June_18_Small_Hall_003

Okay, yeah so welcome everybody to this session that we titled Rooting for Nature, who's not rooting for nature?

And what we want to do in this session is to explore together with all of you the effectiveness the way some of these nature -based solutions function and how we can model the effectiveness of nature -based solution.

This session is brought to you by GFDRR and the global thematic area on nature -based solutions in GFDR, which as Brennan introduced yesterday is a cross -sectoral team in the World Bank. So we work with disaster risk management in urban but also with the environment team, with the water team etc.

So I'm very excited for today. We have three speakers that I will introduce later and that will have like two different presentations to really take you through some of the modeling and some of the like really disastrous reduction effectiveness of nature -based solutions.

So I guess maybe just quick recap, I'll be brief but to build resilience and to reduce disaster risks of course the traditional set of measures that governments often work with are great infrastructure measures or non -structural measures such as spatial planning as we've seen in the previous session or early warning systems but increasingly people are also working with nature to regulate disaster risk to adapt to climate change through the protection of natural assets but also through restoration and engineering with nature.

Some of the rationals, I guess there's roughly three rationals to do that right so one is sometimes it's just cost right so there is a huge investment need in infrastructure services and infrastructure in the face of climate change and at some locations working with nature is just cheaper.

Another reason is more climate resilience right maybe in some maybe in some in some places the traditional gray infrastructure solutions are not the way you to use them you use the design and engineer them are not working anymore in the face of climate change and I guess the third important one is sustainability right so you want to manage and preserve your natural capital maybe I think yesterday we heard from from someone from the Philippines mentioning that okay we can build sea walls but then we lose our beaches and then we lose our tourism revenues right so there is also this sustainability and natural capital component so what we see often is that you know nature -based solutions are not the only the only thing right so we need to integrate them with gray infrastructure and this can be done at the solution level and then in that case we call it like hybrid solutions so it's like sort of engineering with nature but it can also be done at the systems level so you look maybe at a catchment or at a city and you look at the complementarity between the measures at this level right so we've seen in the world bank already quite a lot of these solutions being implemented and these solutions they you know reduce disaster risk and build resilience against climate change but also importantly they provide these other benefits in terms of providing opportunities for recreation as you see here in the wetlands in Colombo or in the urban park in Barra up there or for instance provide a carbon sink such as in the case of coastal mangroves um so despite we see a lot of interest in it at the world bank in in our clients in investing more in nature -based solutions there are some challenges that persist right so it's a relatively new type of uh type of solution still which uh often there is some capacity building needed there is some learning needed and and this is really where our team at GFDR comes into um yeah to play this kind of global knowledge hub role where we try to support our clients with technical studies with training etc And one of the things that we work on,

and that's what we're going to discuss in the session today. And I think yesterday there were some people mentioning that nature -based solutions are sexy solutions, right? Who doesn't want nature -based solutions?

But then there's also some skepticism of like, you know, do they actually work? Is it not just, you know, planting some trees or doing some nice green stuff, but do they actually work for managing risk and for building climate resilience?

And this is really what we're going to look into today. So look at today. So what you need to do is really, you know, have this sort of assessment chain, right? So first you look at what are some of the processes that are occurring in this natural asset.

So for instance, here you see an example of urban forest where, you know, you see all these different processes happening which might lead to benefits to people and might lead to risk reduction and climate resilience.

So in order to do that, we'd like to think of this sort of, you know, assessment chain where you link the biophysical modeling to the socio -economic assessment and try to understand, you know, what is sort of the added value, what is the economic viability of the solution.

So yeah, I'll stop my introduction there. I think we can go over to our speakers. So we have two excellent presentations. And I would like to invite Ian Smith to come to the stage. So we start with the presentation by Ian.

Ian is a geospatial data scientist with GFDR and a nature -based solutions team. He has received a PhD in environmental science from Boston University and he works now on geospatial tools to look at the effectiveness of nature -based solutions mostly in urban areas.

And today he will talk to us, talk to you, discuss with you some of the modeling that can be done to look at the effectiveness of urban green space for addressing or mitigating the urban heat islands.

So Ian, please come forward and maybe a little applause for Ian to get started. Thank you. Technology is always a challenge.

Perfect. Thank you, Boris. Yeah. Hi, everyone. My name is Ian. And today I'm going to talk about one facet of this tool that's been developed in the global program, Nature Based Solutions for Climate Resilience, called the Nature Based Solutions Opportunity Scan.

In that one facet is the heat stress module that we've built. And we're going to demonstrate this using a case study from here in the city of Himeji, Japan. And so one of the reasons that we look at heat stress as one of the potential benefits from Nature

Based Solutions in cities is because of this ubiquitous effect that we see in global cities around the world, where the warmest parts of cities,

shown in the red colors of this map of Washington, D .C., tend to be characterized by high population densities, lots of built -up surfaces, and we refer to this as the urban heat island effect, is when we compare the temperatures in these types of locations to the vegetated portions of the city where we have nature.

These tend to be the cooler portions of the city, such as this park here in D .C., shown in the green colors on the map. And so this is one of the benefits that we can get from Nature Based Solutions, which is an umbrella term that refers to actions to protect, sustainably manage, and restore natural or modified ecosystems that address societal challenges effectively and adaptively, while simultaneously providing human well -being and biodiversity benefits.

And these Nature Based Solutions, or NBS, can take a variety of forms, as you see in the diagram on the left here. Some of these solutions, such as green corridors, urban forests, and open green spaces, we expect to provide some amount of heat stress benefits and temperature reduction in our cities.

And so we can think of Nature Based Solutions in cities in this hierarchical approach, where first we can consider the protection and sustainable management of the existing nature that we have in cities to ensure the prolonged benefits from that nature.

But we might also consider enhancing nature that might have been degraded over time from pressures like urbanization to restore those benefits. And then we can also consider what I'll mostly be focusing on today, which is the creation of new Nature Based Solutions to implement nature where it doesn't currently exist in cities to provide these types of benefits.

And we care about the benefits of Nature Based Solutions for climate resilience, because these solutions can not only reduce our climate risk, but also provide a number of co -benefits. And so here we see two solutions in Nature Based Solutions families that target heat stress reduction in cities, in urban forests on the left, and green corridors on the right.

And so today we'll talk about the cooling effect that we get from these solutions through the provision of shade and evapotranspiration. But if we look at these diagrams, we see that we get a number of co -benefits from these solutions as well, such as additional carbon sequestration capacity, improved soil infiltration, and the promotion of biodiversity.

And so the Nature Based Solutions Opportunity Scan, or the NBSOS, considers these co -benefits. This is a location -specific spatial application of the World Bank's catalog of nature -based solutions for urban resilience with the objective of identifying opportunities for investment in nature -based solutions.

In this case, I'll talk about the urban application of the scan, but it should also be noted that this product also exists for coastal environments and ecosystems. In summary, through this model, we spatially identify urban nature -based solution investment areas at a very high 10 -meter spatial resolution.

Importantly, this tool is applicable across the globe and can be implemented in any city, as it is based on globally freely available Earth observation data. And right now, it's provided as an on -demand service with a quick four to six -week turnaround time in order to serve as a conversation starter in potential NBS investment projects.

And so as a broad introduction to how the scan works, there are four major steps. Where in step one, we work to understand the problem by visualizing spatial variability in hazard exposure across the areas of interest.

And then in step two, we map suitable locations to protect, enhance, and create green infrastructure for each Nature -Based Solutions family of interest. In step three, we combine the first two steps in order to estimate the potential benefits from each NBS family for all of the locations we identify as suitable.

Such that in step four, we can provide decision support by identifying opportunity areas for investment through either a multi -criteria analysis in our urban scan or a cost -benefit analysis in the coastal scan.

And so I wanna walk through what each one of these steps look like using this case study from EMEJI. And so one of the first things we do to understand the problem is to use a global climate model in order to characterize heat stress conditions in the area of interest.

And so here we can see that heat stress in EMEJI is expected to grow considerably in the next decades, experiencing approximately seven times more high heat days in the next 25 years as they do currently.

Currently, the city experiences an average of four days per year with wet bulb globe temperatures higher than 30 degrees Celsius. And so we use this wet bulb globe temperature metric as it's an interesting heat stress metric that not only accounts for temperature but also how humidity, sunlight, and wind speed impact our perception of temperature.

And with this temperature goes over 30 degrees, it's recommended to rest for 45 minutes for every 15 minutes of manual labor. If we look at 2050, EMEJI is expected to experience approximately one entire month with wet bulb globe temperatures that exceed this threshold.

And so we can see that these trends are growing in this city. But if we start thinking about how spatially variable heat stress conditions might be within the city, I would like to invite you to scan the QR code that you see on the screen here to think about this type of spatial variability you expect in a city like this.

And so I'll ask the question, what do you think is the magnitude of the average annual air temperature urban heat island effect here in EMEJI? Or the difference between average annual air temperature between the built environments of the city and the more natural environments of the city?

And I'll give you a few seconds for these answers to start populate and see the consensus answers we come to. Thank you. So it looks like The winner is one and a half degrees Celsius to two and a half degrees Celsius.

And while there are probably certainly days in Himeji where the urban heat island effect exceeds two and a half degrees Celsius, 33 and growing number of people in this room have got the answer correct, as I'll demonstrate here on this slide.

For the second part of step one, where we look to identify the priority areas for NBS here in Himeji. So the map here on the left shows the urban heat island effect here. This is a map of average annual air temperature across the city, ranging from about 16 to 18 degrees Celsius.

And if you think about where we're all sitting today in this room, we're where that black dot is right in that red cloud of high heat stress conditions. And so in order to derive this priority index that you see on the right, we multiply variability in air temperature across the city by variability in population density.

To capture these priority areas where the dark very high priority areas here represent high density populations exposed to the highest heat stress conditions in the city. And so in step two, we wanna consider what possible solutions could we implement in these areas to reduce heat stress.

And so we develop rule sets to determine areas for the creation of urban forests shown in the yellow portions of the map on the left and green corridors shown on the right hand side. And when we zoom into what these areas that we've identified look like, we can see that for urban forests, we've identified patches such as this one, where we see a lot of bare land.

And this patch happens to be surrounded by lots of buildings here. And so planting trees here and letting them grow up might provide benefits to the populations adjacent to this land parcel. And to get an idea of what these green corridor solutions might look like, we can see a road such as this main one running south to north that is cutting through this impervious landscape that currently does not have lots of vegetation.

And so given what we can see about these two types of solutions, I wanna ask another question now. Which of these two NBS families, green corridors or urban forests, do you think might have the highest impact on reducing urban air temperatures?

So you can either choose green corridors, urban forests, or if you think that all trees are trees, then they might have an equal impact. Thank you. So, green corridors is picking up momentum, but I think urban forests is the consensus solution here in this room, which is really interesting because, you know, this question doesn't necessarily have a correct answer.

And so we consider how these two solutions actually do impact temperature in step three of the NBSOS, where we estimate spatial variability in air temperature on the left as a function of land cover composition using a statistical spatial regression model, where we estimate air temperature as a function of the amount of built -up land and the amount of current tree canopy cover.

And so if we look at this total impact column, the third column here in the table, we can see that positive effects refer to a warming effect and negative numbers show cooling effects. And so we can see that trees in this city do provide a cooling effect.

However, when we implement green corridors, the marginal impact of cooling is actually greater than that of urban forests, as you're not only reducing the warming effect of built cover, but also getting that cooling effect from trees.

However, trees could still ultimately have a higher impact if there's enough space for their implementation, urban forests rather. So it's a bit of a trick question. The marginal impact of green corridors might be higher.

The total impact of urban forests might be higher. And so as a second part of step three, we're able to estimate the benefits across this city by multiplying our priority index values from step one with the estimated temperature change by combining the suitability map with our spatial regression model to show in this case three levels of low, medium, or high benefits that correspond to various percentiles where we see these pockets of high benefits from the implementation of urban forests and green corridors popping up around the city.

And with that, I want to ask one final question as part of this particular presentation. Given this map that we just looked at about potential implementation of green corridors and urban forests, how much on average do we think that green corridors could reduce the urban heat island effect here in Himeji?

Zero to 25%, which might be like half of a degree. 25 to 50%, which might be something like one degree Celsius or greater than 50% where we start to nearly think about completely offsetting the urban heat island effect.

Thank you. So, this is really impressive because if we consider the second question did not have a right answer, the majority vote has guessed correctly so far in every question today because it turns out if we move on to step four of the opportunity scan, we find that green corridors have the potential to reduce local urban heat island effects by up to about 44 percent.

And so in this step, we aim to narrow down all of the solutions opportunities that we've been looking at in order just to identify those with the highest benefit. So not thinking about can we put a solution here, but how impactful would that solution be?

And so we can show the spatial variability in this map, but also discretize it by the type of solution identified. And so here we see that green corridors have the, we've identified about 155 hectares, like I said, with the potential to reduce the urban heat island by up to about 44 percent locally, and then 93 hectares of urban forests with the potential to reduce local urban heat island effects by up to about 30 percent.

And so this is typically where our opportunity scan stops. It should be worth noting that heat stress is only one type of benefit that we consider in the scan, but we also consider benefits of different types of nature -based solutions on paluvial and filuvial flood risk reduction, improved access to health and recreational spaces within cities.

And so in step four, we can actually combine these all together in a multi -criteria analysis to identify solutions that not only target just one benefit, but are also tackling things like flood risk reduction, heat stress reduction, and improved access to recreational spaces all at the same time.

However, to get from the nature -based solutions opportunity scan to something like implementing implementation, this output from the scan serves as an important conversation starter in the early phases of project implementation.

But after the scan, in order to see what these effects really look like in real life, it's important to carry out things like detailed analyses as demonstrated in this map of high -resolution air temperature mapping across the city of Tichuanay, South Africa, to identify hot spots of air temperature and the potential impacts of NBS there.

And through these types of analysis, combined with the scan outputs, we might actually be able to reach the implementation phase as demonstrated on the right here with an example from Sierra Leone, where the Freetown, the Treetown campaign has planted nearly one million trees across the city with the goal of stabilizing soils, but also providing some of the co -benefits that we've talked about today through the expansion of tree canopy in the city,

where the benefits don't necessarily stop at ecosystem service benefits as this project has also created thousands of jobs that are directly related to the tree planting campaign. And so I'll leave you with that today.

Thank you very much for your time, and if you would like any more information on the scan, there are several sessions throughout the week, or you can also contact Boris or Brendan or myself with questions about the scan or any methodology.

So thank you very much.

Thanks a lot, Ian. Maybe if there is like one burning question, we could take it while the next speakers are setting up. Otherwise, I can just, ah, I see a question there.

Thank you. I would like to find out in the analysis for the investment opportunities, has there also been analysis of what is the return on investments for the investors?

The answer to that is no, there's no, not necessarily like a full cost benefit analysis as part of the urban scan, rather we focus on simply the quantification of different types of benefits that we might be able to get in these parcels that we identify as suitable to try to select the nature -based solution types that provide the highest benefits in parcels that we say compete for space, right?

Like we might find some suitable patch of land where you could put an urban forest or an open green space or an urban farm, but depending on the types of benefits that are of interest in that particular area, the results of the analysis change, right?

If you're targeting flooding, maybe that space is better utilized as a buyer attention area. If you're targeting heat stress, maybe that space is better used for urban flooding. And so rather than this return on investment approach, we use this sort of index -based quantification of various types of benefits as a context of the scan outputs.

All right, I think we're ready for the next presentation. So hold your questions. Ian is here the whole week, so if you have any questions regarding the heat modeling work, please feel free to chase him, and he's happy to answer all your questions.

Are we ready? We are ready, okay, great. So the next presentation, the next part of this session is a contribution by Arabella Vega and Carlos Reimat. They work as World Bank consultants, and Carlos is a geologist and a civil engineer, whereas Arabella is an agronomist, engineer and an ecologist, and they work very closely together on analytics to identify a range of measures for slope stability,

soil conservation, often combining green and gray infrastructure measures. So they worked for the World Bank and for clients actually in projects across Africa, so in Malawi, in the Democratic Republic of Congo, in the Central African Republic and Dominica, and we're gonna hear from them some of their exciting work regarding these analytics that they do, and also with some nice demonstrations.

So yeah, the floor is yours.

Good afternoon to everybody. Thank you, bodies. Thank you, Ian, for the presentation. So, as Ian already introduced, the Nature -Based Solution Opportunity Scan is a big scope of the Nature -Based Solutions.

With this, we first invite you to join us, and we would like to test what's your knowledge on erosion. Because we are going to another scale, we focus our analysis on terrain data. So, we want to test you guys, and please, we encourage you to participate with the Mentimeter on what you guys know about soil erosion.

This, we're going to take it as a living lab on this subject. So, we are going to have, as Boris already mentioned, we have these cases in three different countries in Africa and Dominique and the Caribbean, where we are going to simulate three sandy soil with three different conditions.

We're going to have a sandy soil, then organic matter onto the sandy soil, and a Nature -Based Solution on top of that sandy soil. So, if you guys could scan the code. Thank you. We're good? All right.

Do you want to go ahead? So, just getting ready. All around the world we have seen these things happen. Landslides, floods, it's not a matter of just Africa, just the Caribbean, just South America. So, we want to be aware that we're talking about a methodology that is really universal and can be applied to many situations with a technical approach that is similar.

So, here we have five columns of different subjects. Right now we're just going to focus on the one in the center. I don't have a pointer. Yeah, there you go. Ecosystem analysis, agriculture, manage, soil types, loss, green growing, and NBS solutions.

But please be aware that we take all this into our analysis. So, edaphology. That's why I ask about erosion. So, we go to the field, usually the two of us, and we talk about geology, soil genesis. We take information such as physical, chemical, biological characteristics, and we do it under a methodology that is worldwide accepted.

Is there a soil scientist in the room? Anybody? So, we use FAO, or we use the USDA classification taxonomy. So, it doesn't matter. It depends on the country where we are. Which methodology we use. But at the end of the day, all the data is impartial, is methodological, it's analytical, and it's straight forward from the terrain.

But the Nature -Based Solution Opportunities can take us there in the first place. So, ready? Do you think... And this is a very easy question. Is soil scientists linked to NBS? That was quick. Anybody supposed?

All right. So, just to make it spicy, right? Okay. Thank you. Thank you for making it like that. There is no right answer. Of course. So, yes, definitely. And in what way? It does have to do with water management, agriculture, forests, and forestry.

It's not one way. It's all of the above, all the time. Back and forward. Everything is linked. We cannot take one away from the other. This scenario, is there any African colleagues? Anybody coming from Africa?

Okay, do you relate to this? Have you seen this on the field? All right, that's what we see. This is the first scenario, and this morning we heard it from you guys, the colleagues from Indonesia, I think, that sweeping, is that the right word in English?

Barbette? Sweeping, sorry. So sweeping the surfaces around schools, around households, is a very, very cultural rooted thing that we do all around Africa and South Asia. I remember you guys said it was Indonesia, right?

Or Sri Lanka. So this, we see it all the time. The second image is a seasonal agricultural practices where soil is nude half of the year, usually. This is good agricultural practices, but it could be improved.

And the third scenario is something that we also see that is conservation agriculture. It's a different type of agriculture. So these three scenarios, we had some fun in our workshop and we did this.

We tried to simulate what was happening. So we have all the data of what's the rain we put into these models, what's the angle of, yeah, so this, thank you. So this is the living lab we were introducing on the first place.

We did these boxes to simulate what you guys saw in the picture and what you guys actually see in each of your countries, right? Go ahead.

Yeah.

What I want to introduce you is what we are trying to prove it's in front of the citizens an easy method to prove that what they are doing could be better. And as you know, when you are going to the field, it's not always easy to combine the people because they are doing the same that they did during centuries.

And in order to prove that what they are doing, you know, you never can say that this is bad, but you must say that that should be done on a different way, you know. And this is what we are trying to share with the locals in order to convince them that exactly what they are doing could be do it in another way.

And this is what we will try to show you. And that will be also available to see on direct, on directly on life, on our booth after that meeting. But what we are trying to do is to simulate exactly the scenarios that we are seeing under the frame.

And this is what we are trying to show.

All right, so which of the scenarios we had there, do you guys think is more fertile? There's no right or wrong answer, so please take a look. NBS, organic matter. Neither is fertile. That's interesting.

So what is your question? Do we have a bot in the room? All right, go ahead. I'm not going to give you the answers, as he indeed. We're going to keep just building doubts in your head. So again, another one.

In which sandbox does the most run of okurk? Do you want to put the picture again or not? Yeah, I think I don't know if that's going to mess with the mentimeter. No, you should. Did it mess with the mentimeter?

Hope you had good memory. All right. Most run of in the Nutsan de soil. That seems. OK, I need you guys to remember that answer. I'm not going to give you any more hints. So this is what actually.

Yeah, we will show you a video that was recorded with the specific sand where we did the projects. This is the sand was from Africa, from Central Africa and from RTC. And we did that, as I explained to you, we did that test in order to prove what is happening in these three scenarios.

And we put the same intensity of water, one and a half liters per minute, and the same sandy soils, and we also modified the cover. The first one, the second one with soils, a thin layer of soils and the third with grasses.

And the test takes approximately 45 minutes in total. And the video I am trying to show you was multiplied by five in order to go faster. You know, I want to show you something. Let me, okay. You are seeing on the right side where the grass is.

You are seeing how the water, it's arriving till the space that we keep it there. You are seeing how the water that comes from the runoff, the water that it's arriving till the end of the test site exactly.

Here you are seeing how the water is arriving. The time it's running in all the three cases is the same water, the same volume of water, the same peak discharge is arriving in each box. But on that one with the grass is covering the surface, you are seeing how efficient the water run off easily and arrive thanks to that four pipes that are catching the water that arrived till the end of the test site by runoff,

and it's driving until there. But the other two ones, you cannot see anything yet, but it's the same amount of water that we are spreading, okay.

Just a quick detail. The deposits to the right, they catch runoff. And the deposits to the left, they catch infiltration. If you see, there's tubes on the top, that's runoff, and tubes to the bottom, that's infiltration.

That's why we can say which is runoff and which is infiltration. So we gave you a hint already. We still have more questions. You can stop it, yeah. All right. So you already have an image of what could happen after a 45, we stopped at four minutes, right?

And it's a 45 -minute rain. That's the intensity of rain we have in the sites where we have studied. So, okay, most infiltration. Is not as obvious. Remember, infiltration was in one side and runoff was in another one.

I'm gonna give you more time just to rethink. Okay, good. Okay, most erosion. Where do you guys think?

What do you expect about the abortion?

Okay. It's general, the answer, okay? Good. So we're going to go to the answers.

Let me show you the second part of the test. Now, to respond, that means we cannot go back. But let me show you what happened after approximately 18 minutes of test. This is accelerated five times. OK.

Take a look on the left side, whether it's a new surface, start flowing the water full of sand, that it's arriving by infiltration. You see the left side? OK. On the center, you are seeing how the runoff don't start yet.

And more or less similar, maybe a little bit less of volume, it's also arriving by infiltration. But take a look what is happening on the left. Something is collapsing. Something is collapsing. This is something that let us understand the locals, because this is exactly what they are seeing in the terrain.

When the storm arrived to the cities, the people tried to keep in home or keep safe. And nobody is seeing what exactly is happening. What we are seeing is just after. And we see the result, but never how it's happening.

And the people that describe the phenomenon describe exactly like that. And now we are proving that this is the scenario that reproduced better, what is happening in the terrain. OK. Let us show you fully a spectacular.

The piping is driving by saturation, all the sand out of the box. But take a look. The water arrived by infiltration, but the majority of them arrived by runoff. This isn't a sliding. This is what is happening.

This is what we are seeing in Kananga in Central Africa. This is what we are seeing in Erdeze. This is exactly what we are seeing. In the center, you can see how the water, it's true that in the beginning, arrived by infiltration.

But at the same time that the other one, it's collapsing. Just in the center, you can see how the water, it's arriving by runoff efficiently. OK. The third with the grass, nothing, no water arrived by infiltration.

All the water arrived by runoff, properly drived only with a cover by grass. Let me go to the end. Take a look. Let me show you something more. Now I want to put your attention on the organic matter.

The organic matter usually gives the water that green or yellow color. Take a look what is happening on the center sample, where we are seeing that the water that arrived by runoff, it's yellow, green, yellow.

That means full of organic matter. On the right side, we are not seeing, or practically we are not seeing. In comparison, it's nothing. Nothing comparable with the center one. The first one that was not, take a look, the quantity, the amount of sun that was transported that was drived by the runoff.

This is simple, but that helps us to show to the city sense about what happened on the terrain. Now.

So, in which of the scenarios there was a greater loss of fertility? Do you guys have any hints on how erosion is related to fertility? What does it have to do with fertility? Take a look because this is tricky.

Cattles already gave a hint of what gives the color to water. He... Okay, we're ready? Let's go.

All right.

This is where we summarize more or less the results. First of all, it's very important to show the locals, the citizens, easily, as you saw, what they are producing, how they are promoting the erosion.

And they are part of the solution if they stop, if they modify what they are doing in each of their parcels. Because the people won't contribute when they know that we are there for help them, they won't contribute.

And when we explain that because they expect a lot of effort, they expect that we will construct huge things in order to stop what is happening. And when you explain them easily with that kind of images that they can do by each one of them in its own parcels, immediately they can start doing easy things as cover the surface, don't continue with the processes that daily is eroding the surface, that seems too much easy.

But this is what, in fact, is happening. This is what I summarize the result there, more or less the amount of water that is retained in the box. It's the same on volume. That means that, in fact, looks like on the green grass sample, no water was infiltrated, and this is not true.

It's the same amount of water was infiltrated on the third sample. That means that the infiltration at itself is not the problem, because the infiltration at the end occur, but occur with another speed, with the same aggressivity with the soil that we have above.

The other issue, it's related with the organic matter. You can see how we have the majority of the organic matter on the second one. We put a lot of this permeability down.

So what the colleagues right here have observed of the agricultural practice is the loss of the organic matter that you guys see when the soil is exposed is exactly what happens in the second scenario.

3% of the organic matter is lost even if we think that people are doing agricultural traditional practices. Another type of conservation agriculture is a better scenario because if you compare 3% of organic matter to 1% of organic matter was lost.

So agriculture, yes, the answer is agriculture to plant food for improving livelihoods in these places but what type of agriculture? We're gonna jump to these recommendations just in a moment. Do you guys stand by your answers?

Everything that you answered before, was it right? Was it completely away from what you guys thought? Still do you think that the greater loss of fertility was where? I think answers have changed, right?

The majority of cases we assume, we summarize in some way that erosion means fertility, and where in the first sample where they knew the surface, the fertility was quite zero from the beginning. There we cannot lose fertility because the fertility was not there from the beginning, but it's true that that area will slide down, will flow down.

But that's true, and what we want to show you is that most probably taking into account the risk, the management of the risk, or the risk assessment, we will invest a lot of money in the first scenario where the sliding will occur, okay?

But the second one is who keep the fertility on the terrain. If we can invest part of our budget on the second scenario, we will keep the fertility there and we will allow the citizens to continue a living there.

That means the resiliency, I think that it's there, keeping the soil where it is.

So what should we do? What does this living labs tell us? What does this data tell us? So all the data we gathered, all the living labs, all the terrain data we use will eventually go to this analytics.

It will go to modelization.

The analysis we do allows us to define from each area of the terrain that we are studying will come the soil. That means we know now from where the erosion will happen and which amount will be eroded for each of the events that we are expecting.

You know, the erosion is not only related with the amount of water, it's also related with the soil availability. This is something that sometimes we summarize, but we summarize too much and we reduce the complexity of what we are seeing in the terrain in some bullets, you know, at the end it's more and more sophisticated than that.

This is thanks to the information that we keep from the terrain, that we obtain from the terrain, we can do that kind of modelization that could be repeated and repeated in order to convince the urban planning, the people who, the decision makers.

So because we have five minutes and I think you guys might have questions, I'm gonna go over the next slides very quickly. So we just talked about the middle column, right? We still need to integrate in all of our projects, metadata, topo data, existing infrastructure, urban planning, and coastal dynamics.

So imagine all that we have in hand to be able to have great and nature -based solutions in our projects in order to actually have hazard and vulnerability assessment. And what do we propose as nature -based solutions?

Soil restoration, that's the first thing. For forestry, for agriculture, nature -based solutions as conservation agriculture as the image already showed you. And finally, water cycle management. This is key in urban and rural environments, water cycle management with infrastructure, with nature -based solutions is key for all of our projects.

And we got it, we have like four minutes for questions? Three minutes.

Yeah, we can take some questions. Yeah, over here maybe. And then after that I see a few hands in the back.

Yes, it's on, and I'm with the CIDA, Swedish International Development Corporation Agency. Thank you both for great presentations. I have loads of questions, but I will direct one. I'm thinking especially on the urban, that requires that a city or a country is willing to put some financing into NBS and planting trees and making green corridors.

As we know, being a government official myself, sometimes it's a little bit politically driven that you want to see quick effects. So it looks good to your people. And of course, planting things and doing soil conservation, the effects will take some time.

So how quick will you be able to see effects? For example, in the urban settings, because I think this is a pitch that is needed, that we also as donors try to highlight that, yes, there will be long -term effects, but how quickly can we see any results?

Thanks.

Does this one work? It does? Sure. I can answer that a little bit about the time it might take to achieve the benefits that we're sort of estimating as part of this heat stress module. So it's true that when you initially plant a tree, there are all sorts of costs associated with that tree, and the tree's not really providing much benefit at all at that early stage of life.

There are various estimates out there ranging maybe like 10 to 20 years where the tree actually starts to provide some amount of benefits, but this, you know, ultimately once this tree reaches maturity, if it's able to survive that initial phase, then you're going to be experiencing those benefits sort of at the maximum amount of provision for the entire lifespan of the tree.

So it's sort of like this long -term investment. Like I mentioned earlier, you know, this opportunity scan is not necessarily considering the costs associated with planting that tree, which tend to be higher in the early stages of the tree's life.

And then the longer the tree survives, the more benefits that might be provided.

Yeah. Can I just add one thing to? Yeah, no, I think that's a very good question. And I think especially in the case of urban greening, it's also in our engagement. We work with a lot of cities across the world on these type of engagements.

And of course, there is always a different. In our experience, it's key to consider the multifunctionality. So you always have these different benefits at the same time. And heat reduction is one of them.

But of course, there might be other benefits that might be coming sooner, right? And especially when it's combined with certain engineering. So it could be, for instance, also designing urban green spaces in a way that they're also flood detention areas or that they are like spaces for recreation.

So if they're designed in this way, some of the benefits might also come in sooner and might sort of help selling the type of solution also in the shorter term.

Yeah, this one works. I'm just going to try to be brief, but for the projects we have, it's tropics and subtropics. So in between seasons and just looking at natural re -vegetation or natural succession, or agricultural practices from dry season to wet season, so that actually means a year, we can see different rates of erosion occurring.

And we have tested it with reflectancy analysis done with lighter. So these stational changes, just wet from dry season, vegetating or encouraging natural vegetation or changing agricultural practices are very efficient and would definitely convince some people to put money in there because it's a year transition.

Okay, I think we're almost out of time, so I think there's one hand in the back.

Thank you, both the presentations were very interesting and exciting. My name is Devashishpal Shubro, I'm from the World Bank Dhaka office, Bangladesh. So I have a very specific question on the second part of the presentation on the NBS with grass.

So I wanted to know, instead of grass, if the NBS with shallow rooted plants, will the results will be same in terms of infiltration and runoff? And the second question would be, again, very specific to the technical modeling that you showed, you have showed us with the sandy soil, but what if the soil, the top soil is sandy, but with a clay subsoil, will the result would be same as you have shown?

Okay, thanks.

So we're, oh, you're there, okay. So the soil survey is key at first. We did sand the soils because it's what we have and this is one test, one model we did in our workshop. But yes, conditions will change once we do the soil survey.

That's the first answer. And the second answer, this is grass. But definitely what we encourage is local native species and a range in complex architecture. Not one species, but we had it in the last slide.

We encourage strata, not just soil coverage. Bushes, of course, agriculture, forestry. So always we speak about forest strata, different architecture, and mimic the forest. I'm gonna sum up like that because first.

The idea is to encourage the people to do the necessary tests to combine. This is a living lab. The idea is to learn together about what is the most appropriate method to assure that the fertility will keep it there.

That's the idea. This is only an example, but obviously the idea is to reproduce what you have in the field. Not to do the same, the idea is to use more or less the idea to reproduce what you have in the terrain.

Thank you. So I think with that it's time to come to a close. Everybody's hungry probably. So I hope you find this a useful session. Please feel free, come talk to us after the session. I just want to make one quick announcement or maybe two before you all leave the room.

One is this thing that you saw in the video, you might have seen it in the hall at our booth. So we're actually going to start this experiment now right after the session. So feel free to stop by at some point to see the sand come down.

It will start in about five minutes or something like that. Then one other announcement is that the Nature Based Solutions Opportunity Scan analysis that Ian presented, we will have a full focus day dedicated to that where we actually go through the Himeji case study and also go outside to see to what extent the results that the model predicts make sense.