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Good morning, and welcome to the session on improving urban climate resilience in India. My name is Natsuko Kikutake, and I'll be moderating this session today. So without further ado, maybe we can go ahead and start since we do have a packed session with four presentations and a Q &A session.

So we have four excellent speakers representing India and Japan today. The first speaker would be Asmita Tuare, who is a lead climate change specialist at the World Bank who has led many successful programs on climate resilience, flood risk management, modernization of hydromet services, and early warning system.

Our second speaker is Dr. Singhha from the state of Uttarakhand in India. He serves as the Secretary of Disaster Management and Rehabilitation of Uttarakhand. In addition to his expertise in disaster management, he has extensive knowledge on rural development, transport planning, skills development, and employment, among others.

Our third presenter is Mr. Kazuki Mariyama, who is the Director of International Coordination of River Engineering, International Affairs, Water and Disaster Management Bureau at the Ministry of Land, Infrastructure, Transport, and Tourism of Japan.

Our final speaker would be Mr. Takeshi Kawamoto, who is the Manager for Sewage and Rivers Bureau Management Division from the city of Yokohama, Japan. Please welcome the four speakers. And Asmita, if you can go ahead with your presentation.

Thank you.

Hello, everyone. So today I'm going to give an overview of a study that was recently completed on urban resilience in India. So India is really in a very unique time. It's going through massive transformation.

And this slide gives a flavor of that. So there are more than 4 ,000 cities, small big cities, in India, the highest number in Asia of city systems. It has been going through a lot of growth. So last 20 years, there is a six -fold increase in urban areas, the size of population.

And currently it is 450 million, which is housing one third of the total population. By 2050, this number is going to double. And it will be around 950 million. So if you compare, USA will be 400 million population by 2050.

So India will add more than the population of USA in coming 25 years. So this is a massive urban transformation which is happening in India. And there's a huge opportunity. I mean, Indian cities already contribute a lot to the GDP, currently 63%, but it's going to be 75% by 2050.

There are also innovation hub. A number of Indian cities have a lot of new types of jobs. And it is estimated that some 70% of new jobs will be in Indian cities by 2050 as well. And what is more exciting is that many of the Indian cities are going to have GDP more than individual countries.

For example, the city of Mumbai is projected to have GDP more than the projected GDP of Portugal by 2030. So this is all very exciting. At the same time, Indian cities face big challenges. Half of the organization is yet to occur.

But then there are already some challenges from the urban side in terms of providing services to cities, to citizens. And as we move forward with the doubling of population, not only the urban services will have to be provided, but because of the climate change, there is increasing heat, water scarcity, and flooding impact.

So with that, the World Bank team did a study looking into the climate impacts that Indian cities are going to have by 2050 and 2070. We also looked into different pathways that Indian cities can take to make sure it's a climate smart and climate resilient growth.

And I want to thank a number of people who have contributed to this study. And these are some of the findings from that. And the study looks into a number of other areas, mitigation -related, adaptation -related, but I'm going to focus more on the findings related to flooding and heat.

So the study finds that the Indian cities are already exposed to flooding. And Pluvial, or the urban or stormwater -related flooding, is increasing quite a lot compared to the other kinds of flooding.

And this is because of the rapid increase or the expansion of urban area. They are sometimes in the flood zone. But more importantly, the way this growth is happening is increasing impervious services and reducing infiltration, which is then leading to higher flooding impact.

Pluvial or riverine flooding is already a big concern. There are many river systems in India. For example, Ganga and Brahmaputra River has a number of cities. And these are all going to increase in size.

And this will lead to massive exposure of assets and people. Some estimates say by 2 .9 trillion of economic exposure will be there by 2080. Coastal flooding is also a bigger issue. And as you know, a number of metropolitan areas of India called Kata, Chennai, Mumbai are all on the coastal side.

And they are also going to have an increase related to coastal flood. This is an example of Surat. It's economically vibrant city. It's called the Diamond City of India. And it has all three kinds of flooding.

It has coastal flooding because of its location. It has a river Tapi, so riverine related flooding. And very significantly, it is exposed to fluvial flooding. And this is not new. The city has been exposed to flooding for a long time.

But recently, the floods have become more damaging. So 2006 event affected some killed 150 people. And estimated damage was close to $2 billion. And cities doing quite a lot of work. They have established a flood warning and alert system.

They have established a disaster cell in the municipality that coordinates disaster risk management, especially flood preparedness and response before monsoon and during monsoon. The city has undertaken the Tapi River Flood embankment and protection project.

And then it is investing a lot into a number of climate related strategies. But our study finds that the new area that is being added to the city is still exposed quite a lot to flooding. And this is something that the city still struggles with.

Our study modeled all Indian cities for fluvial flood. And so what we did is that we looked into those cities which are facing high climate risk and high urbanization risk. In the map, you can see that in red color.

And there are many small and big cities which are in that bucket. Then there are other cities which are lower climate risk and urbanization risk. And our study proposes a number of options, you know, from just making sure that the urban infrastructure is functioning to really investing into green infrastructure would be very important for these cities as they go through this transition.

But even if there is a lot of investment on risk reduction, there will still be sub residual risk. And that has to be attained by improving in flood warning system, by providing flood insurance, which is something which is not very prevalent in Indian cities.

We also looked into the heat impacts. And this is something that many cities around the world are facing. But uniquely in India, last month, there were many cities like Delhi which was exposed to 50 degrees centigrade.

And this is just the temperature. Some of you may know that there is this urban heat impact because of the concrete structure in the city which makes cities even more exposed to heat impacts. And we looked into 10 larger cities in India and realized that the dangerous hot conditions have increased by 70%.

Many of the cities are facing this dangerous warm night as well. We looked into the urban heat related deaths, which are, you know, modeled to be increasing 30% to 40% in low emission scenario and more than 50% in high emission scenario.

So currently 130 ,000 people is the expected death rate. It can double to 360 ,000, which is a massive number. We also looked into the impact of heat on the working hours in a city and realized that this has massive implication.

In Chennai, for example, 2 .3% of cities' GDP is dependent on that time where people work and which is dangerously hot. So our report looks into a number of measures that cities can take. And these are very high benefit cost ratio from urban greenery to heat early warning system to shifting the hours of work and providing cool roof.

All of these investments are really good. And a number of Indian cities, for example, Ahmedabad and I see a representative from there, have taken a number of measures, for example, developing heat action plan.

But this is a few cities in India that have taken that initiative and there are many more that are exposed and need to increase their capacity. So India is really this kind of a crossroad, you know, with half the urbanization yet to happen, that, you know, there is the right time now to take action.

And so today I'm really looking forward to learning not only from other Indian cities, but also from Japanese cities to look into proven solution that can help India really do well in this massive urban transition.

Thank you so much.

Thank you, Dr. Sinner.

Good morning, everyone. I have studied human body and medicine for six years. And I have learned how organ system of our body work in unison, in tandem, listening to each other, coordinated by a lower brain.

And higher brain comes only when something, you know, major intervention required. It doesn't intervene every time. Likewise, our cities require decentralization as well as integration. Our department, local bodies, should work in tandem, in unison, listening to each other, coordinated by higher centers, like a state government, and intervened by central government to maintain the homeostasis, just as our system does it in our body.

. Climate change impacts and resilience, a very generic, you know, things. It means to bounce back, bounce back from what? It's a relative term, bounce back from something, ability to prepare for, recover from, adapt to climate change impacts.

For example, is a city resilient to excess water or shortage of water, not enough water? And planning requires a full understanding of climate risks, which I feel is missing. And broad studies should be mitigation, adaptation with climate justice because, you know, most vulnerable sections are heavily, you know, kind of affected by whatever happens in a city.

And mitigation, addressing the root cause, adaptation, protect against the threat already there and prepare for more change to come, for example, better housing, infrastructure. Impact of climate change, all of you know, so I will move on.

Climate change induced hazard, slow onset hazard, sudden onset hazard, a lot of things happen. Uttarakhand is a hillier state in Himalaya, bordering China. So we face different sort of issues as compared to plain areas.

At, you know, there are times when you get heavy rainfall, cloud burst, 200 -m rainfall in an hour, 400 -m rainfall in 24 hours. And there are times you don't get much rainfall. So because of climate change, rainfall has become so erratic.

Himalayan geology is another problem compounded by the heavy rainfall. And because of that, the cities in Uttarakhand faces flash flood kind of situation during heavy rainfall. It lasts only for two or three hours, but it's a huge challenge because it is not just affect the services, but also, you know, affects the infrastructure.

It damages the infrastructure. So it has to be, you know, mitigated. Resilient cities, you know, as I said, catastrophic event, planning difficulties, biodiversity issue because we also should take care of biodiversity.

Uttarakhand, 70 to 75 percent area is covered by, you know, forest. So we have to take care of biodiversity. That is another challenge. Climate risks, integration of strategy across various sectors, multilaborate stakeholders collaboration and investment in data and, you know, information system.

These are the, you know, issues we should be looking into. A strategy is what should be done, green infrastructure, urban planning, water management, energy system, health, social, technology, governance.

But as far as myself is concerned, I will focus on governance and administrative issues. You know, when I see Dehradun, because Dehradun is a capital of Uttarakhand, there are departments who does one thing, there are other departments who does another thing.

Interventions required. What should be done? Disaster management department looks into climate risk. What are the risks? How it can be valued? How can they be assessed? And then early warning system.

With World Bank, we have done a lot of things to assess the risk and to do multi -hazard early warning system. And because of the knowledge accumulation, we are building on that. A contingency plan. Emergency response.

Governance. NBS. Nature -based solution. You know, urban planning requires a different sort of mindset. When I look my city, everybody is going everywhere for many things. We are not adopting a neighborhood concept in which can I see him as he?

It's very good. People do things in their neighborhood. And that is how you reduce the carbon footprint. And nature -based solution add to that concept. When you have plantation and green areas and green infrastructure, water conservation solutions, then you not only reduce the heat, you also add value to the environment.

Climate -proofing infrastructure. Risk transfer insurance and social protection. Sharing of knowledge. Finance is another issue which we should take care of. In India, there are many things which gets obstructed or hampered by lack of finance.

Barriers. What are the barriers? One thing, if I point out, which is lack of capacity both at organizational as well as individual level. Lack of understanding of climate risk. Our department hardly understands what are the risks associated with different works they do.

How to access and value them. And lack of knowledge regarding when it can be managed. And when it will be managed. When the risks should be reduced. It's a complete, I mean, it requires a different strategy to make departments and local would understand what are the risks associated with different works they do.

Local politics is another problem in India which we face. For example, floodplain management. Local politics abstracts floodplain regulation. Rivers are being engrossed upon. We are not able to do, you know, clear the floodplain.

So that is another problem. Lack of integrated planning. In bureaucracy, this problem is serious. We are trying to overcome this problem. Land use planning, water management, lack of awareness. Like I said, even citizens requires understanding of climate risk and nature -based solution.

Urban flooding, as I said, classic result of lack of sectoral integration. There are many departments and nobody seems to, seems to, in control. Municipal corporation concerned with few things. Sanitation, housing record for tax collection, state lighting, et cetera.

Public works department, road construction, that's all. Daking water supply, shortage of, I mean, they draw water and distribute. They are not, they are not in associated with kind of water recharge, of groundwater recharge.

Irrigation department, floodplain regulation, river management, but they failed in its duty. Development authority, they do land use planning, housing development, building regulation, but they are mostly concerned only with building regulation.

They hardly do land use planning. For a sortie culture, they are not part of urban planning. And they don't talk or listen to each other. That is a serious problem. And nobody seems to be responsible for risk assessment, storm water drainage, groundwater recharge, percolation system, room and right of way for rivers, NVS for water management, moisture balance, heat regulation, and de -pollution.

When something happens, incident occurs. Okay, sorry. When something happens, diastere management department comes into play. And then we try to do risk assessment and take mitigation measures. I'll give you two examples in which geology and anthropogenic activities affects the whole city.

One is Josimat. You must have heard. Recently, there are large -scale land subsidence in Josimat, which threatens the whole city. Then the diastere management department comes into play. We did extensive risk assessment and took measures for mitigation and rehabilitation of people.

Second is Nanital, another heritage city, very old city, threatened by serious landslide. What we did, we did extensive risk assessment and did mitigation measures to stabilize the landslide. A hill city landslide is the serious problem, the only problem if I can say so.

Thank you.

Thank you, Dr. Sinha. Mr. Mariamo.

Good morning, everyone. My name is Kazuki Mariama from the International Affairs Office at the Standard Water Management Bureau, MLIT. I am pleased to have this opportunity to make a presentation out of this forum.

As for the effect of climate change in Japan, the frequency of heavy rainfall is increasing and becoming more extreme. This slide shows the frequency of heavy rain over 50 millimeter per hour in Japan.

Heavy rainfall has increased to 1 .5 for over the past 40 years. And this slide shows recent severe flood disaster. In recent years, there have been severe flood disasters in many parts of Japan. In Japan, considering the effect of climate change and social situation, river planning is being reviewed and converted to river basin disaster resilience and sustainable reliability by all, which is carried out on a basin -wide basis with the cooperation of all stakeholders involved.

First, I'd like to explain the review of river plans considering climate change. River plans have been prepared based on past rainfall and tidal levels, but we are now updating the plans to consider the amount of rainfall increase and tidal level rise due to climate change.

Regarding the rainfall in the plan, we had adopted a scenario that limits the increase in global average temperature to 2 degrees Celsius. And we estimate the rainfall change ratio to be about 1 .1 times.

Next, I'd like to focus on river basin flood control. Up to now, flood control measures have been implemented mainly by river and sewage system administrators within the river area and inundation zones.

On the other hand, the river basin flood control measures are based on the existing measures and involve all stakeholders, including the national government, prefectures, municipalities, companies, and residents.

In addition, the target area is not only river areas, but also the entire basin, including catchment areas and flood plains. This slide shows an image of the river basin disaster residence and sustainability by all measures.

These measures consist of three pillars. First is measures to prevent flooding, including the improvement of river facilities. Second is measures to reduce exposure, including the move of houses from areas at the high risk of flooding.

Third is measures to mitigate damage and to achieve early recovery and reconstruction, measures such as providing information on flooding risk and early warning information. In Japan, a project to comprehensively implement three pillars – these three pillars of measures have already been prepared for all rivers managed by the national government, and the project is being implemented by all.

In addition, river -bound roads have been devised to increase the effectiveness of basin flood control. As a specific example of river basin flood control measures, I would like to introduce the effects efforts of Shizuokashite.

In Shizuokashite, 690 ,000 cubic meters of flood strategies have been constructed by both the public and the private sectors. The blue dots in figure show flood strategies constructed by the public sector and the red dots by the private sector.

This slide shows the effects of river basin flood control measures. In addition to the flood storage is mentioned earlier, Shizuoka Prefecture has constructed the returning basins and the diversion channel, which divert floodwaters from the Tomoe River to the sea.

The Tomoe River flows left to right in this photo. And the green colored part is the returning basins and the diversion channel. The area colored purple is the estimated inundation area in 1974. And the light blue is the estimated inundation area in 2022.

The inundation area was reduced compared to previous similar colored events. This graph compares the number of houses inundated by the 1974 and the 2022 floods. The number of houses affected was drastically reduced to about 80% despite the heavier rainfall.

This is thought to be a result of the effects of flood countermeasures and shows the importance of taking flood countermeasures in advance. The river basin flood control measures is implemented not only by the government but also in cooperation with the private sector.

Next I'd like to introduce an initiative to encourage the private sector to identify flood risks and implement countermeasures. In response to the need to understand the risk caused by climate change and build a more resilient and sustainable global economy, the task force on climate or related to financial disclosures, TGFD, established by the Financial Stability Board at the request of the G20 financial finance ministers and central bank governments.

That released the report in June 2017 with the disclosure of climate related to information or that has financial implications. Based on this, MLIT has formulated the guidance for flood risk assessment 2023 and released it on the website.

Companies can use this guideline to assess flood risk and consider countermeasures. The proposed flood risk assessment consists of three steps. The first step is to identify the current risk. The second step is to assess the future risk.

And the third step is to disclose the risk. In Japan, flood hazard maps are available so it is possible to confirm the current risk by checking the map. By checking the flood risks, companies can consider what countermeasure to take.

Measures can be considered depending on the depth of inundation. If the depth of inundation is shallow, for example, a water stop board can be constructed. Finally, as effect of climate change spread, I believe it is necessary for us to gather here to think about what we can do to reduce the flood disaster risk with by all.

Thank you very much for your kind attention.

Thank you so much, Mariyama -san. Kawamoto -san.

This presentation will be in Japanese, so if you have your translator machines, if you could go to Channel 2 for English. Thank you.

Hello, everyone. I am Takish Kawamoto. I would like to introduce our next speaker. I would like to introduce our next speaker. I would like to introduce our next speaker. I am a professor of Ancient Science.

I would like to introduce our next speaker. First, we would like to introduce our next speaker. I would like to introduce our next speaker. I would like to introduce our next speaker. I would like to thank you very much for your time today.

Thank you very much. Thank you very much. Thank you very much. Thank you very much. Thank you very much. Thank you very much. Thank you very much. Thank you very much. Thank you very much. Thank you very much.

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and it is a very important part of the world, and it is a very important part of the world, The city is a very sensitive city. We have a lot of people from all over the world who love to play with the city.

I have a lot of people who are from all over the world. I think the city of Kasen has a very good city, and there are lots of people who are in the city of Kasen. I think the city of Kasen has the best city.

I think the city of Kasen was a very good city, I would like to thank you very much for your time today. Thank you very much. Thank you very much. Thank you very much. Thank you very much. Thank you very much.

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Thank you very much. Thank you.

Thank you so much, Kaomoto -san.

Thank you so much to all four presenters. We had a range of great presentations from national government, state government, and the cities, ranging from governance and policy to concrete examples on how flood risk management is done in Yokohama.

I'd like to now open this up to questions from the floor. If you can say your name and also who you would like to ask the question to.

Hi, everyone. Good morning. My name is Efi from the World Bank Office of Jakarta. My question will be for India's city experience. I think this sectoral integration also becomes a problem in Indonesia and our country.

So we'd like to know how do you start to create an integration among the institutions in the cities and also maybe across levels in India, and who is the champion so then you can really start to create this integration.

So maybe that's one question. Who is the champion that then it will really push the integration moving forward and maybe you can sort to us give the illustration and how good it is now. And then the second question for the experience on developing these hazard maps I would like to know what is the cost to build these maps and then how long you need to create this.

Thank you.

Thank you. So Dr. Singer.

This sector integration is a serious problem, but we are trying to sort it out. We drop everything, power everything from politics. When somebody comes with cool head at the helm of affairs, then it becomes easy for us.

We as secretaries, we implement the policies devised by ministers and politicians. So it's about politics. One, second, decentralization. We tried decentralization. We tried to empower local bodies and municipal corporations and panchayatiras.

But there is a kind of, we are not trying to give everything. We are trying to hold it back. Most of the power, we try to keep them with us. That is another problem, I think, in my opinion, is kind of coming in the way of sectoral integration.

Because unless you have somebody at the helm of affairs, for example, take, for example, municipal corporation. You know, mayors and municipal commissioners hardly have any power. So unless we empower them and make them responsible, make them accountable.

If you don't give power and financial power and other powers to them, you can't make them accountable. Nobody seems to be accountable. If something goes wrong, we as disaster management comes into play.

And everybody goes in hiding. So that is another problem. We have to empower local bodies and make them responsible. Departments should be kind of unstable to them, which is not happening. We make them power, give them power, both in terms of resources, human resource, financial powers, everything.

That is a solution, I think, in my opinion. Thank you.

Thank you, Dr. Singha. Kamo Tassan.

I would like to thank Hazard Map for their support. I would like to thank the team for their support. I would like to thank the team for their support. I would like to thank the team for their support.

I would like to thank the team for their support. I think it's important for us to be able to be you

Thank you.

Thank you. Any other questions? Gentleman in the back.

Thanks, very useful presentations. I think just one question from Mr. Mariano. And it's around the policy of the private investments. And I understand the private investments through the identification of the risks that they're exposed to and the reporting helps them to intervene and protect themselves.

But are there any examples where they are over -investing in order to provide public safety as well to help absorb some of the water that might be coming into the area and give public benefit?

Maria.

Thank you for your support.

Okay, so you've got the investment that the private sector make to protect themselves from flooding and my understanding is that they make that investment to protect themselves. Are there examples where they might be over -investing deliberately and providing a public benefit as well, in which case they might be absorbing some of the water in their own spaces, which means that the investments that you as the government need to make become less.

I would like to thank you for your support. I would also like to thank you for your support. I would also like to thank you for your support. I would also like to thank you for your support. I would also like to thank you for your support.

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Thank you, Mariama -san. I think we had two more questions. Dilip, first.

I wanted to ask a gentleman from Japan that this modeling and analysis is done by the government or is done by the universities and other consultants. That is first question. Second is, based on this analysis, is there any change in dam management protocols being done?

Because many times urban floods have happened because of river dams mismanagement or management in a more archaic or older way. So has the dam management protocols, if you know, in Japan have improved?

Thank you.

In this case, the Japanese We have seen a lot of people who have been here for a long time. We have seen a lot of people who have been here for a long time. We have seen a lot of people who have been here for a long time.

We have seen a lot of people who have been here for a long time. We have seen a lot of people who have been here for a long time. We have seen a lot of people who have been here for a long time. We have seen a lot of people who have been here for a long time.

We have seen a lot of people who have been here for a long time.

Thank you. And then there was one gentleman over there.

Hello, everyone. Thank you for all your presentations. It was really enlightening. I just wanted to ask the representatives from India that as researchers and the scientific community, we have been knowing since last decade probably that how serious the problem of climate change is.

And especially for a country like India, which has other big problems currently, how would you kind of convince the policy maker or how to get people convinced also that climate change risks is going to be one of the major forces of destruction in the near future?

Do you think for such a country which is going to face such catastrophic damages in future, there needs to be something done on a revolutionary level, maybe teaching kids on primary level. For example, Japan is a very nice case, which really taught its kids how to kind of deal with disasters from the primary level.

So do you think such steps can not only make people more aware, but also it can in turn push the policy makers through the people to put climate change as one of their main agendas? Yeah

Maybe Dr. Sinha and then Asmita.

You know, convincing policy makers, you know, ministers and chief ministers and prime minister. Now it has become easy because it's happening everywhere. So they can see it. It's evidence -based, you know, kind of evidence is there.

So now to convince them, it's no big deal. Now it's easy. Second is, how can we make, you know, risk assessment and doing something for climate a mass movement, including kids? Can we have some course in the schools, some part of curriculum in the schools and colleges?

Yes, it requires, it is high time, we should do it. And now, even the school education department and higher education, they're all on board. What happened in Josima, in Uttarakhand, Nainital and, you know, other areas, it has forced everyone to take

cognizance of what is happening with climate and take corrective measures, make people aware, make school kids aware, unless you have kids.

You know, we cannot correct future. So now it has become easy. It's taking its own, you know, course. Thank you.

Thank you.

Yes, thank you so much. I think you asked the right question. And as Mr. Sinha said, you know, there is at least better understanding of climate risk. How to go about it is still coming in India. Definitely a mass movement is needed, and I hope it's not like a disaster that will trigger that.

You know, I personally, I grew up in India, in Bhopal, and probably some of you know this Bhopal gas tragedy where in one night thousands of people died. And you know, you thought that after that tragedy, you know, things will change.

And it hasn't, you know, because there is also something called half life or a disaster, right? I mean, people are affected, but then they move on after some time, and that window closes. And I think there is now this window where people are realizing every day, every summer, there is heatwave, you know, and every monsoon there are so many flooding event.

And there's obviously earthquake and also, I think we'll have to have mass movement, we'll have to mobilize our politicians. It has to be a big revolution, as you rightly said, to make a difference. The Government of India is actually doing quite a lot.

If you look at the urban mission that they have taken up, they're looking into developing a preparation facility. But there is only so much you can do with policy and, you know, support. It has to also come from people.

It has to come from political angle as well, which is, as you were saying, very hard. So I think moving forward, you know, if all these forces come together, then definitely there is a way forward.

Thank you so much. I think we are coming to the end of our session time. Thank you so much for all the great questions as well as the excellent presenters. And I think the last question was right on, on how we bring this collaboration and engagement between Japan and India to the next level.