth of interest in private companies for a number of reasons of becoming actually partners and be perceived by-partners in doing that in a responsible way. Some of them are the companies that have made things like deforestation free commitments or are really seeing that their own business model is dependent upon adequate water resources, which are disappearing. Groups that have made commitments around climate that can't really meet their commitments without having other actors in the landscape also do complimentary things or co-invest in some activities.

Sara Scherr: So we are starting to see much more interest in private sector and becoming partners. They're still struggling with what roles they should be playing. I'm not talking here about the ones that really just have no interest. There're companies that really don't have a business rationale for being partners and some of them have a business rationale and actually working in opposition to these landscape partnerships. Which is a sort of another category of actors for which one really needs other than external if they're powerful, other external allies of the landscape partnerships to deal with those. But I think there is a lot more promising opportunities for partnering with private companies where there really is a business rationale for them to be part of that and understanding that business rationale is really key.

Sara Scherr: The other thing that we've learned over the last decade is a major constraint to success in these landscape partnerships, is that even when they do a fantastic job of the planning and the design and they find integrated solutions and they're getting their policies in line, they can't get financing for the type of integrated investments that are required. They can't get them for scaling their pilot work. So there's been some really interesting innovative work on finance on two dimensions.

Sara Scherr: One is how these landscape partnerships can internally organize themselves much more systematically to translate their action plan into an investment for private funding, civic funding, public funding, and blended funding. So just reducing the costs and ensuring that the kinds of investments that are made across the landscape are more coordinated. The other one is very new models of finance which enable much larger amounts of funding to shift to sustainable investments in landscapes in which one of the criteria for making the funding available is that it is consistent with a landscape vision and agreed objectives,

etc. So I think we should all be watching for some of the new innovations in finance that I think we'll make these landscape partnerships much more stable and more enabled to achieve their goals much more quickly.

Sara Scherr: Just one last piece about that, most of the funding needs to go to the actual things that are happening on the ground. It's funding for farmers and for co-ops and for infrastructure and for supply chains and for government programs. But there's a really critical part of funding which is long-term funding to sustain these landscape partnerships and the institutional relationships and keeping them together, which right now is grossly underfunded. I think looking for funding solutions for those is a high priority.

Julie MacCartee: Thank you so much, Sara. We're coming up close to the end of our time. So I would like to just pose one final question to both Sara and Pete, which is, what recommendations would the speakers have for improved programming for food security, but particularly looking at USAID and other large donors. We would just love one or two of your broader recommendations.

Sara Scherr: Pete, do you want to go first?

Pete Pearson: I mean, I would say doing these collaborative engagements for development like Sara has described are absolutely essential. For me, it's making sure that food loss and waste is built into these assessments right up front is key for making sure that we're designing it out of the system and making the proper investments in order to do that. We've got a project like this that's happening in Victoria Falls region, that center, that heart of the Kaza region which I explained. I'm hopeful that that could be a really great model for how we can build through loss and waste into these type of projects where we have exploding population, tourism, all the works. We can still have a future that's great for people and for the planet. So I'm hoping to be able to share that as soon as we can to show it as a model.

Sara Scherr: Over to me then, this is Sara, actually USAID is doing some fantastic work on the food security side of things and nutritional security. Also has a lot of programming around landscape initiatives whether it's around watershed and free points or biodiversity or land degradation. I would really love to see USAID more systematically linked to these programs. To build food security objectives into the landscape programming and vice versa. So to me, that's the most critical thing, is to really build that bridge. The second thing is I was mentioning this new initiative on a thousand landscapes for a billion people which is focused on system wide changes that will make it easier for these landscape

partnerships to work effectively together. I would love to score with the USAID possibilities to become my partner in that activity.

Julie MacCartee: Wonderful. Thank you both so much for those recommendations. We are just about at the hour, so we're going to go ahead and wrap up this webinar. I would like to extend a sincere thank you to the Agrilinks team for managing and producing this event today. Thank you to Emily Weeks for your introduction and to our three speakers for your really excellent presentations and for definitely answering the questions that have come in. Most importantly, thank you to our attendees. You are the reason that we hold these events to share knowledge with all of you and to help make connections and engage around these important food security topics. So we hope to see you at future Agrilinks events. Keep your eye on your emails for announcements. Have a great rest of your day. Thank you all.

Sara Scherr: Bye. Bye

Pete Pearson: Bye. Thank you.