Aditi:

I lead the early career scientist network of IIOE 2 and have been part of WCRP family since my role at indopacific HUB in IITM Pune so let's commence this stimulating session for within these conversations lie the promise of a sustainable and resilient future for us all; so Shipra over to you.

Shipra:

Thanks so, everyone. I'm Shipra and I will be co-chairing this event with Aditi today. I'm going to introduce you to the researchers currently based in Singapore working for the Center for climate research. However I am in a different hat here today so I'll be representing the World weather research program and currently I serve as a scientific Committee Member on the WWRP. My research interest mainly lies in seasonal predictions, impact of climate variability and climate change on Extreme events like floods and drought and I'm also engaged with the younger system scientist Community some of you may have heard about this community before but it's about providing voice and leverage to early clear researchers in international science fora and that's all about me and probably we should now kick off this event so first I would like to introduce Roxy Mathew Koll who is a climate scientist at Indian Institute of Tropical Meteorology. Roxy is involved in a nber of research activities over the Indo Pacific region. The list is really really long so it's probably not possible to go through everything Roxy does. However I want to particularly highlight that Roxy is an excellent science communicator and he actively collaborates with a nber of Citizen science networks, local governments and media to bridge the gap between science and society and Roxy's provital role in forming The indopacific Hub and his initiation of crucial activities within this region also makes him the perfect fit to provide a brief introduction to the WCRP my climate risk Lighthouse activity so over to you Roxy for a brief intro.

Roxy:

Thanks a lot Shipra and Aditi for sharing this session. Very good morning to many of you from the indopacific region. I know many of the participant speakers particularly Svetlana and Chris and all have joined quite early for today's session. Thanks a lot for that, so just to introduce today's session, the WCRP or the world climate research program is an international program that helps to coordinate Global Climate research. it's sponsored under

the UN through WMO the World Meteorological organisation, International Council of Science and intergovernmental oceanographic commission yeah and one particular output by WCRP is the CIMIP or the coupled model intercomparison project which coordinates the global model outputs for climate change assessment under the ipcc or the intergovernmental panel on climate change which provides all those climate change assessment reports that we use and even the Cordex program under which we are holding this session right now is one of the activities under the WCRP. It's a core activity to advance and coordinate the science and application of regional climate downscaling through Global Partnerships. The WCRP is reorganising itself making itself much more relevant and closer to the society. In this respect it has come up with different Lighthouse activities one of which is My climate risk which is a bottom up approach to address regional climate risk which starts with the requirements of decision makers and local communities. Climate information, as we all know, need to be made meaningful and actionable at the local scale and that's what the My climate risk activity is focusing on. In terms of climate change, we all know that the indopacific holds about almost half of the world population of which a large share is exposed to risk of extreme climate which means that the climate modelling and research that we have been doing should be put into use. Modelling and research have advanced at a fast pace in the last decade. So how can we leverage this for the benefit of the Indo Pacific region; so this is the task, this is the discussion point of today's 2 hour session. We have got a quite interesting list of speakers with quite interesting talks and discussions starting with Svetlana. I'm not listing all the speakers; the chairs will introduce them one by one and we do have a quite interesting fireside chat session where we are going with new modes of discussion and presentation. So instead of online PowerPoint presentations, we have two experts talking to each other, discussing particular topics of interest and we will also have time for questions from the audience. We have mostly Science Background people but there are non-science background people as well and there will be more participants tickling in as time passes by. There have been about 180 to 190 registrations. Hopefully one third of it will at least join and there are a few media participants as well so let's see how the session goes and at the end we have a panel discussion as well including the Director of IITM Dr Krishnan who is one of the CLS or the coordinating lead authors of IPCC and also Swapna Panicker along with the chairs participating in the panel discussion. So let's have a wonderful day today. Moving back on to the chairs Aditi and Shipra.

Aditi:

Yeah thank you so much for introducing the climate risk activity. Next we have the keynote talk for today by Svetlana, who is a sea level scientist working on the marine ecosystems modelling group, National oceanography Center UK. She's an internationally acclaimed sea level expert, a lead author of ipcc assessment report ar5 and she represents the WCRP safe landing climate lighthouse. She'll talk on unveiling the dynamics of sea level rise from observations to action for Coastal resilience. Over to you.

Svetlana:

Thanks a lot. so I will share the screen. Yeah morning everybody, as you can see from my screen, my talk is about sea level rise from observations to actions for Coastal resilience in my presentation today I will provide some background information about sea level rise, show future sea level projections from the latest ipcc report, I will give few examples of impact of sea level rise in the Pacific region and briefly discuss impact of extreme sea levels and how they will change in future and to finalise I will show few options for adaptation highlighting importance of scientific research to make a decision about Coastal defences and my slide last slide is a short conclusion. So what do we know about sea level rise? If you look on the screen you can see the smary of our knowledge about sea level rise from instrental records. You can see the plot from instrental records. We know that sea level started to rise about 200 years ago and for the 20th century we have an estimate of 15 - 20 cm for different locations but we have global coverage. And we will know that there are reasons for sea level rise and the diagram shows the components of sea level rise. With warming and heat going to the ocean, the ocean changes vole and it's called thermal expansion and then there are contributions from Ice masses from glaciers and ice sheets in Greenland in Antarctica and some contribution from ground water extraction and reservoir construction. As I mentioned, for the 20th century sea level rise was up to 20 cm. What we know from measurements we know that the rate for the 20th century was 1.7 millimetres per year but since the 1990s due to huge contribution from satellite altimetry we know that rate is double. It's 3.6 millimetres per year so sea level is accelerating and to do future projections we model all these components and you can see that for the future even with quite conservative scenarios which you see on the screen we are facing unprecedented challenges for sea to associate it with sea level rise. And sea level rise could be up to 2 metres by the end of the 21st century but of course it's exceptional. I will explain about 2 metres in the next slides. We also know from observations that sea level rise is not uniform and there are regions with faster and slower rates. Sea level rise as I mentioned currently from 1993 to 2002 we know that sea level rise is 3.6 mm per year this is a yellow colour on the map and you also could see that there are some regions with red colour and dark red colour so and you notice that Indian and some part of the Pacific Ocean are actually above with some estimate of up to 5 mm per year. Here to projections, the latest ipcc report produces projections for sea level rise with all scenarios and you can see it on the screen by 2,100 and even by 2,150 because C Level will rise with all different scenarios. It just depends on what kind of outcome we will have by the end of the century and by 2050. I would like to show here that most of the scenarios of course with a medi confidence and likely range which is one standard deviation will suggest sea level rise up to one metre, that's what you see on the screen. But for adaptation and for risk assessment and to estimate actions and the decision about adaptation in coastal area it's very important to have this low probability high impact scenarios which you could see on the screen and that's where the possibility that sea level could be up to 2 metres by the end of 21st century; it doesn't mean that it will happen but we cannot exclude this possibility and also it has to be taken seriously when decision making about Coastal defences. The regional projections are the same as observations, are not uniform and you could see two examples. This is just a median for two scenarios and you can see that there are different colours and with high emission scenarios, of course sea level rise is enhanced and there are regions with faster and slower sea level rise. I put as well here on the right the plot with sea level projections, example for individual locations. Here you can see the Hong Kong and you can see as well the black line which is observations and then the Blue Line, where the median is dark and then this kind of like a Shadow 5-95th percentile for scenario which shows that sea level could be up to 2 metre but overall it's going to be about 1 metre. Sea level has impact and I have shown two examples of impact in coastal areas. I chose two kinds of examples, one is economic impact and this is a flood damage estimate i.e. cost of flood damage estimate for Global case with two scenarios; half metre sea level rise and up to 2 m. Half metre it is 1.5 degree warming and 2 metre is about business as usual scenario and if you look in the global estimate of the cost as a percent of GDP globally it is not above 5 % by the end of the century even with business as usual scenario but if we look at the situation in Vietnam for example the nber with two metres goes up to 26% of GDP even with a half metre of sea level rise. It is 7% of GDP for Vietnam. It's a very different picture for Bangladesh; but this doesn't demonstrate the importance of damage done due to sea level rise or climate change. Because if we look at the population migration due to sea level rise which is on the right part, example already in 2019, 4.1 million population of Bangladesh was displaced and by the 2080 end of the century almost 20% of Coastline will be completely inundated so one fifth of the country will be under the water so this is just examples to show how important to know and have scientific evidence and robust estimate for decision about what to do in the future. Most of the damage will come from extreme sea levels which are associated with tropical Cyclones and the typhoons. If you look at the screen you could see a result for simulations using model outputs for frequent changes in the frequency of extreme sea levels, and here example for events which currently we could expect once in a 100 years and figure shows the decade when this once in 100 years probability event will be once in a year so and if you look at the region Indian and Pacific tropical areas you could see that the next decade we already will have events which are currently observed once in a 100 years almost on an annual basis. It doesn't mean that it will be every year but probability is going to be once in a year. What does that mean for adaptation and resilience? It means that there will be less time for recovery after flood and after damage. So what are the options? As you can see, here are two examples one is a hard engineering solutions and and this is a wall in Jakarta which is protecting an urban area and you can see this is just a concrete wall trying to separate water from the land where there is infrastructure and here you could see example about potential project to provide some coastal defence for Mekong River delta and a large city like Ho Chi Minh and settlements in the Mekong River so this as well will be engineering solution and will be a barrier to protect from rising seas but there are other solutions such as nature based coastal defence to protect Coastal settlements and here you could see example from a River delta in China and the sketch demonstrate the idea that if you have a mangroves planted in front of this wall as you can see here a forest of mangroves, it will build some sediment and it will protect from coming storm surges due to Tropical Cyclones or typhoons and it's called nature based coastal defence and mainly scientists are working to understand for how long this protection with sea level rise will be suitable. So in a short smary I just would like to highlight that since 1900 sea level rise was about 15-20 cm in different areas however by 2100 we expect sea level rise a half metre or 2 metres depending on emission scenario and it is unprecedented challenges for community living on the coast, coastal infrastructure and also for han. Impact of sea level rise is already seen in the coastal areas of South and Southeast Asia and Africa and South and Southeast Asia are particularly vulnerable to sea level rise. I didn't mention local factors here such as subsidence and the large population density in the coast and infrastructure or in the coastal areas. I also would like to highlight that magnitude will increase and frequency of extreme sea levels will increase with all emission scenarios but of course it very much depends on what kind of warming will be in the future. I would like to have take it seriously that by the 2030-2040 the present day 100 years return period for extreme sea level will be experienced at least once in a year along the coastline of Indian and Pacific Ocean this will increase vulnerability and reduce resilience of coastal community because they will have less time for recovery and also less funding to to rebuild the community. The most important things of course for us scientists is to have scientific evidence and robust model simulation and understanding about physical mechanisms to support adaptation decisions by policy makers and also for coastal areas. It's really important to have a proper and adequate flood defence to protect population and economic assets on a cost. That's it from me, thank you.

Aditi:

So thank you Svetlana you are very well in time so we can take some questions. Yes so we have Dr Roxy is raising his hand yes please

Roxy:

Quite hard-hitting you know pointers you have there and I see that some of the 100 year period of extreme conditions might convert to like once in a year conditions for the indopacific region including Coastline of India which is quite,, it's quite nearby it's within a decade that we would be facing and we are already seeing signs of such impacts along the coastline of you know South Asia in regions like particularly in relation to cyclones and storm surges you know com bounded extremes which is one area where there is more monitoring and research and modelling has to happen so until now scientists have worked on these areas individually like there's an expert in Cyclone, there's expert in sea level even the monitoring is also like that and modelling is also like that. Yeah so anyway my question is regarding adaptation we know that a lot of advancement has happened in terms of modelling sea level rise, extreme weather events and all but are there attempts in terms of experimenting adaptation techniques through modelling as well for example including you know maybe high resolution regional models which incorporates these defences both ecosystem based defences and artificial defences and model it and see how how they are good before we go into testing it out you know before we go into trial and error method because there's a lot of concern about mal-adaptation but then again there are no clear pathways or clear mentioning about which way to go I think for each region it will be different so we need to tailor it accordingly so what kind of modelling or scientific advancement do we have in terms of understanding adaptation to sea level rise? That's my question.

Svetlana:

Well, it's very, I totally agree with everything what you said and there are two main points; first of all it is very fast developing area I will just say for example like for the first time regional sea level projections which you saw on the screen but they are this 100 kilometre resolution CMIP’s model were done about 10 years ago so now it is, there are few points for development. First of all, of course we need a model with very high resolution but not only high resolution but also including physics, adequate physics in the coastal area because we currently use projections from the IPCC report like that on screen is very a rough and raw estimate for the coastal areas example what I show for Hong Kong. I deliberately put it there because you could see that observations in black were very different to the projections smooth line of the projections so this I really would like to say that potentially there are so many avenues we do not know for sure and there are some limitations like computational limitations and there are some misunderstanding or maybe not enough understanding about physical mechanism for interaction between deep ocean, shelf sea and a coastal area and we in each area it is important to develop own expertise and own kind of knowledge about physical mechanics. We are trying to make global coastal ocean but I think it is I don't know it will be still not enough good, not good enough resolution like 2.5 kilometres or 5 kilometres of course for real coastal adaptation it needs much higher resolution and different style of models but I think this is where we need to start to think about integration of different models and we need to talk to different communities like coastal engineers what do they use and what do they need and impact community for example doing socio-economic impacts they also need own they have own things like own databases and we try to find the way how we could use them and finally I just wanted to say that there is a need to coordinate and to produce tools for adaptation to simplify it to make a decision for policy makers to have much more about communication. I'm sorry for being so long. I think I put in a lot.

. At least 10 to 12 Indian coastal cities are projected to be impacted by sea level rise by the end of this century. What kind of adaptation or these kind of measures are required to address these issues and or do you have any in mind which you can comment on and a supplementary part or the second part I would say that is the sea level rise, apart from storm surge and all those things, affecting the cyclone I would say intensity or something like that? Thank you.

Svetlana:

So I will answer for the second part of the question that what was on the screen about changes in extreme, so 90% of changes in frequency and also in the magnitude of extreme will be due to sea level rise so we will have some changes in different areas about intensity and frequency of tropical cyclones and associated extreme sea levels but most of the result and it is you know it's addressed in ipcc report is due to sea level rise, I don't have slide now but it is just changing background by even 10-20 cm make frequency, make changes huge changes because it's a logarithmic dependence so even if tropical cyclones let's say will not change but they will and only sea level rise it still will have huge implication for extremes. About coastal defence, I think as a scientist my answer will be that we need to have as Roxy suggested very good tools and a lot of simulations to help make a decision but of course it is very very individual decisions in a local communities to protect or not their assets and it depend very much on the local situation and most of experience until maybe 10 years ago would be a hard engineering solutions there are a lot of examples of barriers and seawalls and dikes and so on but there is a move to implement some nature-based solutions but it is is what I'm for this of course but the is questionable for how long they will be functional and it needs a lot of research to understand about mangrove if they will survive with changes in salinity and inundation more often.

Audience:

Thank you.

Aditi:

Okay thank you so much Svetlana and I saw many raised hands but sorry we are not able to take the questions at the moment but the questions are in the chat box Svetlana please reply to them if you think so and we will take some questions at the end also during the panel discussion in the last half hour of the session. So yes thank you Svetlana again for this insightful talk and now let's transition into an engaging fireside chat which focuses on harnessing Urban climatology and AI unveiling the Dynamics of urban climate for actionable solutions we have with us Doan Quang Van a climate scientist at University of Tsukuba Japan known for his expertise in high resolution climate projections and using numerical modelling and AI techniques. Doan will be interviewed by Shipra, over to you Shipra and Doan.

Shipra:

Thanks and welcome again Doan for joining us today and participating in the far side chat. So probably we can just kick this off right away so to begin with, Doan, can you tell us briefly about your research background, your current research area as well as some of the research projects that you are currently engaged in.

Doan:

Okay thank you, thank you Shipra and thank you all for giving me the opportunity to have discussion here in this very prestigious event. Actually this is the first time that I do a talk like this in this form so I am a little bit nervous. So okay, first let me introduce myself. My name is Doan Quang. I'm working at the Centre for Computational Science at the University of Tsukuba in Japan. I actually am a vietnamese national but I live in Japan for long and I also have worked in Singapore in Center for climate research Singapore for one and a half year and as visiting scientist in Ana National Center for atmospheric research in USA for two years so now I work at the university Tsukuba as assistant professor so my major is about Urban climatologies and investigating how cities interact with atmosphere in modifying the climate like you may know about Urban heat island effect and some cities can modify or intensify the local rainfall in and around the cities so this is what I'm doing and also not just for research but also for doing future climate prediction using downscaling approach and yes so the different aspect the research that I'm doing is to develop the model because we are in the centre for computational science and we have to develop model and use supercomputer to do the climate prediction so I have a plan to develop detail the core of an Urban Camp Model that's if you know that's the atmospheric model including a lot of module like including Dynamic module and on the physics like Cloud physics land surface physics and also planetary boundary layer physics there's a lot of physics core in the one atmospheric model and one of this part that belong to the land surface physics is how we can parameterize city, how the city interact with atmosphere in term of how we calculate a heat exchange heat flux exchange between city and Boundary layer so we call Urban canopy parameterization so I work on developing search model and also very super high resolution does it not relate with weather forus like LES model Large Eddy Simulation that we working on the building to building scale like meta scale is what going on in the modeling and other aspect of my research is I'm trying to ingest in the the new trend of modeling using Ai and machine learning approach so I have a plan to develop some algorithm so called structures organizing map that’s already published that's using to categorise the climate data like weather pattern and all this model is available online that is we can provide in GitHub channel so this what I'm working on now yeah.

Shipra:

So thanks Doan, that's really exciting and I think that specifically for climate impacts and climate actions we do need information which is on smaller spatial scales because especially for policy making so it's great that you are working on this new model so maybe after this chat when you have time if you could like point us to the website or more where the audience could find more information which would be very very useful as well and yeah I also want to highlight before we go to the next question that if you have any questions for Doan in between please feel free to raise your hand and speak up or type in the chat so thanks Doan for the nice introduction of the great work that you're doing so like going forward what are the biggest opportunities and challenges you see specifically in the area of high resolution and urban skill modelling.

Doan:

Okay thank you for the question. So yes as far as after a long time working on city scale modelling I think that's just what is challenging and also an opportunity for the new research direction that I feel is how to incorporate the recent development of so-called urban informatics like big data in urban information to the current framework of modelling. Do you know that in the atmospheric model in the urban parameterization scheme they developed mostly 20 years ago and in just such time you know that after 20 years we have really amazing advancement of the big data that a lot of data observation that we can like Google Earth in some city detail 3D map of the cities and yeah the data become more in detail but we still use the old framework the modelling the urban climate and weather so I think that's the most challenging part; that is how to incorporate such advancement in Big Data or to create a new frame to modelling to model the urban effect and incorporate how it to compor in the atmospheric model that can help us to have better weather and climate prediction so I think this is the most concerning challenge. I am also working on this aspect right now and other challenges if you talk challenge generally about Urban scale modelling is it is about computation resources and you know that when you go to Urban scale we have to go to the kilometre scale modelling right and and if you go to this this level huge computer resource is required that is not really available anywhere and that is one of the the challenges that we need to fill the gap in this aspect in the future. And also when we go to the kilometre scale does we include a lot of the physics processes that happen at a small scale and it create the uncertainty in the final result like cloud how cloudy form and how is urban city interact with localised circulation and how it involved in cloud formation and raining of a city is one of the challenge related with we still don't understand how what happen in such small scale we have no observation and the result show, we have got a lot of result, but we still have limited ability to explain why, which is one of challenges and to do really a lot of study that's to understand would further our understanding about urban processes it is needed and is what happening in urban climatology now that's you try to understand how the really urban area interact with the atmosphere in not Urban heat island but also how it is modifying the rainfall pattern and how it can change the pattern when especially extreme weather happen like heat wave or super tropical cyclone so yeah and the last challenge which could come to my mind is how to build a framework to communicate with stakeholder that's when we go to the city scale it's very local that's and but and then the question is what we do for in just the city scale there's a lot of stakeholdesr need this information right but it really just still in for this moment there is a lot of less communication between who do modeling, who do urban climatology and how we can translate what we did in term of where focus and also future climate prediction how to give such information and knowledge to help the community to have better plan and or to take mitigate any any negative effect of global warming or extreme weather and climateis what come up to my mind about what is challenging of course there a lot of challenging but yeah is is what about is what I'm thinking now yeah.

Shipra:

I certainly agree with you on the information needed for city scale especially coming from an island state like singapore for there's always a demand for us higher spatial resolution information because that's what policies are based on but it's very very hard to also communicate to the users and stakeholders that it comes with the a kind of like warning so how do you best use that information and lot of efforts are needed in that direction as well to educate also the users that what kind of challenges are there to properly use the information that we can provide, so excellent answer when I was just curious when you mentioned about the higher resolution what is the scale we're talking about it's like a few metres a few hundred of metres or thousands of metres

Doan:

Yeah there's two level if you go to City scale is about kilometre scale we think city as whole and usually in what we do in weather forecast now that we don't care about how building look like we just care about city as a whole and to the meta scale is a different thing that's basically is used for by the like construction company or whatever is up saying that we relate with how we build the building to mitigate like heat island effect is more about engineering but now they gradually merges because in Singapore you know that's now maybe they do weather forecast in 100 metre scale right they try to do so and now they go to the really the the detail level building and the challenging is come that's how because is even in 100 metre scale you cannot resolve the whole building right you have to go to meta scale to to really resolve the building so the point that's how to translate that the subgrid information like building to the the 100 scale yeah.

Shipra:

So in your opinion how like advanced technologies because now there is a big revolution in the last couple of years about towards artificial intelligence and machine learning so do you think that these new emerging methodologies could help us going from a couple of metres to even higher resolution like the meta scale like you mentioned about or the construction companies.

Doan:

What we can use this I mentioned about the new technology or new kind of data advancement data that can very efficiently be used for weather forecast let's skip about how weather forecast thing can go to meta scale when and let's skip it now that our that's we use because for country like India is a point to very huge because Singapore is small island country that's you can use 100 metre scale simulation for weather forecast but for other country bigger it is impossible for now, so now we still in at the kilometre scale or even the 100 kilometre so the point here is we have to have a good subgrid parameterization if you want have better weather prediction so is the problem that know that for example Singapore's case there a lot of information a lot of data on the the building how we we can use such data and this the term that we this thing is what we are doing now we try to get information for very high resolution scale like meta scale and we try to learn from this model and we try to learn something we can feedback again to the CU scale model is what we try to doing now in in our group yeah.

Shipra:

So if I put this together so let's say we want to do this for a city like Pune or Delhi which also has a very strong Urban heat island effect because these are the mega cities in India so do you think that it's we can also apply these methodologies only for the city scale in a bigger countries if there is high resolution information available.

Doan:

Yes so okay this one to be clarified the thing that's such now I'm talking about weather forecast technique how do we do the weather forecast better weather forecast or mean climate prediction that we are in our group even more concerned do in such level what we need is the macro impact for like Delhi or Mumbai or Singapore what we don't need is the detail information of city we need the macro or a city at a whole if you don't do it we lost some information because we underestimated the urban effect even in future climate prediction so the thing does using the new advancement in very high resources simulation like areas or Big Data urban informatics useful and to improve the current framework of weather prediction or climate downscaling. This the point that I want to to tell you maybe I hope this answer your question

Shipra:

Yes, you answer my question very well. I think that we are almost towards the end of our roll out time. Before I go to the final question I have, I quickly wanted to ask if somebody in the audience had a question. I'm not able to see that for them we can have space for one quick question.

Roxy:

There is a Q&A by Prakash. Do you want me to? I will post it in the chat so that you can ask.

Shipra:

Okay okay yeah cool so yeah so my last question perhaps to Doan is can you provide some concrete examples on how artificial intelligence particularly in the area of urban climate modelling can benefit communities or help support climate actions especially in the indopacific region and I know this is a hard question.

Doan:

Yeah hard question so there are many ways to use machine learning that I know is really quickly rising field. So one of these is to help to improve how we parameterize the physics process in the modelling. What I told you about how using big data in urban that's the interest in the one of the study that's I think this are done by P that's maybe he will join session later that's with working with the group in USA that using deep learning to to have to estimate the parameter parameter in urban scheme this one of the way to use for you the machine learning big data to improve the representation of the subgrid physic processes that I'm really inspired this one and yeah there's a lot of approach there of using machine learning and actually machine learning and AI is a new field I mean this not real new but in in our field how to apply it is quite the new and the most important is how to formulate the problem how I mean how to what we can do with machine is still exploring the stage the does yeah and believe but in future we be more clear figure about how to is yeah.

Shipra:

Thanks, that's an excellent answer and I agree that before we start answering question we have to first think about if we're asking the right question in the first place so yes so with that;

Aditi:

We have a question from the audience. Do you have a question?

Shipra:

Yeah sure I think we still have one or two minutes if that's okay we can take one quick question.

Aditi:

Oh okay so no it's fine so we can move on.

Shipra:

Okay so everyone listening Doan and joining and for being brave in participating in this fireside chat and there is a question in chat as well so if you can look and probably answer, would be great so I'll hand over back to Aditi.

Aditi::

Yes thank you Shipra thank you Doan for such an interesting discussion, so continuing with our insightful interviews let's now delve into collaborating across borders for climate action connecting climates and cultures so for this we have the expertise of Chi Huyen Truong and AKA Shachi. Shachi with her anthropological training creates impacts by building genuine and productive interdisciplinary partnerships in research and higher education for sustainability. Currently leading the Secretariat of the Himalayan University Consortium, she fosters collaborations addressing mountain and upstream downstream issues of sustainability, interdisciplinary and Leadership. Joining Shachi is Chirag, assistant professor at Krea University in India specialising in climate and sustainability science. Chirag holds a dual degree PhD in Earth Science and theoretical quantum physics with a focus on understanding precipitation response in a changing climate so his extensive research experience contributes to his role as an advocate for climate and sustainability action so over to you Chirag and Shachi.

Chirag:

Thank you very much Aditi and Shachi. Nice to see you. Our conversations have been via email so far so it's a real pleasure to have this chat with you today under the WCRP. So thank you everyone, Shachi. I'll start with some very basic questions about your own work and your own interest before we get more into the details of what that means in terms of climate action. So to start with if you could tell us what drew your attention to the Himalayas? Was it a personal interest, was it a professional interest that drew you there first or was it just by an accident?

Shipra:

Thanks so much again Chirag and good morning to everyone. This is really wonderful to be a part of this conversation. I already learned so much from Svetlana and Doan so Chirag just to be very honest it is actually by accident of marriage that I happen to find myself in Kathmandu Nepal. I've been there already for nine years and I got this job just at first. I needed a job so I applied for this job and I got this coordinating role for the Himalayan University Consortium. However as an anthropologist, every anthropologist who think that we have the ability and skills to adapt and I start looking around you know being in Kathmandu Nepal and start travelling the country experience earthquake in 2015 then I start picking up and realise that this is maybe the region to be this is a maybe the place to be in the world especially when things happening here that affect so much and so many people in the world. So if you're looking at the Hindu Kush Himalayan countries ranging from Afghanistan to Myanmar then the areas in fact cover 10 Rivers 10 major Asian rivers and feeding in fact about 1.9 billions downstream. The Basin of these Rivers feeding almost two billion 1.9 billion people downstream so then I realised you know it is a really a place to be in terms of you know things happening it's the most vulnerable but yet at the same time so diverse and so beautiful as well the beauty of of the landscape but also cultural diversity religious diversity linguistic diversities that actually very much keeping me here back to you Chirag.

Chirag:

Thanks Shachi you know I guess a lot of our careers are often a series of you know happy circumstances and accidents but that really brings us to the very next question about the diversity of this region and the number of countries, regions and nations that it covers. Your work sits in cultures and action right, so could you explain to us the importance of connecting climate and culture when addressing climate change particularly for those of us that may not be very conversant with what that means and what its implications are.

Shachi:

Thanks, in fact let me start from what I learned from the previous speakers, Svetlana and Doan, you talking about sea level rise and then the city. Now as as a national as a person coming from Vietnam by the way just coincidence but I'm also a Vietnamese I realise that how many city dwellers coming from Hing City for example south end of Vietnam would find the models that Svetlana presented relevant to them now this is not a criticism I'm just bringing this as a conversation point now same for Doan for example you know you have this machine learning and highly sophisticated deep learning, how many locals those who live in the lower Mekong, those who live in the streets of the Ho Chi Minh city, a city of 12 million residents would find those models relevant and matter to them? So back to the Himalayas in the same way Chirag, in fact scientists, cryosphere scientists, climate change scientists did a lot of modelling already about the region and in the region but the connection is not there those who live up in the mountain especially on high altitude at the foothills of glaciers how much and how many again the communities would understand the language you speak would understand the image and infographics you present. So back again Svetlana and you brought up and Roxy actually your questions about communication it's not just communication it is actually where to start the problem of research. Whether climate science will have to be meaningful but also actionable for those communities. I hope I sort of tease out may not respond in terms of answer but at least I tease out certain aspect of the need not only just to communicate I would like to emphasise that it's not just communication it is more about bringing in the need of local communities into the research design from the very start actually you need to work backward and there is a term in disaster management but also in environmental economics, it's called implementation science, actually need to work backward from implementation point whether you decide to build a dyke that is a engineering solutions or you make a combination between mangroves as nature based solution together with engineering solutions it has to start from there backward so again I

just really very much advocate to flipping the entire process of doing research that you know you are driven as a scientist you are driven by a constant quest for knowledge new knowledge refining the model and the research tools and methodology for the quest of being better as the knowledge generator now I'm coming from very much end users community they are knowledge holder as well they know a lot and in fact they've been surviving and thriving in those conditions now in the lower Mekong they live on water and instead of being seasick they are land sick so I just make a cruise just the past summer. I took my mother and my son to do a river cruise and I'd like to experience how to be on boat for the entire months of floating down the lower Mekong you know seeing the mangrove and then finally all of us experience what is called land sick as soon as we put our feet on land we feel nausea. This is actually all scientists need to experience this kind of land sickness and actually drawn to you in terms of awareness and perspective back to you Chrag.

Chirag:

That's such a profound point you're making and in fact from a very personal perspective you know please correct me if I'm misinterpreting anything that you said but I do wonder on occasion whether the way I read solutions to climate change I mean I'm studying at a university or as a or at a research institution and I'm not there on the field and very often I wonder whether the solutions that I believe to be good solutions are just a projection of what I believe the problem to be but without actually experiencing life or reality the way that people who are actually in I mean if you're poor and living in a shanty and on the coast where sea levels are rising extremely fast and there are there's high risk of cyclons I'm not that person and so whether I frame the problem right is something that I if I can't frame the problem right or understand the problem right I certainly can't frame the solutions right so it's something which bothers me when I think about it I hope that you know I'm not deviating far away from what it is that you were trying to communicate but on this note can you then give us some specific examples of exactly what you're talking about or projects that you've been involved in which have tried to flip this narrative and try to frame the problem right and then create the solution or the scientific tools that can help to solve this? So specific examples would be excellent.

Shachi:

Great! so let me try in fact the Himalayan University Consortium has a varieties of thematic working groups and one of such groups is a cryosphere and Society now the cryosphere part is understood but then the end society part is such a hard effort to bring in, so we actually insist that you know cryospheric scientist and scientific report wouldn't be actionable or meaningful unless you engage with Society. So what we do is to in fact put together or we don't put together actually we ask whether cryosphere scientists would like to speak to social scientists anthropologist, economist forestry, ecologist just to sit around the table first of all to understand the concern and we start from the way how to problematize what the problem for climate scientists may not be term in the same way as for Economist. So again you know the common language of identifying the problem that we need to arrive at. So we start with that actually everyone feels so discomfort a lot of uncomfortable feeling because again you know scientists of different sciences speak very much different languages not the English but actually they could understand I was there and I observed as anthropologist and sociologist of sciences I realised that everyone speaking past and cross each other without being connected, without being understood. So the first exercise is actually to make yourself

understood, now the next step which is even harder is to speak to the community so what they did is the initial idea is quite simple actually like a model developer for example like similar to Doan they have the modelling which is called lava flow and of course you know lava is actually it's volcano right volcano lava flow modelling so what they'd like to adapt and colleagues are actually coming from University of Bristol so what they think that the lava flow the modelling can actually be adapted to look at debris flow of the flooding in the Hindu Kush because the flooding is not just water it's a lot of debris including soil including boulder actually big size boulders coming down with such a huge velocity when with this altitude so they want to refine the modelling tool that actually from the scientist side that you already have the modelling tool that already worked elsewhere with those countries that experience volcanic eruption to the Hindu Kush Himalayas with the flash flooding with this high velocity. So that is the motivation of scientists, however when it comes to the HUC Community the Himalayan university community we said like no we don't do that you know we we don't find is meaningful for you just to refine your modelling let's talk to the local community and see whether it matters to them. So these scientists and social scientists go actually to the community at the mean which is a location of the disaster just happened two years ago and they actually go to the field and see the devastating impact of the previous flooding which is a year ago and you can see that entire the entire village was just wiped out you no longer have your belongings but also no more land to cultivate the all the fish pond they raise a fish trout on high altitude Lake which is gone so livelihood gone belongings and properties gone so they talk to local people officials District levels and what matters to them for them you know the modelling they wouldn't understand but however they will explain to you that they would expect flooding of every year already so actually now when you Svetlana when you say that you know the the indication is that the extreme weather will happen more frequently almost on the probability is almost on yearly basis now these local people already have a sense like they don't have the science of it but they know that such such medium scale of extreme weathers happened every now and then they don't have the term of probability they know every now and then it would happen sometime it's more severe than others now they have the ability to actually adapt already on the ground they have this local knowledge already now the extreme will intensified the impact will be more severe now this is what where the scientist coming in now so these conversation actually start bringing people closer to one another and understand a bit more of each other’s side of the stories so this is this is where we are Chirag we have not reach any concrete point in terms of you know thanks to the adaptation of this modelling that you have a better science or more impactful science but at least the mutual understanding is there so scientists learn that local communities they do have adaptive ability and re resilience they can bounce back they can rebuild community already however this communication in terms of intensity again and it's a severe impact again needs to be reciprocity two ways to understand so I hope that I describe one very concrete example of what we do but we have other thematic working groups like that working on food nutrition security, looking at needlets for example this year is international year of millet of FAO and how much climate change impact would have an impact on the food and nutrition security in the mountain because these crops is becoming neglected. Farmers no longer grow millets even though it is highly nutritious in terms of value but also is a form of security in terms of you know if you go into shortage then you can take out because this can store or even a year or even longer than a year you can check the millets out and actually feed your family, so this is another example of understanding the local context local perceptions of risk the local indigenous knowledge how to adapt and then communicate back to the scientist.

Chirag:

Excellent thanks so much it's very easy for non-scientist to be alienated from the whole process of modelling, for one thing it's technically complicated and for another they are usually you know models are agnostic towards culture or other kinds of knowledge. It's mainly concerning itself with chemistry, physics and biology and so on, so thank you for bringing these other important aspects into sharp focus. We are running behind on time so I think I would like to skip to the audience and ask, oh I think there's already one person I don't know if there's anything else on chat I haven't checked just yet but Aditi please go ahead while I check the others.

Chirag:

That was excellent. My question is when there is indigenous Knowledge not able to hear you yeah yeah or you can post your question in the chat if not yeah why don't you post your question in the chat in the meanwhile I can take the other question from the chat.

Shachi:

Roxy in terms of weather forecast in fact International Center for integrated Mountain development which hosts the Himalayan university consortium we are based here in Kathmandu Nepal, they already working together of course with meteorological department of each country in the Hindu Khush to develop simple application for farmers for local community members to actually make a decision in terms of the crop choice and so this is climate service. Actually I have my colleagues Mandira I I'm not sure if she's one of the panel session in the same conference she's in Pune right now she can tell more about these examples, but let me relate a bit more in terms of the bottom up participation approach of in fact I'm sure you probably have heard about open street map technology so what we do for the HUC Community is to empower local female mappers so what we do is actually bringing the open street map to the community and and mostly women anyone who have a cell phone who are willing to participate so we train them to use you know the concept of coordinates and understand you know upload the upload to map what matters to them. For example scape oute in the city in Dhaka for example Dhaka Bangladesh and you know it's is such a very Infamous for traffic jam so so as a seated dwellers you already have these local knowledge intuitive knowledge about the root to avoid in order to go home early earlier or shorter route in order to avoid the traffic jam so what we do is actually to give this tool to local mapers all of them are women to map The Escape if anything happen in terms of disaster so this is one example again and then for Bhutan, Bhutan is mountainous country then we ask local mapers to map the locations of places that matters to them such as school health post and the house is where the elderly people who actually know a lot of stories to tell because they consider that is also an asset because knowledge holders Heritage bearers is also a Heritage that you need to keep so we ask them you know what do you think is precious for you valuable for you so it's not just the school the health post the places where a lot of grains and varieties and seeds are stored but also those houses of elderly people who live because they know a lot of stories so again it's a concept of emergency, resilience, preparedness. But it affects very much B and is strongly based on local perceptions. The open strip map is there and quite powerful as welL. But now the idea is how to validate with these satellite images because you need to actually validate, because they upload all the coordinates and also they pin down all the information in terms of socioeconomic information. Then the question comes when you talk about Ai and other deep learning. The questions come, if this movement of local mappers picks up because they really want to make it into a movement of local mappers then how to handle the governance- the ethical questions of governance of data. Because again you know it's back to the point of control, the authority of control of data and that is the principle of care if you're aware of these indigenous data governance aspects. So lots of aspects when we bring in new tools and new ideas, but again you know the conversation has to be interdisciplinary. Otherwise we will not be able to come to a Consensus.

Chirag Dhara:

Thank you Shachi, Aditi has asked an excellent question in the chat but I'm afraid we are completely out of time. We are running late already. so Shachi perhaps you could either respond on chat or perhaps there is time at the end of all of these fire chat Far Side questions, discussions.

Chi Huyen Truong:

Absolutely absolutely I do that

Chirag Dhara:

Thank you very much over to you, Aditi

Aditi Modi:

yes thank you Chirag, thank you Shachi. So Shipra can you take over

Shipra Jain:

yeah so, now taking the fireside chat session forward. we are now on the third session and also the final one, which is on the advancing climate research for Action in Africa- focusing on the climate risk assessment resilient development Pathways and health impacts and in this dialogue we have Chris who works as a climate scientist at the University of Cape Town and Chris works on the intersection of climate science and climate action with a focus on Urban Africa. So Chris comes with a breadth of experience in understanding climate risk, the connection to health as well as Urban Development and his work on resilient development Pathways and health impacts are actually very crucial for crafting effective climate action strategies and therefore we hope that he brings a very unique perspective to the table. For the interviewer we have Arvind who is an associate professor at the physical research laboratory in India. Arvind’s expertise is on complex biogeochemical cycles of carbon and nitrogen in the Indian Ocean and ecosystem Dynamics. Arvind's work advances the understanding of the environment and also provides a foundation for sustainable development strategies under climate change. So over to you Arvind.

Arvind Singh:

Thank you very much Shipra, Aditi and team at IITM for putting this together and so welcome Chris. So Chris and I have a tough job now, because a lot of ground has already been covered but at the same time Chris comes from Africa, the continent which is mostly ignored for the geopolitical reasons or for whatever reasons so Chris perhaps would have some stories to tell us which we did not hear before,so that is something new. Chris will bring hopefully and to begin with- like for all the other panellists we will also ask the same question to Chris, what brings you to or what brought you to Academia, I mean why did you choose this career and particularly looking at a background which was computer science you could have also become an excellent engineer or you know but so why did you choose this could you highlight us.

Chris Jack:

Thanks and thanks everybody. I really enjoyed the discussion this morning. yeah I've learned a lot and I really resonate a lot with what Sachi was talking about earlier. But I think we'll get back to that, so why did I choose this career is always an interesting question. I guess a bit like such as well some of it is accidental but I guess at an early age I was fundamentally curious about the world and why things happened. I live in Cape Town on the southern tip of South Africa and the weather changes very quickly and I was always intrigued as to why this happened and then when the possibility that you could actually predict what was going to happen tomorrow emerged in my Consciousness that became really intriguing to me and became really interested in the idea that we could actually predict what's going to happen in the future and that kind steered me down the road actually eventually of computer science because a lot of that prediction requires modelling and big computers so I went down that road for a while and then I actually needed a vacation job to help pay for my University fees so I walked into professor's office and had taken one of his courses on climate science some you may know him professor Bruce Hitson. He's very involved in WCRP . I just walked into his office and said I can program computers do you need me to do anything and that started a long career of computer modelling, dynamical downscaling, statistical downscaling and a lot of data processing kind of work and now eventually to where I am now that's quite far behind me and I do a lot more work engaging with stakeholders, decision making, complexity and so on. Yeah so that's my random journey into where I am now.

Arvind Singh:

Thanks Chris, thanks for sharing your story . It's quite inspiring and also quite motivating for many of us who have joined here today. s=So bringing to the next question because you are an excellent science Communicator. I have seen through different social media channels about you. So how do you see the science communication now? for example, if you look at how the science has been traditionally done it was like let the work speak for itself we don't have to publish anything and now in social media the things have changed, a lot of people are putting their stuff on Twitter, Facebook, LinkedIn…There are many platforms in which people view these things very differently. So we would like to know your view on this?

Chris Jack:

I think it's such an interesting question and science communication is one where I feel a lot of tension for me and maybe for others, I think definitely. Science communication has changed over the last 10-20 years that I've been part of it. It has definitely improved a great deal, there's a lot more thought into how we communicate science, more training of scientists through their training as scientists to learn how to communicate the science. So I've seen a lot of that and a lot of the benefits of that coming out. So I've seen a lot of young scientists now presenting their work and I'm amazed. I'm really astounded at how clearly and effectively they can communicate their science. I do think there are tensions though, because I think there's a lot of focus on identifying what is your core message, like stripping away a lot of the complexities which is really important. what is the core message and what does it mean for people you've got to make your signs meaningful for people. but that process is actually really difficult because what is Meaningful for me as a scientist, what my perception of what's the core message or meaningful for me is going to be very different to other people and I think Sachi touched on this quite nicely in her discussion points. so I think we're seeing a lot of sort of very good communication and sometimes even in the Twitter or whatever it is now, message or a Blog article or even a news article where the science is presented really simply and the core message comes through it's a headline message but who has decided what that headline is and who is it meaningful for. Is it meaningful for somebody who's living in a Shack, in a city, in Africa or is it just meaningful for other people within that sort of Science world or for people in Media. I think we need to be asking some important questions around who is the science being communicated to and to whose benefit, who's making decisions around, what's important messages in that science and one last thing on this which I think really important is the process of communicating science clearly. We strip away a lot of the complexities and that is helpful for communicating. It also hides a lot of those complexities. So, I increasingly get worried with messages that I see, that are beautiful simple headline messages but behind it there's huge uncertainties and conditionality. If this is the case then that message is true but we don't know that, this is the case. So I think we need to keep reflecting on our communication and who we're communicating to whose benefit, who's making the decisions and there's a lot of Ethics behind it as well. Sorry, let's sort of open it up rather than close it down.

Arvind Singh:

Yeah thanks, I think you highlighted quite well and also thanks for correcting me that Twitter is X now and X is present it's not X. So yeah, I mean you test a very good point about communication right. When you simplify science, then the story is incomplete in many ways and when you communicate to policy makers, to lay men, to the public then you simplify. Of course simplifying is okay but at times we are also in the communication era where there is also a lot of fake news even in science there are climate skeptics who propagate different kinds of ideas. They can twist your words particularly in the media if you see if a published paper says something else if that comes out in the media it has a different headline altogether. Do you have any take on this or how the common public should be aware of what they should read and what they should not read and how they identify?

Chris Jack:

Yeah so you've touched on another point, I didn't raise which is you know the skeptic Community or the fake news Community. I think that also feeds on some of these dynamics of that complexity that gets hidden and so that message, you can critique the message. If the message is going all the way back alino talk sea level is going to rise by 2 metres comes up as a headline message and of course you can attack that because it's not true in the complete sense it's true under certain conditions and certain assumptions that is true and it's not to undermine the signs but there's complexity behind that signs and so I think a lot of Skeptics will attack those key, those headline messages and saying but that's not true and here's evidence to present what that isn't true but it's because that complexity has got hidden in the process. I don't know the full solution to that, I think finding a balance between coming up with very simple sort of headline messages while still communicating uncertainty is really key. I think we've become almost afraid of presenting uncertainty. It feels like if we say things are uncertain that somehow we're ignorant or we don't know something I think uncertainty is a key motivator of action. If there's a lot of uncertainty whether it's going to rain today or not that motivates me to be prepared for different outcomes so I don't think we should be as afraid of presenting uncertainty as we've become I know it doesn't make quite as cool a headline but I think it's really important that we continue to present those uncertainties.

Arvind Singh:

yeah true, I agree with you particularly in India we predict particularly in The Institute from where Roxy and Aditi they come from. They predict the monsoon but it's hard to present the uncertainty to the public who would care about the monsoon prediction. So it's a very challenging job it remains there although we have mostly three predictions whether it's going to be a normal rainfall or a flood year or a drought year and then there's lot of spatial heterogeneity and different months now there is flood in one month and then we have dry spell and then the again the flood comes up it happened actually this year in Himachal in the northern part of India where it I never heard that it was a flood in that particular region but this was flood two times it was in first was was in June probably and then there was a dry spell and then again flood. So, it is so complicated how things can be predicted even if it shows up in the prediction. It's a challenge but you are right that somehow we have to develop our own way to communicate the uncertainty when we do it. Now we move on we will change gears a bit so we will like to know more about your work like so could you tell one of your projects which you think is quite important quite close to your heart and which has a significant impact on the society or in scientific Community let's say so do you have something to share and perhaps the audience can pick a few questions from that and they would like to ask a couple more questions.

Chris Jack:

Great thanks, yeah I mean I I'll talk about a project that's very close to my heart that is ended a couple years ago but we ran it for six years was called fractal and it was focused on urban climate resilience in southern Africa so we worked in eight cities across southern Africa and we took a we did what Sachi actually suggested we tried to flip the model so approach was to spend a lot of time with people in the cities both government officials, decision makers but also where we could with community members or at least Community Representatives or Community organisations. We invited them all into the room together multiple times and we tried to understand what their challenges were and what their understanding of the problems they were facing. In the first engagements, we didn't even talk about climate change. I mean it was in the title of the workshop I guess but it wasn't on the table as a point of discussion. We just wanted to understand what people were wrestling with, what kept them awake at night and it was a really interesting and challenging process. Because it made science very difficult. It's quite easy to do big picture science. It's quite in some ways not to dismiss the effort but it's quite easy to run a climate model and look at the output and say it says you know rainfall is going to change by this percentage. For example there's a lot of technicality behind that and complexity of course but it's an easy process but when you're working with a community in an informal settlement in esaka that deals with flooding every year, that has major water access problems where people get sick every year because they're taking water out of shallow water worlds what is the science? How do we construct the questions to bring to science for these kinds of challenges? Time frames are really challenging. Many communities are working on a month by month, year by year kind of time frame even City governments might be planning out five year strategies but certainly not to the end of the century like we're seeing in much of the climate science. So again how do we bring climate science into these kinds of engagements? The way we did it was slowly building relationships and building trust and where we could see some climate science contribution we could bring in. So we might bring something in around changing long-term rainfall in the kuui river which provides a lot of water for laka and we did a small research project that focused purely on that question and we brought the results of that back into the discussion and we deliberated about it and we understood it together and in that case we decided that was useful information in that context but a lot of the work actually drifted away from the climate science so in Africa generally so many of the climate challenges come down to governance how do we make decisions? Who makes the decisions at what scale are those decisions made? Governments are trying to make decisions around climate change but often don't have the capacity. Communities know what they're experiencing as Sachi was saying we also worked with University of Bristol who developed very high resolution flood risk Maps for luaka and we printed these out on big pieces of paper and we brought them into Community engagement and the response was from the community. Yes we know that we know where it floods we don't need your very complicated model to tell us where it floods .Of Course they was still value in the modelling because we could explore different futures and we could explore some questions but we had to recognize that they know where it floods and they also know what to do about it, they know where the drains should be because they live there they can see where the water flows they understand that. So starting to work with them to say okay well where can we bring some science in combined with your information can we take that to city government and help inform form their planning and so what we have started seeing in some of the cities and I work mostly in the Saka is the city government are did recognize the process the mayor even attended many of our workshops which is very exciting and now we're seeing that a lot of those decisions are being delegated to the ward and and local level committees that are given authority to make some decisions and even now giving some finance to fund some of the implementations that they want to implement around flooding. So again it's not solving all the problems, many of these problems are not seemingly solvable. But it was very inspiring for me to see a very different process, very much led from the bottom trying to connect across different governance scales trying to weave in a bit of science where there is value for that science and seeing people empowered to bring their own expertise to make decisions and action. Yeah so that's another example that is really close to my heart and I'd love to see many more examples of that.

Arvind Singh:

Yeah true Jack, I think the most interesting problems or the important problems are also most challenging. To involve everyone so maybe there is a correlation or there is cause and effect that they somehow fall in this category. So we have a followup question on this, I would have asked the same question but Roxy has this question and I think no one better than Roxy can articulate this. So he has posted it, here I will read it out for you. So, how is the capacity building in Africa in terms of research monitoring and modelling? and then also supplement my experience after interacting with the East African research Community. While there is interest from researchers, the government support for capacity building is quite low. How do we go about dealing with this issue?

Chris Jack:

yeah, I think we could have a whole seminar on that topic. I think it's a really important question. I think capacity building in Africa is very challenging. I think the governments do see the value of building that capacity but there are so many competing demands for finance, for resources that it tends to get left on the side. A lot of capacity building is resourced and motivated from outside Africa. So we have international institutions doing amazing work trying to build research capacity in the continent. One of our biggest challenges is that research capacity tends to leave the continent. So once some capacity is being built and the people are offered an opportunity off the continent then they move and I don't blame them in many cases the opportunities are enticing and and very attractive what we're trying to do in Africa is build a kind of critical mass of researchers in particular locations I think it's vary to work in an isolated context so many of other academics work with across Africa are vary isolated in institutions they have very high lecturing loads they just really struggle to do any kind of research and if we could build a bit more of if you like a critical mass of researchers that can work together, can motivate each other, can encourage each other on the continent I think that would be really helpful of course.we do need the resources the financial resources, the infrastructure to implement the research and and that's an ongoing Challenge and I think the International Community will have to continue playing an important role there for for some time to come I'm inspired by a lot of the young researchers that are emerging at the moment. There's a large cohort of early career researchers who are Dynamic, who've been trained in a different way, who are working across disciplines who are asking new questions. What I'm desperate for is that they stay on the continent or at least stay engaged with the continent and don't drift off into other opportunities. Thanks

Aditi Modi:

We have a question from the in person audience. So can we take that now.

Arvind Singh:

We are running out of time. we are already one minute late as per.

Aditi Modi:

yeah we will just take this quick question from

Arvind Singh:

up to you. You are the super chair.

Rupak Kumar:

Thank you aditi and sorry for extending the time. My name is Rupak Kar. My question is about regional cooperation in Africa. As you know, in Africa they have actually pioneered the concept of what we call Regional climate Outlook forums. where countries sharing common climate interests come together and develop their products jointly. so these have been in place in Africa for more than 25 years. but at the same time having been associated with them. I find a lack of local research capacities contributing to the success of these forms which are still dependent on external assistance in terms of technical inputs and capacities. How do you think we can use these existing forms to actually broaden them to consider bringing local research developing capacities and working to improve these joint activities? In fact these forums have been built in Africa and they are now being implemented and emulated all over the world. which is a great example given by Africa but at the same time I think we need to support them to enhance the quality of their outputs. If you are familiar with those forums it'll be useful to see. What are your perspectives in improving them?

Chris Jack:

yeah, very familiar with the forums and I think it's a great question and a great thought if you like around capacity. I think the EAC and the gagov Outlook For in East Africa are really nice example of where a lot of capacity has been built and that's an example where I think there's been a critical mass built at Pac that creates an environment, where people are not working in an isolated space and they have colleagues and support and there's a lot of international support as well. So that's one that I'm very familiar with where there's been a kind of critical mass of research capacity built. There's still progress to go, of course. I think something that is quite important is building Partnerships between universities and met services and research institutions. I think often people don't studying or you know students studying don't see a career path into research in Africa and the Outlook forums the regional bodies like sakov and goov and others I think, they provide a potential kind of career path for for a young academic who's wanting to explore that route but that needs to be set up early on even as the students are studying in universities they need to be engaging with these research activities and research bodies. they need to be inspired, they need to be travelling and you know participating in discussions they need to be entrained into that research environment. So I think those kinds of Partnerships with Academia and universities are really important. Sorry, I know it's short of time. I think that international support is obviously really valuable but needs to be very strategic. it doesn't build up these dependencies with International institutions it needs to become much more Collegiate. If you like equal Partnerships between the international institutions, there needs to be a long-term thinking around how this plays out in the next 5, 10,15 years and if we are still going to be dependent on all these big International institutions to implement climate action in Africa.

Arvind Singh:

Thank you Chris, so Roxy has given me a licence to go for some more time and so Aditi you have a question so please be very quick because Chris can still go long.

Aditi Deshpande:

Yes, Thank you Chris for that great discussion. My question is something which is relevant to both Asia and Africa that you know when you speak of ground level people who are at ground level. who have knowledge of how extreme occur and they also know how to work with them. How would you say or you know do you have like a thought on creating a pathway for disseminating information about climate change without diluting the nuances especially when you have multiple languages concerned so this is true of Africa and both of the Asian subcontinent where you have multiple languages and there are of course borders across where people are particularly vulnerable but they will not have much of a language knowledge to speak to let's say policy makers or to people who are into communication so how would you think of bridging that gap. Any thoughts on that?

Chris Jack:

yeah, lots of thoughts, the one that jumps to mind is one that I'm also really passionate about, it's the use of narratives or storytelling. So it's quite an intensive process it puts within a bigger process but it's something we use quite a bit in fractal and we used in many other projects where we actually co-produce stories of the future with participants including Community participants. So they are able to articulate their understanding of their lived experience in a sort of narrative form and then we try and weave some of the science into that so we say this is your understanding is your lived experience of living in lusaka now what might that look like in 50 years time. can we write a different story that reflects 50 years when temperatures are much higher, maybe you know rainfall is more extreme. how would that change your story and we found it quite a compelling process for people to be involved in because th ey're able to express their lived experience and their lived experience kind of drives the process and the science then gets woven in behind that whereas normally what we see is we have the science story dominating and then we try and somehow connect people's lived experience to that. so we again tried to flip that process around a little bit. As I said, it is quite intensive. It takes a lot of time to develop the process and to kind of implement it but I think it's really valuable. I think there are lighter ways of doing it as well. So for me, allowing people to express their stories is a really powerful mode of doing this okay.

Arvind Singh:

Thank you very much Chris, so we don't have much time now but just once again. I would say thank you very much Chris for narrating all your points. Now I will hand over to Aditi and team and IITM

Aditi Modi:

Yes, thank you Arvind, thank you Chris for actually having a very interesting discussion and we are already running 20 minutes late. so we will now move ahead to the panel discussion so over to you Dr Roxy.

Dr.Roxy Mathew Koll:

Thanks a lot Aditi, so I invite Dr Krishna, Dr Swapna, the interviewers and the speakers over here for the panel discussion. Aditi Modi can you spotlight them. while I introduce our speakers, our panellists.

Aditi Modi:

yes yes sure, sure

Dr.Roxy Mathew Koll:

Krishna,as well, is just perfect. yeah so folks, let me introduce our panellist. We have Dr Krishan here. who is the director of Indian institute of tropical meteorology under the ministry of Earth Sciences. He has been heading the climate change research in IITM and for the last two decades. He was a coordinating lead author for the IPCC report the recent six assessment report and together with Dr Swapna, also has been IPCC lead author and together whether they had led the you know climate modelling in for South Asia. The first model for South Asia has been led from this institute in their hands and they have a lot of insights to provide for us for the Indo Pacific region. Welcome Dr Krishna and Dr Swapna and welcome all the panellists. so let me jump straight into the questions,the discussion. The first query to Dr Krishna. We would like to know since you have worked with ipcc reports for quite long and even the synthesis report as well. What is that take a away from the IPCC reports that you have been part of that you feel is most relevant to this region, the indopacific region and what do you think are the activities from your organisation that's IITM or the ministry of Earth Sciences or Cordex you have been involved in Cordex as well in contributing towards this.

Dr.Krishnan:

Yeah, first of all thank you Roxy for the kind introduction and also for this invitation. as far as the takeaway message from the IPCC report in the context of the indopacific region which is most relevant. I was basically involved as a CLA in the water cycle changes in chapter eight of the IPCC AR6 assessment report and Monsoon was a very important part. We had a very detailed assessment of monsoons, Regional monsoons and today I will briefly touch upon my few points about focusing on the Asian monsoon in the context of the Indo Pacific region. so the main assessments quickly I will smarise. We said that since the mid 20th century the South and Southeast Asian Monsoon precipitation has decreased. This is a high confidence statement, the dominant cause being anthropogenic aerosol forcing so there are multiple drivers. we have the greenhouse gases, we have the aerosols which are kind of counteracting the greenhouse gases so during the historical period since 1950 there has been a decline in the precipitation, which was attributed to the anthropogenic aerosols which offset the effect of the greenhouse gas forcing and for the East Asia the dry north and wet South pattern of East Asian Summer monsoon precipitation change. It results from the combined effects of greenhouse gas and aerosols. This is also a high confidence statement. so the most important Point why I'm stressing is in the near term that is 2021 to 2040 period, the South and Southeast Asian Monsoon and the East Asian Monsoon precipitation will be dominated by the effects of internal variability this is an important point I wanted to stress this is a medi confidence. so we are already seeing the effects of the internal variability but in the long term and the mid-term the precipitation in both the monsoon regions are projected to increase. so the the when we talk about internal variability two things come there very important to me according to me one is the changes in the ENSO right now we have a very big El-nino going on in the Pacific we have also a very strong Indian Ocean dipole in IOD developing in the Indian Ocean and this has big implications on the monsoon and to begin with. We are already seeing this year begin in June and have a big deficiency. In August, July we had above-normal rainfall in parts of India. India as a whole there are Pockets where rainfall is very much deficit in in Northern India in certain parts of North and Northeast India and rainfall is still deficit so the ENSO influence was very very strong but since I think when mid later part of August and early September also the rainfall was very much deficient now recently I think the IOD influence. We are seeing that picking up the monsoons may mean it seems to have made some recovery and will not be a very deficient Monsoon so these drivers. we have this big El-nino impact and the IOD impact which are kind of having opposite impacts on the monsoon precipitation at least for the Indian region. the question is what will happen in the future to these modes of variability that is a big issue because Monsoon still even so in the near term we have to be so the Indo Pacific is supports these major modes of variability coupled ocean atmosphere coupled variability like the ENSO and the IOD. in the fifth assessment report it was mentioned that with warming actually, we will develop more like a El-nino type of situation the SST pattern. The Walker circulation will weaken and we will have more El-nino type of SST warm. but then when you see the sixth assessment report we are seeing that actually the Walker circulation has not weakened, it has strengthened, the trade winds have strengthened and why is it happening and there is a school of thought that thinks that there are problems in addressing the cold pool biases in the Eastern Pacific. So the cold in the Eastern Pacific that is due to problems in resolving the clouds processes their feedbacks SST still in the cold pool SST is still cold tongue is not properly resolved and those deficiencies are creating problems with the CMIP models in capturing the ENSO simulation. so the big question is what will happen to the ENSO in a warming climate at least in the near 20 years near term and also the IOD. as some studies are telling the IODs are going to get intense they are going to get stronger but we have to really see that is also an important problem. because they have a direct impact on the Monsoon. so improving the models will be important and the IITM Earth System model Dr. Swapna is leading that effort so it has one of the good models where the IOD positives are nicely captured and its tele-connection with the Indian Monsoon. So I think a great deal of focus on improving the representation of these coupled processes in the Indo Pacific will be very very important and that is my quick takeaway most important message from the water cycle from the monsoons perspective.Yes,thank you Roxy.

Dr.Roxy Mathew Koll:

That's a lot for you to brief us on the you know takeaways and also the challenges and also the progress in terms of addressing these challenges for this region particularly from IPCC point of view. So based on that we have a few short questions before you leave just one minute more. from Mohan Kar Das from Bangladesh. so he is asking how this progresses whether from IIITM or Ministry of Earth Sciences. How can we use this for regional collaboration for example along with Bangladesh or other neighbouring countries in South Asia?

Dr.Krishnan:

yeah I think because normally during the IOD years, this year also we saw a lot of monsoon depressions developing low pressure systems in the Bay of Bengal and we really need to understand that generally we have seen in quite a few cases during the IOD years the low pressure systems are forming in the Bay of Bengal, they're moving Westward and producing rain so it has implications even for the region for the Bangladesh region in all the Rim countries around India and Africa for instance East Africa. Ethiopia gets a lot of rainfall smer time. so I see a big teleconnections with these modes of variability having important role in the precipitation the Bangladesh region over the regions of Africa. I think we need to enhance our scientific collaboration and improve the models and so working together with these Regional Partners will be very very important. I think, also in the Indo Pacific region, training and capacity building has to be developed in this region already. We need to further enhance and strengthen that and have good scientific collaborations.

Dr.Roxy Mathew Koll:

This activity together with Cordex is part of that Regional collaboration. yeah thank you thank you very much krishan.

Dr.Krishnan:

I know thank you Roxy. yeah maybe I'll wait for one or two minutes for Swapna. I don't.

Dr.Roxy Mathew Koll:

yeah so all panellist, we are extending for 15 more minutes considering that we have a very tight discussion here. Now Swapna, along with the ipcc report she also is a sea- level expert. yeah so Swapna what is your takeaway. I'm not extending the question but from ipcc the same question that I posted for Krishan I'm asking you what's your takeaway from the work that you have done so far concerning the region?

Dr.Swapna:

yeah thank you, Roxy and good morning all and first of all I would like to extend thanks for hosting this event as part of the ICRC-Cordex and also my climate risk and the safe landing climate activity that me and Svetlana are part of. Thank you so much. yes we had an interesting talk from Svetlana about the increasing extreme sea levels along the global cost lines and also along the Indian Ocean coastline she has highlighted. Yeah, I contributed to the chapter four of the IPCC report wherein we looked at the future projections in the climate and one of the emphasise what we got is that we will be Crossing 1.5 degrees in the coming decades. so as we move on with increase in the warming extreme events are projected to increase and the characteristics of the extreme events itself are changing by the human activities and when we look at the indopacific region where we see that sea level is rising that is one of the dominant impacts of warming of the Indian Ocean and the Seas surrounding us and that the region like Indian Ocean region is home to 2.6 billion people that contributes the 40% of the global population. So we need to understand how the extreme sea level is increasing, and how we can address these changes. One of the things that I would like to highlight is that as Svetlana also mentioned, because these are the coastal processes we don't have the very high resolution modelling along the coastlines. so as we can have an adequate address like how these are affecting our coastlines. We always rely on the CMIP6 projections; they are like more power. so we need to have a multiple approach like we have already the tight gauge information from the along the coastlines and we also have to integrate like the AML methods or something like that whichever available observation is there that has to be integrated and also look at the projections from the models how they are projecting, and our own study we see that yes extreme sea level events one of the point what IPCC report also suggest that extreme sea level events that previously occurred once in 100 years could occur annually by the end of the century see if that is true for the Indian Ocean region also. our own research finds that yeah extreme sea level events are in. so we need to have some adaptive policies to be framed. As a global modelling Center what we have contributed is to the CMIP6 and IPCC assessments and our own projections, we are trying to understand how these are going to change along the coastlines. I hope this will help to have more adaptive measures so that we can have a resilient South Asian population. Thank you Roxy.

Dr.Roxy Mathew Koll:

Thanks Swapna. so I have a very quick followup question so this was a question that Quang had sent to Svetlana. but I think you can answer this question as well. The question was what are the factors that lead to variations in sea level rise among different regions around the world? and I think you have correctly worked upon the same question particularly for the Indo Pacific region. Maybe you can give a quick short answer.

Dr.Swapna:

yeah, the major causes to the global sea level if you consider it is the mass addition because the Glaciers are melting that is adding adding more to the ocean so that is the major cause for the global but we see the tropical oceans it is a thermal expansion because ocean is taking more than 90% of the heat in the climate system is going into the oceans. more heat is going into the oceans they expand, the thermal expansion that is another major cause for the sea level rise if you consider the tropical regions.

Dr.Roxy Mathew Koll:

Thanks Swapna, so we will move on to the other panellist now and we are also thanks Krishan.

Dr.Krishnan:

Thank you Roxy.

Dr.Roxy Mathew Koll:

Yeah, we also hope to aggregate all these discussions into a report or article. We will get back to the panellists and speakers during this process so that we can publish the key challenges and the way Forward in terms of the Indo-Pacific region. so we wanted to give a chance for the interviewers as well the chairs of each fire set to chat. so I have posted the join question in the chat itself. so Shipra I will start with you. You know, you already had a quite perfect discussion with Quang, so based on your discussion that we had here or based on your own understanding, what do you think is the way forward in utilising climate research and modelling for Action in the Indo-Pacific ?

Shipra Jain:

yeah, so as I'm answering this not only from this meaning itself but also from my experience that I've accumulated in the last five years working in the area of Climate Services. So two things I want to mention is that first, I think there is a need to realise that transformation of climate information to climate action is not a linear chain process, it's not a value chain process. It's a value cycle. so of course science can inform actions like such has also been highlighted. but actions can in turn also inform science and we still need to close this Loop and make it a cycle. Secondly I feel that there is also a need for climate translators of course, like I think that there's a lot of perception that if you get training for communication you're excellent for your job but like any other skill just getting training doesn't make you fit for that role. so we really need to acknowledge that as a talent and a skill and if possible professionalise those activities. So I think that there are a lot of big communities who work at the intersection between science and society and if we can professionalise those roles it will also speed up the translation process of using the information we have for better or resilient climate action. yeah just these two things.

Dr.Roxy Mathew Koll:

Right, those two points are quite important and we are taking note of that moving on to you Chirag do you have some points to add on from your experience or from your today's interaction.

Chirag Dhara:

yeah thanks, thanks very much Roxy. Maybe one point I would make although I can't resume to propose a solution it's more highlighting or spotlighting the issue. It's that climate modelling is agnostic to developmental issues and very often some of the impacts are not just coming from climate change. they're also coming from the kind of development that's happening. There are winners and losers in that process. So for example, if you took the example of the Sundarbans on the eastern coast of India, there is sea level rise to be sure, there's extreme sea level rise, there are tropical Cyclones that hit that region. India and Bangladesh are affected quite severely but there's also a lot of damming of rivers. Upstream of the major rivers that flow into the sundarbans and that reduces silt to the sundarbans and therefore there is erosion is now the dominant process in the sundarbans whereas because the influx of sediment has reduced and so the relative sea levels in the sundarbans would rise even in the absence of glacier melt, global warming and climate change. yeah in addition in many parts of the world there's groundwater extraction which is unsustainable and that itself also causes land subsidence and therefore in relative terms sea levels will rise even in the absence of climate change of global warming and so our Solutions are modelling if they have agnostic to this issues we may solve we may try to solve a lesser problem or a lesser version of the problem than the true problem that exists because of the largest system that is climate and human societies and the economy. so again in some sense these are in the impact models but to make them regionally relevant we need to consult with the people that actually live in these regions much as what Shachi proposed it needs to be a bottom up approach and these concerns need to be very fully integrated into these models to make them relevant to people that live there and solve the problem in its entirety rather than just climate being taken as the whole issue.

Dr.Roxy Mathew Koll:

That's quite an important take away from this discussion and from your own experience and more connecting to the ground level experience as well yeah. we will move on to Svetlana who gave key talk and I saw that Shipra already had some questions posed to Svetlana which is quite important at this level. Could you ask that question?

Shipra Jain:

yeah, so my question is actually about the IPCC report and it doesn't only concern sea level rise in particular but I said sea level rise because Svetlana is expert in that. So we know that with every IPCC cycle there is an update in the numbers whether it's the worst case scenario or mean level rise or the frequency of streams in especially in the case of sea level rise for example if we build Coastal defences. the stakeholders are planning for like 20 30 or even more years out and the IPCC cycle is roughly like seven to 10 years as a pause and with each cycle there's an update in number so we also get this question from users that how do we plan for next 50 years if you keep updating the numbers every five or seven years so in that scenario what do you think is the best approach to communicate to the users that it's a evolutionary process and our understanding about the sea level rise is also increasing with time and that's why number changes?

Svetlana Jevrejeva:

Well I think in general, I would say that in a way it's very good that every IPCC report is improving and maybe numbers and scenarios are changing but it reflects our advance in understanding the impact of climate change specifically on sea level and so on. I mentioned that huge advance in producing Regional projections. 10 years ago it will be just Global number so I think in a way we see huge development but I also will say that we mention stakeholders but they have very complex and different needs some of them asking up to 2,300 what will be because there is a infrastructure on a cause designed to last for very long time and of course there is a short term interest and I think scientific Community currently trying to address that what was mentioned about this internal variability and role of internal variability and there are a lot of projects now about decadal variability and how we could make better prediction not projection this but next 10 years 20 years and I think scientific Community trying to address these social needs and interest in stakeholders in different dimensions. but also we have to admit that it's such a complex issue and there is no simple solution. because needs are very very different and I think we could see progress and I think it's quite a lot of potential improvements in the future. but I mention and I think there is a need and I think the scientific Community most probably will coordinate integration of climate models with impact models and tools for decision making for short term and for long term and things like that. I think, there are plans and climate research program putting those things on a 10 years plan what should be developed as it previously it was about CMIP for example like you know long time ago CMIP was just originated and developed. so I think we know the kind of questions and we're trying to address them. We will see how it goes but it was a very interesting discussion and I really appreciate everybody's opinion. Thank you.

Dr.Roxy Mathew Koll:

Thank you, we would like to have some additional points from Arvind as well and then we will have takeaways from Quang, Chris and Shachi and then we will close the meeting.

Arvind Singh:

yeah thanks Roxy, so this is of course not from this discussion whatever we experience in terms of communicating what we do or what as a community do and something taking from what Chris says about uncertainties and Chirag pointed about something that we clearly know. So I think we should have a priority list of what we know more clearly so in terms of for example the extreme rainfalls it is quite clear now that this is all because of warming of this planet and there cannot be any other reason for this. So some priority list and what is the level of uncertainty we have that order and trying to communicate to the policy makers to the public or writing what exactly you do Roxy you know communication is not just putting on Twitter, you go on TV, we can write to newspapers. I mean why I never could think you know sometimes it is puzzling that we pay so much for publishing the paper in journals right why can't we pay a little bit amount of money in the newspaper we write which will be communicated and they may also want to take it for free but do we make you know sufficient effort to reach out to them so this is what we should learn and and you know try to communicate. this is one point about the communication what are the key takeaways we should have a Clarity. the second point is that I think the global warming climate change in broadly and then sea level rise many of these aspects have got well deserved attention however on the other side being a oceanographer myself I think some of the aspects like ocean acidification which is known to a certain Community but for example ocean deoxygenation which will have a far-reaching impact within the ecosystem and it has not got the attention that it it deserves so how do we go in that direction because I think probably it doesn't directly affect us. we do not see it, the extreme events, we see them the warming, we see it you know the monsoon the droughts and flood. we see it so we get connected to it the ocean deoxygenation acidification all these we do not see and so some effort should also be made in this direction to to see what's going on in Communications. Thank you Roxy.

Dr.Roxy Mathew Koll:

Agree on that social responsibility and also looking beyond into the ocean ecosystem changes. as well thanks a lot, quick one minute take away concluding remark.

Doan Quang Van:

Okay so okay thank you first I want to thank Roxy and the team for a really excellent event that's I really honoured to be joining so for me from my perspective it's a very good opportunity to learn the diversity of the climate chain Community. That's their larger scale research like sea level rise or human dimension on a regional scale like me to do City so and I hear a lot of the word Communication in this discussion. so yeah because our we just focus on our field so the very good opportunity that we connect and we build a framework that we can communicate with each other to know not only what we doing but other what is interested in and what we can adapt our action to other people need. so it's really inspiring to join this,I hope we can have just more than like some event like this in the future so thank you yeah.

Dr.Roxy Mathew Koll:

Thanks a lot one and I'm moving on to Shachi. Shachi I think I'll combine this with a question from Aditi Despande, I mean this is connected to what you generally work on. So how can scientists work on addressing the role of geopolitics in climate policy formulation?

Chi Huyen Truong:

That's too big a question. I would not attempt to answer. But let me be brief. I think climate action has to be a collective action based on mutual understanding and respect of all not just stakeholders but also between Sciences, social sciences, scholar of humanities, artists, social media, influencers and I think we have not mentioned the term self-reliant mindset because you're talking about external funding donor driven, demand driven. We are still very much operating on the current Paradigm of practice. I think there must be a shift to boost self-reliant mindset on the ground but also the scientist Community as well. In terms of you know we can make things happen without too much of the external Notch. Not until then I don't think any solutions will be really grounded for the lasting impact. I would not be able to respond in a justifiable way but it links to the attitude and behaviour because you know when Svetlana started with actually integration, how modelling can be more effective in fact you know there are already a movement to integrate human and social behaviour into Climate science behaviour as well and it brings to the future leadership and education because you talk a lot about communication but the future, we need to actually already start to school kids at the generation not Z but Alpha to make them understand the importance of interconnectedness, mutual dependence and share responsibility for the planet earth. I'd stop here.

Dr.Roxy Mathew Koll:

The beautiful insight is Shachi and we are sure to collect all these insights. yeah, moving on to you Chris. Chris thanks for coming early at your time and please.

Chris Jack:

Thanks so much. It's been nice to watch the sunrise out the window as we've been talking. yeah, thanks I can't. I'm not sure what I can add beyond what Sachi just finished with. I think, this integration of different ways of thinking about the problems and the challenges and different ways of approaching Solutions I think is really key sometimes I get really despondent at the slow progress in adaptation resilience across the world but particularly in Africa where I'm from and I keep asking myself the question why is it not happening? Why are these changes not happening? and you know so often it's not through a lack of science it's not that the evidence isn't there, it's not that the will isn't there, it's just we're not bringing the pieces together that something is broken and I think Sachi was really touching on this and I think we need to keep asking questions around the mode of bringing about these changes the dependence on external funding programs and projects that come and go and leave citizens exactly where they were before I don't have the answers but I think this discussion has been great I think what we need is more of these discussions with more different perspectives asking challenging questions and saying why aren't things working? How can we shift things? I think there are glimmers of hope. I think we've had some today where we can we can see that when you do shift things around change can happen local expertise can come to play and have local reliance and local solutions as well as the big Global IPCC Science coming into the picture so let's keep having the conversations and being honest and open and challenging each other. Yeah, thank you very much.

Dr.Roxy Mathew Koll:

That's a positive way forward, on to you aditi , yeah Moving on to closing discussion.

Aditi Modi:

Thank you everyone for such an interesting panel discussion. we actually, some of the points we could resonate very well with and so now as we wrap up today's event it's clear that or I believe at least that our discussions have eliminated actionable Pathways for impactful climate action in the indopacific region and we have dived into some crucial topics like rising sea level, urban climate Dynamics and the necessity for climate research in Africa and these insightful contributions from our wonderful speakers and all of you from our engaging audience highlights our Collective commitment towards tackling these pressing climate challenges and I want to extend my sincere gratitude to each and everyone of you for your valuable contributions and let's harness this moment and drive this real change towards the sustainable and climate resilient future and so yes thank you for being an essential part of the current dialogue. it's just not goodbye it's a call to action. so yes take care let's keep pushing for a better world. Thank you everyone for joining. Thank you everyone from the audience.

Chi Huyen Truong:

Yes, let's keep in touch. Thank you

Shipra Jain:

Thank you much