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This is an interesting session because we are not talking only about early warning but how early warning connects to local actions. We have a very diverse group of panelists here. Since this is an early warning session, let me begin by asking a very simple question.

Did anyone look at the weather forecast last night and planned for the rain this morning? That was the very simplest way of early warning that you are already aware of. We are going to talk deeper than that.

So today we have a group of panelists representing international organizations, also technology developers, technology adopters, as well as someone who is joining online who represents local adopters of early warning and take actions.

So let me just take a moment to introduce the panelists. First I have Dr. Robert Emerson, who is the associate program manager from the NASA disaster program. I also have Mr. Johan Luther, technical coordinator of WMO, and I have two other persons online.

One is Ms. Amy Yajiro. She is the deputy director of the development corporation division of the Japanese Red Cross Society. And last but not the least, Ms. Fennell Lavani. Very interestingly, we have Ms.

Lavani representing the legal side of early warning. She is the regional disaster law coordinator for the Asia and the Pacific for IFRC. So as you see, we have a very diverse group, very diverse experience on this stage.

What I will do is that we will spend the first half an hour to discuss with the panelists. I will ask some very difficult questions to them, and they will answer just to paint the picture for you to have a bit of understanding of what early warning can be done for different aspects.

Then I will turn the floor to you for your turn to ask more difficult questions to them. And then I will come back at the end to wrap it up. So this is a simple way of what we will try to achieve together in the next one hour.

So with that, let us start with the first question. And I want you to go to your hand first. As you are in the think of the early warning for all initiative, which had been recently adopted, I read it and I saw that you guys set a very ambitious goal that every person on Earth needs to be protected by early warning system by the year 2027.

Then from your own view and from the view of WMO, how do you see innovations in early warning playing not only co -exist with local actions but support each other in achieving this ambitious goal? And the next question is what are the biggest challenges now and how will we overcome this together?

That's the question for you, Mr. Johan.

Thank you very much for these very comprehensive questions. And thank you very much for the invitation to this panel. So I'm based in the regional office of the World Meteorological Organization, WMO, in Singapore.

So this session, I understand, focuses a bit on Asia -Pacific. And maybe let me quickly say something about WMO and about the early warnings for all initiative as a whole before coming to your questions.

So WMO is a specialized agency of the United Nations and the authoritative voice on weather, water, and climate of the UN system based in Geneva. And we recently went out to the regions and established small regional offices there to be a bit closer to our

member states and to really what is happening on the ground and be more supportive of them.

And we provide a framework for cooperation in meteorology and operational hydrology. And we also work on the standardization of meteorological data and information on the fast exchange of this information and on the respective capacity development and training that is necessary for that and the cooperation between meteorological services and hydrological services.

And as such, early warning is really at the core of our mission. And of course, WMO, since its inception, has worked on early warning systems for a very, very long time. And the partners that now came together under the early warnings for all initiative have also worked together for a long time.

Already in the 90s, we had early warning conferences. Then we had multi -hazard early warning conferences and checklists. And the whole framework of early warning systems was established. And then we had in Sendai, the target G, the global target G on substantively increasing the coverage and accessibility to early warning systems, multi -hazard early warning systems.

But over the years of implementing the Sendai framework, not all countries are covered by these systems. And they don't have early warning systems that warn the population of the most destructive hazards that affect these countries.

So to accelerate the implementation of the achievement of target G, the UNSG launched this early warnings for all initiative in 2022 on World Meteorological Day and called upon key agencies such as WMO, but also UNDRR, and later on ITU and as a non -UN agency IFRC to lead this initiative, but also work with all the other partners, starting from UN agencies like UNDP or WFP, FAO, UNESCO, but more and more reaching to non -UN agencies and also to regional organizations because it may be perceived that the early warnings for all initiative is just another UN initiative coming top down.

But it's actually supposed to be, and hopefully it is more and more a bottom up initiative where countries realize that this is an opportunity for them to partner up in country, but

also with other countries, and receive the support from the UN system and through them also from a variety of donors.

Now, you were asking about some examples and some challenges. So I only came to the region nine months ago, and I had the opportunity to attend some of these early warnings for kick -off workshops where countries are starting to develop roadmaps for implementing the initiative at the country level.

And these roadmaps are being implemented through a variety of capacity development projects. And there I can see a lot of innovative approaches where research comes together and donors come together and government agencies come together and civil society comes together.

And some very briefly examples I can think of are, for example, in Cambodia, this 1294 early warning system, which is a voice messaging system that is distributed to the 90% or so of the population that has mobile phones and it's available in different local languages.

or I can think of flood gauges where I learned that it's not only about how high the water is and then giving a color code there but it could also be how low the water is because it's actually maybe not the flood that is the problem but the low water level that is the problem when you don't have navigation.

Navigation is not possible anymore or fishing is not possible anymore so that was an eye -opener for me or in the Pacific where some flag early warning systems are installed or really different channels have to operate at the same time so sirens are still operating, megaphones, the elders of the communities are operating them or using AI and crowdsourcing and tracking what people are saying about the weather,

what they are observing. So yeah and then just coming to some of the challenges which still remain because one of them is actually access to financing and the absorption capacity of all the money flowing into these countries so sometimes we are concerned that the operational meteorologists are becoming project managers and they cannot do their actual work anymore.

Also access for local communities or CSOs to the climate financing, disaster risk financing. Then of course we have the maintenance of observation networks. Stations have to be replaced in over 10 -15 years and one nice idea to engage local communities here is that we ask and we also remunerate some of the local organizations to actually take care of these observation stations so that they are protected from vandalism and they are kept operational until the next version of that system comes in.

Also we need to find more evidence for the social economic benefits of these systems so that not only donors invest but also the domestic funders invest and maintain the system because studies have shown that you have up to tenfold return on investment into these systems so it really pays off.

It doesn't only save lives but it also pays off economically and then maybe still one of the biggest challenges is of course reaching that so -called last mile so for the warnings to be inclusive and gender sensitive, reaching people in remote areas, minorities, refugees and displaced people.

So what I said about applying different communication channels at the same time so that redundancy of communication channels is I think very important. I think there's much more but I think we also can.

We can come back to it. We can come back later. Thank you so much, Johan. And I request everyone to no doubt the questions that you may have for Johan. And we will have an opportunity to ask him later.

But thank you for painting the big picture. It looks like this reaching the last mile still remains the biggest challenge that we all are faced with. And we get to that point on how local communities and local actors help us to connect to the last mile.

You also mentioned about access to information, limited ground observation stations. I think this is an issue for many of the developing countries. Luckily, we have another source of data from the sky.

And we have Dr. Robert Emerson from NASA. You may not be realized that NASA not only sends people to space, but they also look back at the Earth and try to give information to other users on Earth. So Robert, your question is, you have been working to support countries to use data from satellites all along to support early warning.

Could you give us some examples of the most important use cases from NASA in terms of supplying data for applications? And you must have seen some gap in producing your data and people on the ground adopting the data for their own use.

How do you think we can work together to close that gap? Two questions, over.

Thank you so much, Peron, and thank you for the invitation to be here. I'm delighted to talk to you all today. So again, NASA does do Earth Science, and we're really proud of that part of our work. One thing I will stress, and one of the challenges I'll lead with this, I guess, we are a science agency.

We are not an operational response agency. We develop scientific projects, and scientists speak a certain kind of language when it comes to data and information, and that's already a challenge. I'll touch more on how that matters, but I think ultimately, most of what NASA does is observational in nature, and that's telling us how the world is right now or, you know, was we have data sources to tell you going back decades what the world looks like.

There are some forecast datasets and potential seasonal forecast datasets even that might be relevant, but typically those are a smaller proportion of what we work with, and particularly in the applied science space.

Observational data is, you know, the facts of what has happened, basically, rather than what is upcoming, and translating that into early warning and by an extension early action is implicitly a next step.

I would say that by telling the, you know, we explore what the world looks like as it is, but that, for example, if you have a flood, that's just telling you where the water is. It doesn't tell you who's impacted and what that implies for human infrastructure.

A disaster is when humans are incorporated. It's not when there's just water there. That's a phenomena, and so at the core of this challenge is translating science data of observations into information about other systems that are connected to those systems.

So some really good examples of how this has been done well include, for example, looking at how observations of drought and soil moisture can be incorporated into agricultural monitoring systems, and we've worked with the US Department of Agriculture and the FuseNet system, for example, has been used effectively to build kind of agricultural predictions.

Understanding how rainfall data can be used to look at stream forecasts on a much shorter time scale. NASA's geogolized products is widely used as a stream flow forecast data set, and we also have some connections with shorter term analyses of forecast data that have been used to predict, for example, potential for landslides.

So there's all sorts of different hazard analyses that we've looked at, and I think these are some good examples, and we are certainly proud of this, but again, I think there is a big gulf between actions needed for early warning and translating and having that kind of translation from what science data is needed.

So for example, if I was to ask, you know, am I going to need to know what the weather's going to be out today? Is this road I'm going to drive down going to be impacted? You can't answer that question with science data or with space based data alone, you need something, you need to know where the roads are, what the connectivity of those systems looks like.

And I think where we've had most success is partnering with groups to do kind of combined system approaches. So thinking how our observations from orbit can be paired with ground based analysis of, let's say, road connectivity or agricultural systems to inform something about what those systems might look like in the future.

And this to me is where this challenge lies. And I think you look at a lot of scientists and they have a very deep domain expertise, and specifically science data from orbit is particular in this case, because the data is often complex.

And so the scientists working on those systems that we support have a very kind of depth first knowledge. And I think to do these kind of early warning questions, you need to know a lot about the humanitarian aspects, the questions that are going to be asked by stakeholders on the ground, as well as the potential breadth of data sources that are going to be out there.

And I think one potential solution, one thing we found is that you can have a lot of success with having kind of generalists be involved in this in the middle of an understanding how that can be how all sorts of different data can be built into those systems.

So one good example, last week, the program I'm part of NASA's disasters program, launched our new disaster response coordination system. This is a an effort to leverage science data and science data from NASA to support disaster response.

And this is using science experts, but not just the kind of specific mission tasks, science experts, but we have on staff, a number of, I guess, I would say even generalists, we call them disaster coordinators whose role it is to take different data and answer questions for stakeholders in a more kind of like informed manner.

And it requires that middleman to be a translator. And one other effort, and I encourage you to go and connect with Rhiannon Price and her team who are here on behalf of NASA lifelines, and their booth is down in the exhibit hall.

We're building connections with, they're building connections with humanitarians to scientists. And again, that translation aspect has been at the core of this. One other thing I just briefly want to touch on is I mentioned a lot of what we do is observational in nature.

But there certainly are forecast data sets that we have developed that NASA uses. But truth be told, they have not seen a lot of use in the early warning, early action space. Part of that, I think, is because the nature of uncertainty in those models looks quite different from, for example, observational data.

And so, for example, rainfall, if you have a rain gauge, you know what that looks like. You have a number that's counted. It's either there or it's not. I work quite extensively with seasonal to sub -seasonal rainfall forecast data, and that's data that's coming one to nine months in advance.

This is not the same format, and particularly an example would be that we see that at any given day in this forecast, the rainfall is never zero predicted anywhere, because there is always a potential for rainfall almost everywhere in the world at like one to nine month forecast.

And so how do you translate that into an effective kind of meaningful forecast for early warning when what you're typically using is gauge -based data, which is factual in nature rather than predictive?

And so, again, having an uncertainty, understanding about what this means and how those uncertainties can be incorporated into those decisions has to be at the core of this, I guess, this translation aspect that I was thinking about.

So there's a lot there, and I'm happy to talk more about this, but some food for thought.

Thank you, Robert. So one key takeaway point here is that NASA has a lot of data. So if you're interested, try to catch Robert after the session. But anyway, thanks for sharing your thoughts. So the critical point here is that even though NASA is considered themselves as a science data provider, but they need also to connect with users to understand the needs and the use cases before they produce the data that can be useful.

Now, let us move on to the user side. And we have Mr. Nitai from the government of Bangladesh. Now, as a senior government official, your country has seen a lot of disaster. You faced with disaster, and some of which you have been able to cope with really, really well.

Can you tell us how Bangladesh has been very successful in using data and information to inform early warning and early actions? And equally importantly, what have been the major challenges in your countries in relation to early warning at the local level?

Mr. Nitai.

Thank you very much. to arrange such a great event that brought actual practice on us on various streets and of connectivity to disaster management and all that we did. So, let's start with introducing my department, I belong to Department of Disaster Management and of the Ministry of Disaster Management and relief government of Alabama.

Department of Disaster Management

Oh, thank you. Department of Disaster Management is the Nudal Agency for Overall Disaster Management Business in the country. I'm pleased to share insights on how our country has effectively utilized data.

I'm pleased to share insights on how our country has effectively utilized data and information to guide early warning actions, as well as the challenges we face at the local level. First of all, let me share some mandatory provisions regarding early warning system in Bangladesh.

Early warning mandates lies with various departments, Bangladesh Meteorological Department, Flood Forecasting and Warning Center under the Bangladesh Water Development Board are the main two agencies for generating early warnings in the country.

Bangladesh Meteorological Department is responsible for all hazard monitoring except flood. I mean hydrological hazards. It's a responsibility of Flood Forecasting and Warning Center under the Bangladesh Water Development Board.

And my department, Department of Disaster Management, is mandated for dissemination of early warning to last mile for all hazards. We have achieved a number of success in using data for early warning systems.

Currently, we are operationalizing early warning systems for flood and cyclone, very effectively and working on other disasters as well. We can define our success in both national and local level. At national level, for comprehensive data collection, Bangladesh has invested significantly in meteorological and hydrological data collection.

The Bangladesh Meteorological Department and the Flood Forecasting and Warning Center continuously monitor weather patterns and water levels using advanced technologies such as satellite information, weather routers, and automated rebargages.

For early warning dissemination, the data collected is analyzed to generate early warning alerts. These alerts are disseminated through multiple channels, including SMS, voice messages, television, radio, interactive voice response services.

It's a toll -free service from all the mobile phone operators in the country. Flood hoisting system, it's only at coastal areas and voluntary jobs and social media. The Cyclone Preparedness Program, CPP, is a notable example where community volunteers play a crucial role in disseminating information.

CPP received UN Public Service Award in 2022. Flood preparedness program, urban volunteers, are ongoing efforts in the country. Integration of modern technology, we have integrated space -based information and technology, GIS, remote sensing to enhance the accuracy of our predictions.

This allows for more precise mapping of at -risk areas, communities, enabling targeted early warning and response strategies. We are happy to share that Government of Bangladesh is implementing a flood early warning project.

Higher application of LIDAR sensor -based drone are being used for digital elevation model data acquisition to generate flood inundation mapping along the Brahmaputra Jomuna River system, which will make us able to develop five -day inundation forecasting.

At a local level, community -based approaches we have implemented community -based early warning systems. These involve training local volunteers who act as fast responders and disseminators of early warnings in their communities.

I mean, last mile. Disaster management committees are established to manage and act immediately and efficiently during disasters in vulnerable areas to ensure that early warnings reach every household.

They are equipped with necessary tools and training to respond promptly to disasters. Moreover, an online database has been developed that contains major information of disaster management, committee members, names, designations, phone numbers, and so on of every disaster management committee.

Public awareness campaigns are conducted to ensure that communities understand the warning signals and know the appropriate actions to take. This has significantly improved the community response to early warnings.

Of course, challenges in early warning at local level remains. Although we have achieved many successes in disseminating early warning from top to bottom of our administrative levels, we still need to manage some challenges.

We have technological gaps. Despite advances, there are still technological gaps, especially in remote and rural areas. Limited access to internet and mobile networks can hinder the timely dissemination of early warnings.

Now we are exploring how we can reach fishermen at sea with warning messages. Resource constraints we have, local disaster management committees often face resource constraints, including insufficient funding, inadequate training, and lack of equipment.

This limits their ability to effectively respond to early warnings. Infrastructure limitations also remains. Poor infrastructure in certain areas can delay the dissemination of early warnings and the education of evacuation plans.

Roads and bridges that are in disrepair can become major obstacles during emergency responses. We are working hard to increase the number of shelter homes to provide safer stays during disaster for both community people and life strokes.

In conclusion, while Bangladesh has made significant strides or works in using data and information to guide early warning actions from the national to local level, challenges remain. Addressing these challenges requires continuous investment in technology, infrastructure, and community engagement, ensuring that our early warning systems become even more robust and inclusive.

I'm hopeful that we can work together to overcome these challenges and fight disasters in more effective way and make our country as a role model for disaster management. Thanks for questions. Thank you all.

Thank you so much, Mr. Nittai. So despite all the technological gaps that Mr. Nittai mentioned, I have to say that your country, especially the Department of Disaster Management, has come so far from a country that lost hundreds of thousands of lives from a cyclone event two decades ago.

Now, in recent events, you almost have no fatalities. So this is another evidence of success that had done not only at the national level, but triggered it down also to the local level. Can I check with the organizer if Ms.

Fennell is online? She's online, OK. All right, so the other thing that you may have realized that I want to change the perception is that we are talking about early warning for all, but you are seeing only four men speaking here.

We actually have invited female experts, renowned experts, to come here with us. But in the last moment, they cannot make it here. But they are still gracefully joining us online. The first speaker I want to connect with is Ms.

Lavani. Can I call you Fennell? Can you hear us? OK, perfect. So you are our only legal expert here in this panel. So I'm going to ask different questions. The legal aspect of disaster risk management, and especially early warning, is something that sometimes we forget about.

So as an expert, my question is, could you tell us why it is important to the data provider, like NASA, and data adopter, like the government of Bangladesh, to be aware of the legality aspect of disaster risk management and early warning?

And my next question is, when it comes to us, all the practitioners, what are the one thing that we should keep in mind when it comes to legality of this thing? Fennell, the floor is yours.

Thank you very much, Mr. Chair. Can you hear me?

Yes.

Lovely. Malo Lele, good morning. And Sawadee Ka from Bangkok. I apologise that I'm unable to join you this morning. But it looks like you're in great hands with a great panel of experts there in the room.

Thank you very much for the great question. And you are so right that laws, policies, plans are certainly not the first thing that most people generally think of when it comes to disaster risk management or early warning.

But in our humble opinion, the reality is that laws and policies and plans underpin all aspects of disaster risk management, including early warning and early action. We like to think of them as the often invisible foundation of disaster risk management that protect and prepare communities all around the world.

So we heard a very lovely statistic earlier on about how early action not only saves lives and livelihoods, but also reduces the cost or furthers the impact of the dollar in early action. But what we often don't realise is that early action starts with a legal framework.

So, for example, who defines what an early action is? How do communities or public authorities know what to do during a disaster? Who's in charge? Who should people listen to? What data sources should you be using?

And the answer to these questions should really be contained in a robust legal framework that really details what those actions should be when they happen and also who is responsible for them. But this is essentially what disaster law is.

They are legal frameworks that enable governments to allocate resources for preparedness and early action measures such as establishing an early warning system, pre -positioning emergency supplies, again, as we mentioned, the type of data sources they should be using for early warning systems or ensuring that emergency response funds are available.

And they can also streamline decision making and coordination processes during critical phases of early warning and early action response. Unfortunately, because we overlook them so often, we usually don't think about it until it's too late, until we are trying to undertake anticipatory action or early action.

But we realize there's no current provision in the law to take gender considerations into account or until we're trying to get funding released for community early action. But find there's actually no provision in the law or the policy or the plan for the early release of funds based on the warning.

So legal frameworks are important because they clarify who can do what when we need it to. Legal frameworks are also important because they should hold people to account. So early warning data providers need to ensure the accuracy and the reliability, the timeliness of the data that they provide.

And the decision makers who use this data for early warnings need to be aware of their responsibilities if they act or fail to act on accurate warnings. And this is another area where legal frameworks become really important is because these legal guidelines often establish what are the standards for data quality and dissemination processes.

And this helps ensure that early warning systems are based on high quality, reliable data, which not only helps an effective early warning, but also builds public trust in early warning systems. What's regards to the second part of your question around legal protections for other providers and decision makers?

This is no doubt a theme that comes up time and time again in our consultations and discussions, particularly with governments. And essentially it's discussions around the fear of repercussions if they issue early warning, but the disaster doesn't actually materialise.

And. But at the same time, an entire early warning, early action process has been kicked into gear. So the questions we often get asked do they have to pay that money back to the disaster fund? Did they just waste time around valuable resources?

Will people ever believe a warning again? And again, the legal framework here is crucial because it should protect those who are doing their jobs and doing it well. And as disaster law practitioners, we always advocate for a no regrets policy to be adopted in the legal framework.

And of course, this is where legal actions are taken that can be justified, whether the hazard or the events materialize or not, but which if you carry out these actions, they still increase resilience.

So we also advocate for immunity clauses and a lot of disaster management acts, which grant government agencies and also other decision makers immunity from liability when they issue warnings or when they're making decisions based on disaster data, provided that they are acting within the scope of their authority and they follow established protocols.

On the other side of the coin, there can also be liability for those who fall or admit to issue a warning when data suggests that they should have done so. Again, all of this to say rarely that the law provides us clarity in times of great uncertainty and its clarity on people's rights, on roles and responsibilities at all stages of early warning systems.

Thank you, Finon. This is critically important. I mean, everyone wants to do a great job in saving life, but don't forget on the legality side of early warning, especially when you go from innovation technology to actions on the ground.

So this is something that you should keep in mind. So the last speaker is Ms. Emi Yajiro from the Japanese Red Cross Society. Can you confirm that she's online?

Hi, can you hear my voice?

Yes, we can hear you, Emi.

OK. Great.

Okay, so Amy, thank you for joining us. My questions for you here is about Japan since you are representing the Japanese Red Cross Society. So your country has been a model country to many in how best to handle disasters.

And as a national Red Cross Society, what do you think are critical factors for local decision makers to make quick and informed decisions to save life and reduce impact of disasters? That's the first question.

And the second question is, what do data information on imminent disaster help local early warning and emergency response decisions? Just give us a few great examples from Japan, please. Amy.

Thank you very much for the question and please allow me to share my screen for the presentation to answer your question. So can you see my screen?

Yes.

OK, great. So first, let me explain the Japan context a little bit. So as you may aware, Japan has a nationwide and a rewinding system to help people make life -saving decision. So for emergencies such as earthquake or tsunami, the immediate emergency information is given through silent or alarms on individual smartphones or alert on TV and radio programs.

And so on. And it won't take more than minutes until the information is delivered to everyone. And for the predictable emergencies such as heavy rain, high tidal, like this morning, early attention information is issued when a weather event or phenomenon of a certain alert class is forecasted to occur within the next five days.

So Japanese Red Cross has the obligation to cooperate with the national and professional government in the provision of relief assistance under the law, which name the disaster countermeasure basic act.

And our local chapters prepare themselves according to the SOP leveraging their early warning information, I mean data. But as we all know, only a limited number of lives can be saved by public assistance like us, especially in the event of catastrophic disaster.

So that is why Japanese Red Cross focusing more on preparedness such as disaster risk deduction education to improve the self -help and mutual aid system within the communities. So the factors which we can reduce the impact of the disasters are of course the reliable breaking information like early warning system.

But of course, knowledge is of where the risk are and how to avoid them, what information you can get and from where are also the essential factors as well. But what we would like to highlight now is even though they have both factors, some people don't change their behavior.

And we're assuming it is stems from the psychological factor. So I'd like to take this opportunity to introduce our recent survey result in a video. And I switched the slide, hope you can see it. So according to the central disaster management concept survey on embarkation behavior during tsunami, this result shows that tsunami information and embarkation order were seen or heard by 60 to 80% of people,

but only 30 to 50% of them actually evacuated. And this is another example. Heavy rain disasters shows similar result. According to the website we conducted by Japanese Red Cross 2021, 78 .3 people answered.

They hadn't evacuated although they have perceived embarkation order. I changed the thread again. I hope you can see it. But let me continue. So reasons given not following the embarkation order include the neighbors and the friends didn't evacuated.

And they had not been affected in previous disasters. So they thought that would be fine this time as well. So we have called this psychological tendency as normal bias and conformity bias. So normal bias makes people calm down by assuming that the crisis not the big deal.

And conformity bias makes people behave in the same way as others in even of the disasters. So although we are in the verification phase, we are assuming this psychological characteristic is one of the critical factors which affect the decision making in the emergency.

So for raising awareness on that, we all have such biases. Japanese Red Cross has developed their public awareness too which are animation and cartoons. I switched the thread again. And the animation on your left explain the existence of normal bias and conformity bias in everyone's mind by comparing them to grasses, which makes anxiety invisible.

So I supposed to show this animation, but due to time constraint, I put the QR code of this animation on the bottom. So if you have a smartphone, this animation has an English subtitle. So please see it.

And thank you very much.

Thank you so much, Emi. And I'll leave this screen on so that everyone in this room can take a picture of this QR code and you can watch the animation later. So this is a very interesting statistic and thanks for conducting this kind of research, Emi.

I think this opened a lot of our eyes and sometimes in a perfect world, we think that by providing great information, great early warning data, things will be perfect. But a lot of times you forget about a human element from the user side.

So this opens our eye and hopefully we can try to do something to address this issue. So I promise that we'll come back to each of the panelists one more round for the final intervention, but I thought I want to make sure that we can hear from the participants here in this room as well.

So let me open up the floor for questions from any one of you to any of the panelists and please raise your hand. I'll walk over to give you the microphone and when you speak, please introduce your organization name first and then state your question.

Thank you. My name is Murray Dale from JPA Consulting. Fascinating insights to many of these issues. Thank you all very much. I'm interested in the idea of uncertainty in communication and interested in the panel's views on how you communicate early

warnings that are not certain because of course, especially with regard to flooding, no one knows exactly whether indeed it will flood or not or how severe a flood will be.

So in order to communicate that we can use probabilistic tools but at some point a decision needs to be made that is binary as in yes, we put up a demountable defence or yes, we evacuate or no, we don't.

So I'm interested in your views about how you've maybe tackled this issue of translating uncertainty in flood, in particularly flood forecasting but any early warnings and if you have any lessons or insights on that.

Thank you.

Thank you. So, I'll go back to you, you're the second question, but let me try to answer, ask the panelists to answer the question first. I wanna turn to Robert first and then Mr. Nittai after. From the scientific point of view, how do you present uncertainties?

So this is actually a key consideration for a lot of things. And I will say, from a science perspective, scientists who are working on data, the uncertainty is often a reason why. And that move from uncertainty of binary decision, often a reason why they don't engage in work in this space, frankly.

And people are concerned that their work might be used in ways that they're unconvinced by or that it might lead to the wrong decision, considering that they don't have the uncertainty. So I don't think we have a fantastic answer.

I think that uncertainty communication is, we often end up doing this qualitatively. I think we end up in a place where we provide some version of, here's the data, here's the level of uncertainty. What does that mean for you as a stakeholder and how certain your decisions need to be?

In my experience working with groups like FEMA and the states, some data is better than no data. And ultimately, decisions that have any information are better than none. But that is your running away before you've even thought this through.

So I'm convinced that we still haven't got a good answer to this. And I would love to hear the rest of the panel's thoughts, because I'm not going to mind. I'd love to convince scientists to get more engaged in this.

OK.

So let me turn to Mr. Nittai first, because as a person who makes...

As you know, uncertainty is obvious in any early warning system. So that's why it's very important to make people aware of the uncertainty. So that's why the Airness Campaign program is ongoing all over the year in the country.

That makes people aware of the uncertainty of early warning. So that's the things we are practicing in our country.

Thank you, and I'm sure that you have come across your difficult decisions to make yes or no, like you said, based on the information that you had. Johan, do you want to touch upon this point a bit?

Very briefly, I just want to say that on Thursday we have a whole focused day on the topic, so the question will be discussed in detail. But just with regards to flooding, for example, I worked in a project where we visualized flood hazards in hazard maps, but we used different ways of delineating the flood extent and the return periods.

So through actually experiments and surveys of the perception of these maps, we found that different ways of using symbols or lines or colors helps with communicating uncertainty. And then the other thing is, if you have no regret solutions, it may not be so bad if you take action and nothing actually happens.

The flood does materialize. Thank you.

And I said earlier that we must not forget the legality aspect of early warning. So I want to post this question to Fennell as well. So Fennell, if you can still hear me, so this is about uncertainty in early warning.

So even if we acknowledge that uncertainty exists, we take actions and our actions turn to be wrong actions. What comment do you have on that?

Yeah, thank you, Chair. And I think just as was mentioned by Jochen, definitely that's absolutely what the no regrets policy exists for is, I always say this a bit of tongue in cheek that, you know, law is a risky business.

But there's there's a lot of risk and having legal solutions like a certain immunities when people are making decisions based on the information that they have, I think is a solution, as was mentioned, that will allow people to act and take the necessary precautions regardless of whether that disaster actually materializes.

And something like a no regrets approach allows people to err on the side of caution rather than then just simply walk away because you didn't have sufficient information. And I really like what was said that little information is better than no information.

Thank you.

Thank you so much. So I invite you to continue this conversation in the session on Thursday on uncertainties. Your question.

Hi, my name is Fanny from Deltares Institute in the Netherlands. And I would like to ask my question to the Disaster Agency of Bangladesh. I've been actively working seven years in Bangladesh, and it's very nice to offer for you that you provide.

But also, I would like to ask, like, how can we support from all of this planning, the Bangladesh that are planned for 2100, but very much focused on the food security? Is there any plan for the countrywide drought forecasting, for example, or salinity forecasting in the deltas for the agriculture?

Good job.

In our country, Agriculture Department, Department of Agricultural Extensions, they have early warning system on drought forecasting. And they have developed Bangladesh agricultural agro -metrological information services, that is BAMIS, it's very popular in our country.

So people, those who are very much involved in agriculture sector, they are using this. Yeah.

Thank you. So your question, please.

Thank you. I'm Micho Werner from IHE Delft, also in the Netherlands. And I'd like to come back to this question of trust and policies and mandates, because I think that's I think in Bangladesh you would know to that very clearly.

And in my experience in research, but very much in practice, that's one of the big issues, I think, of early warning. And I'd maybe like to come back to this early warning for all initiative, which given a mandate of WMO, which is usually to the I'm in the hydrology side, to the national hydrometrological societies.

And I'm just wondering how can you leverage this initiative, which I think is a great initiative, but also has the risk of stranding at the NHMS, at the hydrometrological society, because if that is not a trusted partner to communities, it may fail.

So, you know, how can we leverage sort of this global initiative to, yeah, maybe improve, help improve policies in countries? Because sometimes it's, you know, I've worked in Colombia, for example, where just the fact that the NHMS sells data means that most people, there's like a distrust relationship.

So people will not pick up on the forecast. So I'm just wondering how you can leverage this initiative to, yeah, to to overcome that barrier.

No, thank you for the question and it's really key and as I said this the partners working on early warning and early warning systems work is not new but what is new with this initiative in my observation is that it's really a big push from the highest level which really translates to the national governments, to the UN country teams, to the UN humanitarian teams to really work together in a kind of standardized but flexible way so if you look at this executive action plan for the initiative it really is built around these four pillars of early warning systems with a cross cutting pillar let's say made up of enablers such as the governance and the legislation and the capacity development and the resource mobilization so for me it's really an opportunity and a structured way of working together and eventually like Bangladesh is one of the focus countries and to develop a plan of how to access resources better and faster and it's not only about national met services or national communication ministries are on board the regulators and the providers of communication the whole risk knowledge community so hopefully building more on this impact based forecasting so not one agency cannot do it alone not the global level not the regional level not the national level so it really has to cut across these levels and so for many of the UN agencies it's really one of the highest priorities now and I just feel that there has never been such a coordination in these efforts so it's really early warning for all but also early warning with all.

Yeah, I coined the phrase early warning by all, I thought it was a nice.

So I see the people are starting to leave the room, so one final yes -no question.

My name is Fokula Arifin and I work at Trimes. My question is, Dr. Robertson, that is there any technology in NASA that can help countries like Bangladesh who are trying to develop early learning systems for deep sea fishermen or like that, and NASA can help countries like Bangladesh in this regard?

Uh... I hesitate to answer on behalf of all the datasets. There's probably several thousand datasets. I don't have an expertise in all of them. Let's talk afterwards. I'd love to come up with a solution that would be relevant, but something we've never thought about before.

So that's a great thought.

Thank you. So I hope that with the limited time, you got your questions and your my answer, but hopefully they trigger more questions to discuss during this week. So try to catch any of the panelists anytime you see them this week and ask more difficult questions.

So I want to thank all the panelists once again, and both who are here and those of you who are online for this very rich discussion today. One thing that I picked up from everyone's partnership. So it seems that this early warning cannot be done by one organization or one person.

We have to work together, hence the word early warning for all, right? But I want to add early on early warning, not only for all, but it's by all as well. So we have to work together to reach, to take data information technology to reach the last mile and make people life safer in the future.