

## June\_18\_Small\_Hall\_004

I think we heard this morning from Nagoya Governor when he said they couldn't get their disaster risk management running quickly because people couldn't get to the centers. So transportation and infrastructure are absolutely critical when it comes to responding to disasters.

So we need really resilient infrastructure. And yet in 2022, only 2% of adaptation finance went towards the transportation sector. So we need to really start thinking about adaptation, not as an add-on to our infrastructure investment, but really integrated into those infrastructure solutions.

And the business case for doing that is really strong. The Global Commission on Adaptation led a study that suggests that investing \$1.8 trillion today in climate resilient infrastructure by 2030 could amount to more than \$7 trillion of net benefits.

So in other words, if we spend money today, it really saves money for the future. So infrastructure, resilient infrastructure is absolutely critical. So my name's Jane Jamison and I am program manager of the Quality Infrastructure Investment Partnership in the Infrastructure Finance Department of the World Bank.

This is a partnership with the government between the World Bank and the government of Japan that promotes sustainable, resilient, and inclusive infrastructure that's delivered through economically efficient means and sound governance.

And resilient infrastructure is one of the six key principles of the QII principles. So that's really why I'm delighted to be moderating this panel today, where we'll first explore the tools and resources that we have at our disposal to think about quantifying risk in the transportation sector.

And then we'll lead into a discussion about infrastructure projects and how, whether they're delivered through public finance or private finance, how we really need to integrate risk into those, climate risk, into those projects.

And then finally, we'll hear examples of how technology and big data can really revolutionize how we think about resilience in infrastructure. So the session is really all about partnerships. So this session is a partnership between the global transportation infrastructure finance groups of the World Bank, GFDRR, our hosts, QII partnership, the University of Tokyo, and also PF, the Public Private Infrastructure Advisory Facility,

another one of our programs that supports infrastructure investment. So our session's gonna be in three parts. And I'd like to ask my colleague, Federico Pedrozzo from GFDRR to introduce the first session.

So we're really going to think about climate risk and economic assessments and how we think about resilience within our transport sector. Fred is a disaster risk management specialist in GFDRR where he leads the infrastructure, resilient infrastructure work.

So Fred, I'll pass over to you, thank you.

Good afternoon, everyone. Pleasure to be here, as usual. Have a strong connection to Japan. Have the pleasure to study here many, many years ago. And I'll pick up on what James just said. I think timing, it's a crucial matter for transport, right?

Not only timing in terms of allowing people to get where they have to be in terms of an opposed disaster situation, but also, I guess, in terms of making sure that we invest in the necessary funds to address climate change.

And we know that the window of opportunity to have is very short. So the bank actually has been pushing quite strongly on our institutional commitments to address that. Today, we're going to be focusing a lot in the transport or pretty much in the transport sector.

As Jane mentioned, GFDR has the global program on the resilient infrastructure. We have three different streams of work, water, energy, and also transport. And we're also open to other sectors like health, education, and the bank.

Again, so my name is Fred Pedrozzo. His work has been done in collaboration with the global transport team, as Jane mentioned, in terms of our organization at the bank, Jane and Simona. Unfortunately, they've not been able to be present here.

So I'm speaking on their behalf as well. So Jane just mentioned climate change poses a significant development challenge. So in the World Bank, the idea that we have right now is how can we actually invest money in terms of to reap benefits for the future.

Jane just mentioned the idea would be how the dollars that we invest now is going to actually create social and economic development for the future. So what you see here, it's not only the problem of having water under your roads or like the railway is not working.

The problem is that all this infrastructure that has been used before that event are no longer useful and for how long. And that's going to impact dramatically social economic development. So there's always a question on how much we invest on and how much it gets back for you, like the one to four dollars or one to seven or one to eight.

Regardless how big those can be, what we can actually ensure is that all investment in terms of climate change adaptation for the transport sector, we get benefits. So we're never going to have a negative equation on that.

Jen mentioned that unfortunately once we did an exercise at the bank for whatever reason, we have been pushing the envelope quite well in many sectors. So if you can see here in the water sector alone, there is probably around 50% of related investments to climate resilience or climate adaptation.

And it has been a great number. Maybe historically, that's one of the facts, right? So water has always been a sector that's thinking about water distribution, water sanitation, drainage. So it's more on their DNA, per se, compared to other sectors.

Cross sectoral projects, also the number is quite significant, 37%. Again, the idea is not to get to the specific numbers, but just have an idea how much they have been pushing. And cross sectoral can be from solid waste to other types of investments at the bank.

But once we look at transport alone, it's quite concerning. So, Jen mentioned, 2%. If you look at the graph here on the right hand side, transport, unfortunately for whatever reason, either we're not accounting well or we're not doing so well.

And I would say I've been in the bank for 10 years. My background is transport and DRM. I think there is, we're converging right now a lot in transport investments and climate change. So that has been basically one of the institutional pushes that we have to start addressing climate change, not only in the transport sector, but in any other sector.

So I think there is a promising window for us in transport investments in the near future at the bank. Unfortunately, the window is very narrow. So that's one of the points that we've been trying to talk for our clients, for us to actually keep pushing that agenda.

And how can we mainstream climate resilience and transport? There's a lot of discussions. It seems that we're talking about new engineering. And I'm fairly against that idea that we have, not as engineers, we have been able to address those.

It's just because maybe the variations on extreme events or the level of precipitation, so on and so forth, they were not as dramatic as right now. So we have seen events like in Brazil, where they're talking about the worst floods in Brazil for a one to 1,000 year event.

That's quite significant. So one of the ways, or some of the ways that we can address is by bringing more and more climate disastrous mitigation, adaptation to climate change, or a location of resources effectively.

So all of this is actually culminating quite a lot on a better environment for us to discuss with our client countries why we want to invest, how we want to invest, and what are the benefits. And again, goes back to that point that many times we were asked, can you give me the number?

Unfortunately, it's not about the number. It's about the perspective that whenever you invest in a transport infrastructure, that transport infrastructure should be there to allow the system to operate.

So I'm back in the early 2000s when I started doing my studies in transportation. We talk a lot about transport reliability. You really want to know how much takes from you to go from home to work every day, if it's 30 minutes or 45 minutes.

You do not want actually to be caught by surprise that if it rains too much, it ends up to be an hour and a half. Or if it rains too much, then you're not gonna be able to reach your workplace. One of the ways that we're trying to actually address that at the World Bank, we try to actually have three different pillars, what we can see here.

One way is to try to address each country and what are the common issues that these countries have. So we call about the climate risk economic assessment. We can have the establishment of different methods or methodologies for economic assessment impact.

I think Guillermo might be bringing some more examples. I'm gonna bring one very briefly. And I think most importantly, as an institution and in terms of our commitment, we have been inserting that in every single process at the bank.

Right now, from project identification, preparation, and implementation, we have to address those. We have to actually tick the boxes. We have to meet some institutional commitments for as you move forward with our financing.

So we can no longer not address climate resilience. You have a QR code, then maybe after the presentation you can dig a little bit more, but that's the Argentina case. I'm gonna have one slide very briefly.

But again, just reviewing from past practices, if you look at those percentage numbers, unfortunately they are not that great. We have seen that unfortunately not being addressed in critical assessment or economic assessments or adaptation evaluation to a number of projects that we've been developing at the bank.

So there is actually a lot of room for us to improve. Again, as I mentioned, this is not about creating new engineering. It's about trying to merge different disciplines, hydromat, flood modeling, so on and so forth into our projects.

And how can we actually do that? The idea for us is to start having some more system planning approaches. We can leverage a lot what is available out there. In the past, we had invested quite a lot of money, resources to have better databases so we could allow clients or ourselves to actually do some sort of disaster risk analysis.

Thanks God, I guess, from all these efforts that we have done, there is a lot of technology in terms of global data sets. So we can actually get Copernicus data sets. We can use open street maps that are freely available that you can actually replicate quite quickly.

That actually is becoming more and more cost effective for us in terms of pushing that envelope and maximizing a lot of the climate co -benefits. So we were not able to actually start measuring how much of our investments were contributing to disaster risk mitigation or climate change adaptation as mentioned here in the opening remarks.

So this example that we have here on the right -hand side very briefly, there is a bread and butter DRM approach. So looking at risk maps, flood modeling, and trying to merge that with a road network in Argentina and start looking at exactly what are the risks or what exposure or the vulnerability of this different infrastructure, road infrastructure in terms of us trying to understand better how can we actually mitigate them.

We have a very interesting presentation from our colleague that once you see a road flooded in a city, what you have to see is not that road flooded. It's like people that are not able to actually deliver what they were delivering or not being able to reach schools or hospitals.

This is the real impact. Of course, you're gonna have some physical impacts on those infrastructure, but that's something that is very hard for us to actually bring into the perspective because it's a long -term process and involve a lot of decision -making in terms of our client countries as well to start investing on that.

So the three, the integration that we have actually looking at into the World Bank Group work stream, just very briefly, we have an instrument called CCDR, the Country Climate Development Reports. Those are set the baseline for the work.

Infrastructure sectoral assessment programs or project or into project development. So what I'm trying to show here is that we no longer are in a position that whenever the test team goes or a team goes to a country, they don't have a good baseline.

We do have a great baseline right nowadays that actually does not require us to spend a lot of resources to start talking about climate change adaptation to our clients. That's my last slide and just, again, this is, I think, possibly the great three challenge that we have.

Resilience costs money. We cannot actually say that Japan is where it is, and there's very little money invested here, right? So we understand that resilience comes with a price tag. The question is how much of that price tag the countries can afford.

So that discussion about the economic benefits and the decisions that are gonna be taken is very important. So the budget and resource allocation is very important. We have to look at maintenance as well.

So unfortunately, most of our countries, they kind of build like good infrastructure, but they don't put good maintenance. So many times they say, oh, there is a drainage system. The drainage system is clogged just because the world is not clean.

So again, it's like not having that particular system. Prioritization, the most vulnerable assets. I was having a conversation with a colleague in Japan, and there was an explanation about the new Maglev, right, that's gonna connect Tokyo to South, and that's the other side of Fuji Mountain, right?

So the idea is like how critically our infrastructure is located and how we can actually address that because what you do not want is not having options. It is okay that systems will operate at a lower capacity after disaster, after an extreme event.

And finally, engineering standards. I have started working in a country recently that was basically people say, there's no standards, we invest 1% of the money to engineering designs. So they're not doing designs, it's just building infrastructure.

I heard about countries saying, oh, we want to improve that road because that road was built in dots. It's not an engineering road, engineered road. So basically just built to get the bulldozer and build a road.

So right now, what we're trying to place is that there is a minimum that we have to address that. One of the examples that we are gonna close with is the very popular HDM -4, which is a tool that has been used quite a lot in the past few years for economic analysis for highway investments.

And that had been used not only for the World Bank, for the multi -develop, for the MDBs. And the bank is right now investing a lot of resources and energy with the global transport team and with support QII and as well, GFDR, to try to update to HDM -5.



What HDM -5 will have is basically trying to bring climate modeling into asset depreciation. So we want to see how pavement can be actually been used on a long period of time. And the idea as well is trying to bring one of the missing points from HDM -4 that it was designed, but not unfortunately encouraged to work with these client countries in terms of asset management.

So just like to close saying, we need money for sure. We need expertise, we need engineering, we need maintenance. So all of this together, I think that's what this question is at the bank to work with, with these countries to move forward.

So up here, thank you very much, Dan, really appreciate that.

Thanks Fred, I'll just stay here for a second. So thank you Fred, that's really interesting. Just entry point, I think, to share some of the tools and resources we're developing to think about climate hazard, climate risk, and disaster risk, and how we incorporate that into our infrastructure project.

So let's delve a little bit deeper now into actual projects. And in this case, we're particularly looking at private finance. We recognize there's a huge infrastructure financing gap. And the private sector is going to have to play more and more a role, both meeting that infrastructure finance gap and addressing the challenges of adaptation.

So now we're going to delve into how do you apply some of those tools and climate risk and disaster risk into infrastructure projects, particularly private sector projects. So I'd like to invite Sanaya Sasamori, who is a PhD student from the University of Tokyo, who has 20 years experience in infrastructure finance and PPPs.

And she'll tell us a little bit about work she did. Actually, when she was at the wall bank, I'm working on resilient infrastructure and PPPs. And then our colleague, Guillermo Diaz -Fanez, who is a transport specialist in the Africa region, will delve a bit more into some other projects around private infrastructure and adaptation.

So Sanaya, over to you.

Thank you for inviting me at the forum. I'm Sanae Sasamori, doing research on University of Tokyo. Used to work with the World Bank. Today, as Jay mentioned, that transportation requires a large investment and also needs to cope with technological innovation.

And partnering with the private sector is an important strategy. Today, I'd like to share with you the case of Japan, a PPPs in Japan, how to build a disaster -resilient transport infrastructure, not from an engineering point of view, but from a contractual point of view.

So, mobilizing private capital through public -private partnership is a key major to support development challenges. This is a major to procure and implement public infrastructure and or services using the financial resources and expertise of the private sector.

There are several types of PPPs at the left. Oh, sorry. At the left end, the service is fully owned and operated by the public. And at the right end, the service is fully privatized. So normally, PPPs falls in between.

And PPPs has been used widely in the transport sector, such as airports, sports, roads, and race, and urban transport. Risk sharing is one of the key components in designing PPPs. Risk sharing means which party will bear the cost arising from the risks.

So transferring to private, the risks that it's better able to control is a key for the success of the project. And disaster risks, one of the big infrastructure projects risks and categorized as false module in the PPP contract.

Sorry. So these are the project risks and disaster risks is categorized as false module. And it also needs to be identified, evaluated, and shared between a government and the private operator. So let me explain the three steps how to structure risk sharing between the public and the private.

The first, you have to identify the disaster risks and define false module in a contract as clearly as possible. This is the example of Sendai International Airport Project. This is the first concession airport project in Japan and built in Sendai.

You may know the name of Sendai. Sendai is one of the places which has severely damaged by the earthquake. After that, this operation started. So you can imagine how difficult to deal with such disasters risks.

So false module in the contract, in this contract is defined as a factor affects the performance in the contract and also the phenomena listed below, which includes storm or typhoon, flood, earthquake, tsunami, et cetera.

So the point here is there is the threshold agreed in advance what the level of disaster is eligible as false module. So not all earthquake is considered as false module. Certain risks has to be transferred to the private sector.

And the key takeaway is to identify the disaster risks and the level of disaster needs to be done in advance so as to avoid disputes and also to take quick response in the case of disaster. The second step is risk evaluation, which means to assess additional costs, expect to be required if disaster risk materialize, and check the availability and cost associated with the disaster risk mitigation measures such as insurance.

Actually, insurance, fire insurance with earthquake rider is very common in Japan. To mitigate earthquake risks. So here, hazard maps and disaster database are utilized in evaluation, and big data here can be useful for assessing disaster and also to actually affect the coverage of insurance and the insurance premium to be provided to the private sector.

So the third step is risk allocation. So after identification and assessment, a disaster risk has to be allocated to the party who can control the risks in the most efficient and effective manner. So the public sector may consider that they want to transfer as much project risk as possible to the private.

But here are the points to consider. First, the degree of the importance of the service and how much disruption is acceptable. Because the service is public service, so the public sector may not want to stop providing it.

So they may feel that they can take all the risks. However, number two, but transferring all the risks to the public may not be efficient, sorry, efficient, because to transferring certain risk is to provide incentives for private operator to minimize damage from disaster.

And to take a precautionary measure. Here is another example of Japan, which is Kansai International Airport Project. This is also the concession airport project. And the point is here, the private and the public agree that the cost below 10 billion arising from the disaster should be taken by the private operator.

But above the public will take responsible. So it provides incentive for the private sector to take precautionary measure and also to precautionary measure. However, the public consider that the airport service is essential service, so they establish the concept of emergency situation, which allows the public sector to step in and to take over the operation directly in case of the emergency situation they consider.

This is kind of the combination. Here, this is the publish the books, and you can find more about the cases and also the discussion points that I've shared with you today. Thank you very much.

Thank you, Sanay, for this wonderful tour of what research looks like. I'll speak for a few minutes. Talking about this particular study that we are doing with PF, one of the facilities in the World Bank, about innovative financing for transport resilience as part of our efforts.

So without repeating what has been said before, I wanted to first bring a few other cross-cutting barriers as it relates to transport climate resilience. The first one being around strategy and policy.

One of the biggest issues that exist is that a lot of the climate commitments that exist do not really present climate resilience and climate adaptation as a big risk in transportation. Typically, there is a lot of talk, especially in the NDCs, about electrification of vehicles, immobility.

And a lot of times, the commitments of transport are under energy infrastructure. So this is a big issue that exists. And similarly, if we look into organizational capacity, it's not only that there is a lack of understanding, but also there is a lack of tools and knowledge.

For example, I see here my colleagues from VRR. Colleagues, they know very well that the regulations, even in the most advanced economies, do not reflect climate change. So how do we expect a Sub-Saharan African country to cope with climate change if, let's say, a country in Europe that has the most advanced research is still not able to do so?

And then beyond code, we have to think about project-level conditions. It's very different to look at a code than to actually design a project for very specific conditions because we need to demonstrate a financial business case study that is gonna ensure that the project is viable, that it is feasible, and that ultimately is going to mobilize perhaps the private sector to deal with the risk.

Reflecting a bit on what Fred started today, in terms of existing finance for climate, we see that while there has been some advancements in systems planning and engineering and design, a lot of the financing is only stopping there and it's not going further.

We're not seeing those investments in those adaptation measures that we're saying we're gonna do in our projects. So we do need to do something about it. And part of it is to start seeing how we can mobilize financing for the implementation, for operations and maintenance, because this is really what is going to unlock the interest of the private sector to invest.

Jane mentioned today in her opening remarks that resilience is an investment and not an add-on value. So if it is an investment, let's invest. And then reflecting a bit on the

points on risk sharing, I'm not gonna get into details on the different types of PPPs and whatnot, but instead I wanted to present this big scheme talking about the more private the contract is, very likely, the more careful it's going to be the design because the risk is falling in the private sector.

They don't wanna lose any money. And the opposite happens where on the other side of the spectrum. And we should not be neither of them, right? We should be somewhere in the middle. And this is where contract structure becomes really interesting.

We heard from Sandy talking about first majeure, talking about the importance of identifying, evaluating it, in the study that we're conducting at the moment. So hopefully we can share some results in the next UR.

We're trying to identify what are the type of clauses, what are the type of conditions that need to be part of the contract that allows us to reevaluate how we are entering the project versus how we are ending it.

If we have a 20 year PPP contract, for example, maybe by year eight, we want to reevaluate, hey, the assumptions we made in our analysis are they realistic, are they materializing, were they too conservative or not?

So that we can perhaps change that 10 billion yen that falls on the private sector and increase it to 12. It really depends. So with that in mind, I just wanted to leave with an example of a project where some financing was mobilized exclusively for adaptation.

It was from the ADB, where they mobilized \$7 million from the Green Climate Fund with intention to invest only in adaptation investments. And this is something really important because what I see a lot of times is, as I said, there's a lot of talk about let's use nature - based solutions and that happens a lot of times, but other times it doesn't.

And we have to really define where this financing is coming from so that we can utilize it so that we can ultimately, like in this case, mobilize private sector participation as the private sector took the interest of the project by taking the operations and maintenance.

Instead of talking about the key takeaways because of time, I'm gonna stop here, leave that there and pass it back to Jane. Thank you.

Okay, thanks. And I'll ask Guillermo to stay right where he is as we move on to the next you click on to the next into the next session. So we have tools and resources to help us think about climate risk.

We have contract management contract tools to help us structure projects that incorporates that risk. But then let's dive down into a specific project example. How do you use that information? How do you get information to inform your project design and development?

So we're going to dive down into the country of Mozambique, one that is very vulnerable to natural disasters. And we have a virtual speaker joining us to tell us a bit about how they've used available data in a very data poor environment to inform their infrastructure design and planning.

And then Guillermo will compliment a little bit more about how big data and mobile telephones can be used again to inform your infrastructure design. So a very innovative approach in a very highly vulnerable country.

So Guillermo I'll let you introduce our virtual colleagues.

Yes, so Mariana Loli, she is a senior engineer in Grid Engineers, she'll be presenting some of the work that she did with the World Bank, but instead of me presenting her, I'll pass it back to her. Kalisper Mariana.

Hello, everyone. I am Mariana Loley, a Climate Resilience Consultant from Grid Engineers. I will present a study focused on understanding flood risk in data poor environments. It was funded by the World Bank thanks to the partners shown here in the slide.

Our focus was Maputo, the capital of Mozambique. The Flood Hazard Intensity Index offers a practical way to empirically assess flood hazard in data poor environments. It provides a qualitative estimate of flood intensity on a scale from low to high based on the multi -criteria analysis of flood conditioning parameters.

Its greatest advantage is the minimum requirement for data. Nevertheless, due to its empirical nature, it necessitates at least a partial validation against historic flood evidence. Indeed, it is possible to carry out the analysis based exclusively on open access global datasets.

Here, I summarized some verified resources useful for regional flood hazard analysis in any location worldwide. The selection includes a variety of datasets from climatologic to geomorphologic to infrastructure and people.

For example, WorldClean is a valuable resource for historic information and future predictions of precipitation as well as temperature. NASA and USGS offer good resolution maps of elevation and ground properties.

A very comprehensive analysis of road topology and hierarchy is possible thanks to downloadable data from OpenStreetMaps, where you can also find information on the location of critical facilities such as schools and hospitals.

The Humanitarian Data Exchange platform of the United Nations provides good resolution population datasets, as well as assessments of social vulnerability evaluated with respect to well -established indicators like the poverty headcount and the multidimensional poverty index.

In the same platform, you will find historic flood impact assessments in terms of inundated locations and populations affected in recent floods, which can be useful for validation. We adopted the INFORM framework, which is suitable for assessing risk in regions where human vulnerability is significant and disasters can escalate to humanitarian crises.



Risk is here the resultant of four components – hazard, exposure, vulnerability and the lack of coping capacity. The fourth component is a key addition to the typical formulation of risk. It introduces the major role potentially played by the existence or lack of institutional resources and, of course, infrastructure to support response and recovery.

The analysis runs in GIS, where all the aforementioned datasets are synthesized to produce regional scale maps of each one of the risk components to eventually compose a map of the overall flood risk index showing its geographic distribution in qualitative terms.

The Maputo metropolitan area is highly susceptible to flooding and likely to face increased impacts due to climate change. This area has a long history of inequalities, with natural disasters disproportionately affecting the poor.

Many vulnerable people live in flood plains and face frequent inundation. As a result, accessibility to jobs is one of the lowest in Africa, with one third of public transport users reporting that flooding hinders their mobility during rainy days.

To tackle the problem, the government of Mozambique launched a major urban mobility project financed by the World Bank. Our study was part of it, aiming to guide flood adaptation interventions considering both current and future climate conditions.

The map of the flood risk index in the study area indicates in red the locations where flooding is expected to have a very high impact. Currently, over 150 km of roads are highly susceptible to flooding, and we predict a 60% increase expected by 2040 under pessimistic climate scenarios.

Recognizing the challenge, these results can be used to prioritise interventions for upgrading and adaptation of the road infrastructure, with a prospect to reduce inequalities and improve living conditions for Maputo's marginalized, very urban communities.

Importantly, this framework is transferable and can be used to tackle similar challenges in other countries. It is very handy in that it enables quick preliminary evaluations without extensive data collection.

Thank you very much for your attention.

Faristo Mariana. So based on this, sorry, based on this study, the QII mobilized a additional study in partnership with the University of Tokyo. The idea was that we had a lot of data that was open data essentially, but we needed to understand really granularly what is happening on the ground.

And so with the intention to support an ongoing operation of \$250 million to improve the mobility in urban Maputo and its pre -urban areas, we decided to understand how can we address mobility challenges?

We saw that women are typically the most affected, and we wanted to understand what were essentially the different trends, what were their different paths, and how much time they spent to get access to public transport.

So with that in mind, this first study, which is already complete, was able to use big data to understand traffic demand in real time of how women move where they move so that we could really design an inclusive BRT system that is also well -connected with feeder roads.

Because the reality is that the BRT is not going into those rural areas, it's going to the last mile, and we needed to understand where are the investments supposed to go so that we can really connect those women that are the most vulnerable populations.

Thanks to the success of this study, a second study was mobilized, it's currently ongoing, and the idea of the study was to really understand how can we better bring the policy and regulations side on transport, how we can build capacity, so that we can maximize those investment in infrastructure.

We wanted to understand how we can do better planning in conjunction with those investments so that we have digitization of the ticketing, so that everyone had access through their cell phone to buy a ticket, so that we can really also count whether the number of stops that we have are appropriate, and so that we could better maintain and operate better.

Given that the private sector was the one that was mobilized to do the fleet acquisition and to operationalize a 24 -7 maintenance service center that is in charge of the operations and maintenance of the BRT.

This project, the operation is ongoing as well, it's under implementation, and I'll stop here and pass it back to Jane for the closing in questions. Thank you.

Perfect, thank you Guillermo, right on time there. So we have a little bit of time for questions, so maybe I'll open up for any questions, comments. There's a lot of information we've bombarded you with, so if you wanna pick up any of those points.

I think these gentlemen have a microphone if there's any questions.

Thank you so much for the presentation. You touched a bit on connecting transport investments on climate investment, resilient investments to services. I wanted to ask if you did specifically to quantify the impacts on the services, what has been done on it.

And secondary, unlike the second talk, if you can please a little bit dive down into the validations of open source data that you were able to do in Maputo, that would be fantastic to know. Thank you so much.

Thank you for the wonderful questions. Hopefully this responds to both of them. So essentially, you heard Mariana speaking a bit about the flood characterization, and we're able to identify really where are the areas, not only with the most exposure, but also with the most risk based on the populations.

And this informed the design so that we were able to identify these are the points where actually we need to bring most of those resilience measures to protect the infrastructure, but also to protect the people.

Because the other thing is that it's not only flood, they have an issue with landslides in the area. And in fact, the 24 -7 service center was gonna be initially located next to one of those areas where landslides risk was highest.

And because of the study, we were able to convince the government, hey, this is not like one of the ideal places. And this aligned very well with the safeguards part, so everyone was really happy. On the second question, I didn't understand well if you can, I covered it?

No, it's okay. Okay.

So I guess the question is how do you validate that data if you're using open source data?

Yeah, yeah. Okay. Thank you. Yeah. So, yeah, the case of Maputo, unfortunately, is that the open source data is of very, very low quality. So, we had to just correlate it with historically what had been happening in the last few years.

Obviously, this is not the best way to do it, but because of the lack of perhaps better means and resources, we really put the responsibility of the design into the firm that is preparing the design of the VRT, and we just have validated that what they're presenting is consistent both with historical events from the last few years and with the open source data that we have available.

Thank you.

Thank you. Along that same vein, when you're talking about data quality and also validating data, I was just thinking about what are the emerging trends that you've seen with all the issues that we have with big data and actually using it in contract structuring or even, like, say, Paris alignment assessments.

Could you shed some light on that?

Perhaps I can jump in and perhaps on the contracting if you wanted to comment. So for the Paris alignment assessment, for those that are not as aware, typically MDB financing requires to be Paris aligned.

And it helps a lot for the disaster screening, for us to be able to understand what are the actual risks and for us to design how the projects are going to be designed at the end of the day. It gets a bit complex when it comes to contracts because if we have, for example, a PPP, it could be very performance based and not output based and that gives some creative freedom to the joint venture to design how they want to address that performance requirement.

And there has been some latest trends in which contracts are not purely performance based but they also could be output based where there's a bit of, we could dictate a bit what kind of output you're gonna get.

For example, if you're saying, well, my performance, I need to keep this certain speed for this road instead of only having that, that could be a good KPI but you could have another KPI that is around, yes, you need also this number of kilometers of road with this type of material along this, this and that type of point due to the fault vulnerability.

In terms of the impact of big data on PPPs, we have already seen that that is happening in, especially in insurance companies, and the big data of disaster has helped to make accurate, the increased accuracy of the disaster risk such as floods and earthquakes, and which I have heard that it helps a lot to determine the actual coverage of the insurance to be provided to the private sector.

Very briefly on data, we, on GFDR, we channel a lot of trust fund resources to test teams. And I think, I would say, from the previous few years, we have a tendency to be a little bit less prone to actually finance data acquisition on the premises that there is big data or there is data available.

I truly agree that the quality of the data is always questionable, but so is the change in reality, right? So the question is, even if you have like a good data set that has been built this year that has been collected and spent like 100K to actually collect that data, the question is, is that data actually available for the next year?

Because the events are changing so dramatically. So, bottom line, I think we're trying to go from the point that, well, where's the baseline? Where's the cheapest data sets that you can start doing some work?

Not with the justification that that data set is actually answering all your questions, but are answering some questions, right? So I think that's one of the ways that you can approach that need. We have seen good progress on that when I see, and I didn't cheat on these slides, but on the presentation about like open street maps, Copernicus, they have been very, very useful.

Of course, you always might need like a lighter survey or some drone survey to improve your assessment, but we cannot assume that these countries like Guido said, we have an expectation that they're gonna invest a lot on data and then start doing something.

Those are developing countries that we need to get the ball rolling and at some point improve those assessments.

I think we had another question here, but definitely, we've come a long way from the days that we stand on bridges and counted cars when I was a graduate engineer, so we've come a long way. So there's a question here, and I think one at the back after that.

I think we are counting cars in a different way right now. My name is Nesh Rainer from the Nihon University in Tokyo, Japan. I'd like to make one question that maybe permeates all the presentations. You mentioned to make economic assessments in light of these studies, and what I have seen is that we go from the...

If we look at the whole modeling that goes through the project, we go from very detailed optimization models from the demand estimation side to very informed gases in the economic assessment. So how do you...

Let me rephrase. Do you have a methodology to standardize the economic assessment? Especially because when we are working with disasters, the impact from the economic side, it affects the society, not only in the affected area, but in the surrounding areas.

And it's really hard to express these indirect economic impacts. So how do you do that? I'd like to ask Dr. Perdoso and all the presenters about how they manage that in their specific issues.

As we're running a little short of time, maybe we'll take a second question from the back. If I can squeeze in a third one, Saneya, I'd be really interested in hearing what are you hearing from the private sector in terms of thinking about climate risk and disaster risk management in projects, so just maybe add that in there as a third question.

So at the back there. Thank you.

So, I want to be very practical, coming from DRC, Congo. I think we always know that there is many studies, assessments was done, but the problem is why the previous sectors don't get actions, because actually, yes, we've done a lot and we have many studies.

Even JCA did some urban transportation master plan in one of the cities with all those assessments, and then they know the risk. But still, the action is not following. Based on your experience, what can explain these aspects?

I want just to be very practical. Thank you.

So I guess to my point, too, like if I guess it's, even with all the data and information, what is stopping the private sector investing and coming into projects? So similar to my question.

Very briefly on Sydney's question, well, if you look at HTM, which has been a system or a software that has been built in Patugat in the late 70s, they have been using quite a lot for economic analysis of road investments in the international development world.

Unfortunately, and that's why we're actually trying to push for the update for HTM 5, we have never considered the climate change. So basically that's more of a static way how your assets would depreciate over time considering maintenance needs, so on and so forth.

There is, I think like it kind of hit the target in some levels because we manage to use that as a systematic way for transport investments, not only for the World Bank, for other development agencies as well.

It didn't hit the target once it comes to road asset management, so on and so forth. So the idea to come and incorporate climate change will actually give a little bit more potential and a standardized way for clients to actually address that.

Finally on that question, one of the things that I'm trying to advocate, and I think the World Bank advocates, is like climate resilience or climate change or climate de - deputation, this should not be a complex problem, right?

We not want to overwhelm, and I think that's one of the discussions we had. We had many, many discussions about what's the concept of resilience, what is resilience, everyone is gonna have a concept of resilience.



As a matter of fact, what we need to do, it should take actions on plans. And as you mentioned, we're coming across this idea of like having studies that go on the shelf. Much better for us to have even like public data that is available, not good, not precise, with low quality, that allows us to do the first step.

So that's a mentality that you're trying to add into our institution.

If I may compliment quickly before Sunny comes in to address the first and the last question. I think this is a generic problem that exists that everyone is trying to do the same thing in different ways, in the same places, and sometimes in the same time.

If we think back when sustainability became a word, everyone was sustainability, sustainability, that was a buzzword. There was the lead certification, still is a thing. And then in the late 2000s, early 2010s, resilience became a thing, and every single company, every single organization started to define resilience, and then, oh, it has adaptive capacity, it has absorbed, so there's no consensus,

right? There's no consensus, that's why the private sector doesn't know what to do with the \$78 trillion that they have available to invest in infrastructure today. They do not know what is resilience.

No one knows what resilience is because we don't have a global consensus. We try as much as possible through rating systems, through frameworks, to say, well, this is resilient. But then, if you ask three different people, resilience means different things.

And I think that's a starting point, and this is a perfect space for us to agree on what resilience is and should be, and I think Fred and I were talking about it earlier today, that resilience is not only that the infrastructure is standing on damage.

Resilience is that there's operation and there's functionality beyond the fact that there is a black swan event coming in that allows to have quality of life beyond the event. It's not only about surviving, it's also about being able to bounce forward, not back.

And regarding the way that we all try to assess, HCM5 is one of those efforts, but I mean, even in the presentation today, we saw a very great example from Argentina and another one from Maputo, where the methodology, I guess the concept was very similar, and I think the outcome also was similar in terms of what we tended to do, but it was not following the exact same approach, and this is something that we need to advocate more and work for so that the private sector can say practically,

okay, that's resilient, here is the money.

Let me add to, especially to the last question, I understood that your point is all the necessary assessment have been done, but why the private sector hasn't come in, right? From the PPP perspective, I think the project has a variety of project risks, especially operation risks and disaster risk is one of the risks and the financial, especially financial, is difficult to take and the insurance is the key because they are based on the world of probability and the big data can be very helpful for providing the necessary information to the insurance to provide insurance,

but financial lives in a different world on a different context. So the thing is you better consider how to develop insurance market in the company, a country, and if there is not, then you can ask the World Bank or the other institutions to take the certain risks, especially disaster risk, because certain risks the financial cannot take.

Thank you Sinean and all the panel, Fred, Guillermo, fantastic panel, we have to wrap up there but I think you'll agree it's been a very wide -ranging but really interesting discussion. If you want to know more, tomorrow we have a session around attracting the private finance into adaptation so to understand a bit more the private sector drivers of investment in adaptation.

Secondly, if you're interested in the tools and the risk assessments, there's a session on Thursday morning on some of the tools that you can use to promote resilience in infrastructure and then on Friday, really exciting session to come to that point about how do you structure a project to incorporate adaptation and resilience but also make it bankable.

We're doing a workshop on the climate PPP toolkits that we've, the PF, Public Private Advisory Facility and the Global Infrastructure Facility and IFC have developed to really practically implement this approach so three really exciting sessions and I hope you can all come along and join us in the rest of the week so thank you all very much.