

**Workshop Report**

# **Building Resilience to the Risk of Compound and Cascading Disasters in the Context of Climate Change**

**Launch of the New e-learning Course on AP-PLAT**

---

**Workshop Report**

**Building Resilience to the Risk of  
Compound and Cascading Disasters  
in the Context of Climate Change**

**Launch of the New e-learning Course on AP-PLAT**

**2022**

**Ministry of the Environment Japan**

---

**Workshop Report**

**Building Resilience to the Risk of Compound and Cascading Disasters in the Context of Climate Change  
Launch of the New e-learning Course on AP-PLAT**

Copyright © 2022 Ministry of the Environment Japan. All rights reserved.

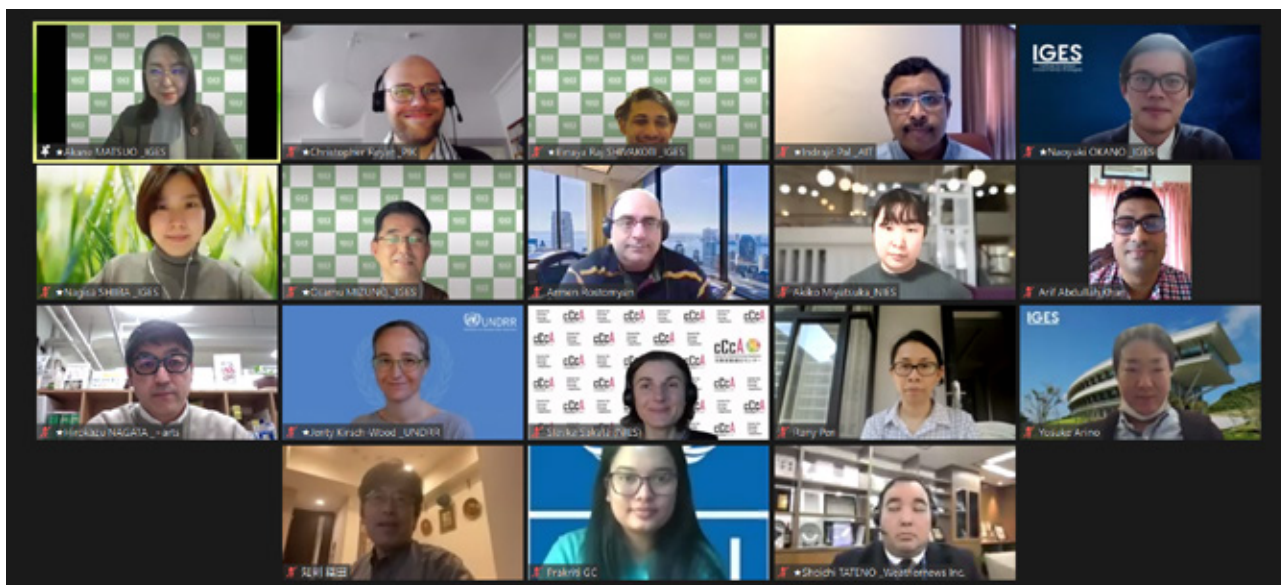
No parts of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or any information storage and retrieval system, without prior permission in writing from the Ministry of the Environment Japan.

---

# Contents

<b>1. Background and Objective</b>	<b>1</b>
<b>2. Programme of the International Workshop</b>	<b>2</b>
<b>3. Summary of the Sessions</b>	<b>3</b>
Session 1: Building Resilience to the Risk of Compound and Cascading Disasters: Systemic and Complex Challenges	3
Session 2: Implementing Resilience Enhancement Measures by Integrate DRR-CCA	7
<b>4. Reflections and way forward</b>	<b>13</b>

The International Workshop “Building Resilience to the Risk of Compound and Cascading Disasters in the Context of Climate Change: Launch of the New e-learning Course on AP-PLAT” was held online on 21 January, 2022, organised by the Ministry of the Environment, Japan (MOEJ) and co-organised by the Institute for Global Environmental Strategies (IGES). It marked the official launch of the new e-learning course on AP-PLAT, “Building resilience to compound and cascading disaster risks.” It gathered leading scholars, experts and practitioners in the field of disaster risk reduction and climate change adaptation to discuss challenges of compound and cascading disaster risks and how we can better prepare for them. This report summarises the stimulating discussions that took place at the workshop.



# 1. Background and Objective

In the era of the climate crisis, we see the deepening risk of disasters in every corner of the world. The Japanese government’s Joint Message on the Synergy between Climate Action and Disaster Risk Reduction, by the Minister of the Environment and the Minister of State for Disaster Management, calls for integrated approaches for disaster risk reduction and climate change adaptation in this era. In the wake of the COVID-19 pandemic, there is also a growing need to address cascading and compound effects of pandemics and disasters by considering system-wide impacts. In this context, MOEJ has developed an e-learning course “Building resilience to compound and cascading disaster risks” with IGES. The aim of this e-learning course is to carry out capacity building for local government officials/decision-makers so they can implement

robust management plans against compound and cascading disasters like hydro-meteorological disasters in the COVID-19 era. The course is part of the capacity development programme provided through the Asia-Pacific Climate Change Adaptation Information Platform (AP-PLAT). This international workshop officially launches this e-learning course and sparks discussions amongst a broad range of stakeholders, and further discusses the capacity gaps and needs to strengthen disaster management at the local level against compound and cascading disasters. The discussion at this international workshop is, by itself, instrumental in transforming this e-learning material into future actions for disaster risk reduction and climate change adaptation.

## 2. Programme of the International Workshop

Duration	Agenda
5'	Opening Remarks and Explanation of the Purpose of the Meeting <b>Genichiro TSUKADA</b> , Director of Climate Change Adaptation Office, Ministry of the Environment, Japan (MOEJ)
16:05-17:10	1st session
5'	Introduction of Session 1: Introduction of the AP-PLAT Capacity Development Component <b>Osamu MIZUNO</b> , Programme Director, Institute for Global Environmental Strategies (IGES)
15'	Launch and Introduction of the AP-PLAT e-Learning Course: Building Resilience to Compound and Cascading Disaster Risks <b>Binaya Raj SHIVAKOTI</b> , Senior Policy Researcher, Institute for Global Environmental Strategies (IGES)
10'	Keynote Speech: Compound and Cascading Risks: Reflections from Down Under <b>Akhilesh SURJAN</b> , Associate Professor, Research & Theme Leader, Humanitarian, Emergency and Disaster Management Studies, Charles Darwin University
10'	Presentation 1: Scoping Study on Compound, Cascading and Systemic Risk in the Asia-Pacific (AP-STAG) <b>Rajib SHAW</b> , Professor, Graduate School of Media and Governance, Keio University
10'	Presentation 2: International Policy Developments in Response to Compound and Cascading Risks: A Focus on Systemic Risks in UNDRR <b>Jenty KIRSCH-WOOD</b> , Head, Global Risk Management and Reporting, UNDRR
10'	Q&A
5'	Break
17:10-18:30	2nd session
5'	Introduction of Session 2: <b>Akane MATSUO</b> , Policy Researcher, Institute for Global Environmental Strategies (IGES)
10'	Presentation 1: Transboundary Climate Impacts on Europe: Early Insights from CASCADES <b>Christopher REYER</b> , Potsdam Institute for Climate Impact Research, Research Department 2: Climate Resilience
10'	Presentation 2: Implementing the DRR-CCA Integration Through the Idea of Adaptive Governance <b>Indrajit PAL</b> , Associate Professor and Chair, AIT School of Engineering and Technology
10'	Presentation 3: Weather and Climate Service with Cutting-Edge Technologies for Climate Change and Disaster Risk Reduction <b>Shoichi TATENO</b> , Section leader of Public Private Partnership Data Strategy & Corporate Development Initiative Sustainability Committee Weathernews Inc.
10'	Presentation 4: Global Outreach of Entertaining Disaster Prevention Education from Japan <b>Hirokazu NAGATA</b> , Chief Director, +arts (NPO)
20'	Breakout sessions: Audience to be divided into three breakout groups to discuss the following topics
-	Their experience and views on compound and cascading disaster risks
-	How to use this e-learning material
-	What kinds of capacity development tools are needed in the future on AP-PLAT Moderators of each breakout sessions are: <b>Akane MATSUO</b> / <b>Nagisa SHIIBA</b> / <b>Naoyuki OKANO</b> , Policy Researcher, Institute for Global Environmental Strategies (IGES) All the presenters and audience will join
10'	Report from breakout sessions: Commentator Christopher REYER - Potsdam Institute for Climate Impact Research <b>Akane MATSUO</b> , Moderator
5'	Closing remarks <b>Yasuo TAKAHASHI</b> , Executive Director, Institute for Global Environmental Strategies (IGES)

---

# 3. Summary of the Sessions

## Opening Remarks

Mr. Genichiro TSUKADA, Director of Climate Change Adaptation Office, Ministry of the Environment Japan provided the opening remarks. He welcomed the participants and presented the significance of the theme of the workshop. He set the scene by mentioning that weather-related disasters are increasing in intensity year by year, and adaptation to the impacts of climate change is now seen as an urgent issue around the world. He stated that the workshop has been organised in order to deepen our understanding of compound and cascading disaster risks so that we can accelerate our efforts to prepare for them. He concluded his remarks by hoping that the workshop would help deepen understanding of these issues, introduce scientific findings, share good practices, and strengthen disaster risk reduction measures and adaptation strategies in various countries. In addition, a flexible approach is required to provide assistance



for compound disasters. In Niigata, financial aid was provided before the government determined the thresholds for compensation because it was clear the situation was different to previous years and could not be explained by snow alone. This was an exceptional measure which allowed the fast provision of aid money to victims.

## Session 1: Building Resilience to the Risk of Compound and Cascading Disasters: Systemic and Complex Challenges

The first session marked the formal launch of the new AP-PLAT e-learning course, “Building resilience to compound and cascading disaster risks” featuring reflections by leading experts on the deepening complexity of compound and cascading disaster risks. The purpose of this first session was to provide a detailed introduction to the e-learning course, and

to present the challenges posed by compound and cascading disasters in the era of the climate crisis. The session also reflected upon gaps in policy and practices in Asia-Pacific regions that this new E-learning course is trying to fill. The session was chaired by Mr. Osamu MIZUNO, Programme Director, IGES, and had four speakers.

### a. Launch and Introduction of the AP-PLAT e-Learning Course

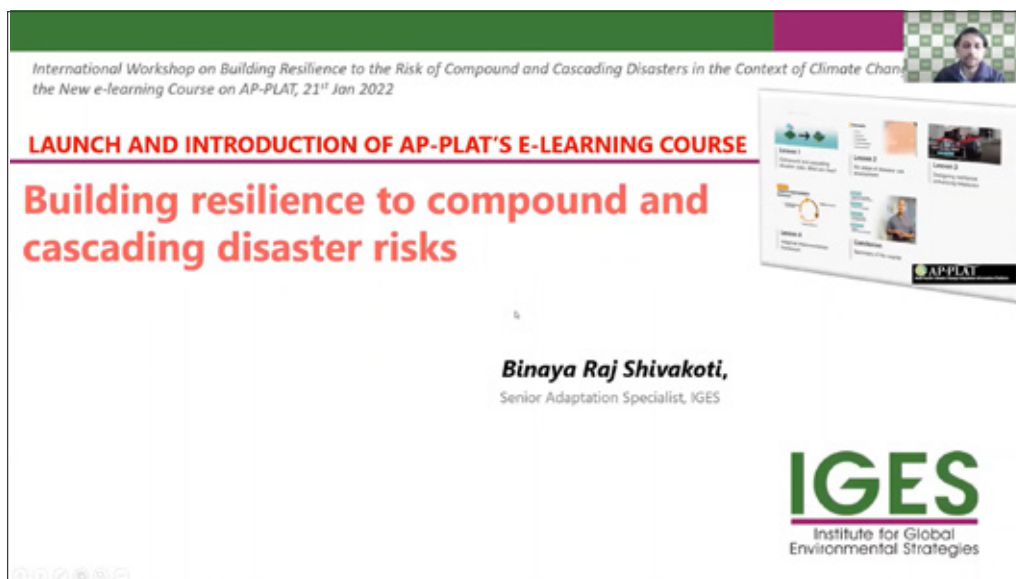
Dr. Binaya Raj SHIVAKOTI, one of the developers of the e-learning course, presented the background, contents and follow-up steps of the course followed by its official launch. While the world is still struggling with the COVID-19 pandemic, the need to deal with a complex scenario for disaster risk management is emerging. On top of that, climate change impact

is becoming responsible for extreme hydraulic meteorological disasters often involving profound and cascading effects. However, governments, sectors, communities and individuals are less likely to be fully aware of the complexities involved and may not have access to the necessary knowledge. Therefore, MOEJ in collaboration with IGES developed an e-learning course



attempting to highlight the importance of compound and cascading disaster risks, to encourage governments and relevant stakeholders to think seriously about this issue in their disaster risk management and climate change adaptation planning. This self-paced online course is openly available for all audiences and consists of four lessons: 1) Introduction to compound and cascading disaster risks; 2) Risk assessment; 3)

Designing resilience enhancement measures; and 4) Adaptive implementation framework. Downloadable video files with full-script texts, worksheets and a case studies booklet are also available online ([https://ap-plat.nies.go.jp/adaptation\\_literacy/resources/e\\_learning/drr/index.html](https://ap-plat.nies.go.jp/adaptation_literacy/resources/e_learning/drr/index.html)), which can be useful while organizing training sessions on related topics.



## b. Keynote Speech: Compound and Cascading Risks: Reflections from Down Under

Prof. Akhilesh Surjan delivered a keynote speech highlighting the emerging need to deal with compound and cascading disaster risks especially from recent experiences in the Pacific Region. The most recent disaster of an underwater volcano eruption in Tonga occurred on the 14 January 2022, resulting in severe socio-economic damage in the country and the region, while the COVID-19 pandemic made the operation of international assistance more complex. He also introduced the case of Australia which is affected by an average of 10 cyclones every year. The Aboriginal communities in the northern part of the country are more vulnerable to such disasters in terms of their health, education and employment conditions especially when COVID-19 infections had spread

during the cyclone season. Australia is a member of the Coalition for Disaster Resilient Infrastructure (CDRI), and it suggests a multiple-sided approach to prepare for and respond to natural, biological and technological threats. Finally, Prof. Surjan suggested that the highlight of these training materials is creating resilience in the critical infrastructure system, which is essential for everyday life with energy, food, water, transport, communication, and most importantly, health. These training materials could also provide reciprocal experiences for sharing and mutual learning platforms without a division of societies between South and North.[drr/index.html](https://ap-plat.nies.go.jp/adaptation_literacy/resources/e_learning/drr/index.html)), which can be useful while organizing training sessions on related topics.

## E-learning training package on strengthening resilience: some suggestions



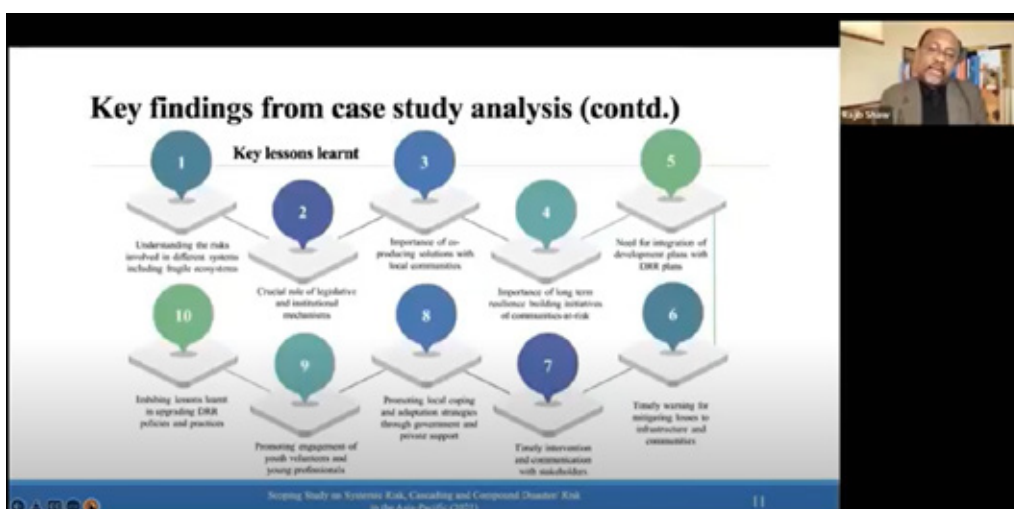
- COVID-19 has proven that all countries - be it developed or developing countries OR small or large economies – all are equally vulnerable. There is no safe-heaven !
- ‘Cascading effects of disaster’ received heightened attention since Tohoku Triple Tragedy of 2011.
- COVID-19 caught the world by surprise, but the legacy of Ebola, MERS, and SARS meant that several Asian and African nations had systems in place to mitigate the severity of the pandemic.

21

### c. Scoping Study on Compound, Cascading and Systemic Risk in the Asia-Pacific (AP-STAG)

Prof. Rajib Shaw introduced a scoping study on compound cascading risks and systemic risks conducted by the Asia-Pacific Scientific and Technical Advisory Group (AP-STAG), which is the regional scientific and technical advisory group of UNDRR. The objectives of this study was to analyse and learn from the good practices of management of compound, cascading and systemic risks, understand the gaps and challenges, and develop a basic framework for enhancing risk governance. This study has two sets of analyses: drawing up 40-plus case studies from the Asia-Pacific region supplemented by literature reviews and a series of expert consultations. The results of the study provide useful information for establishing a few principles of

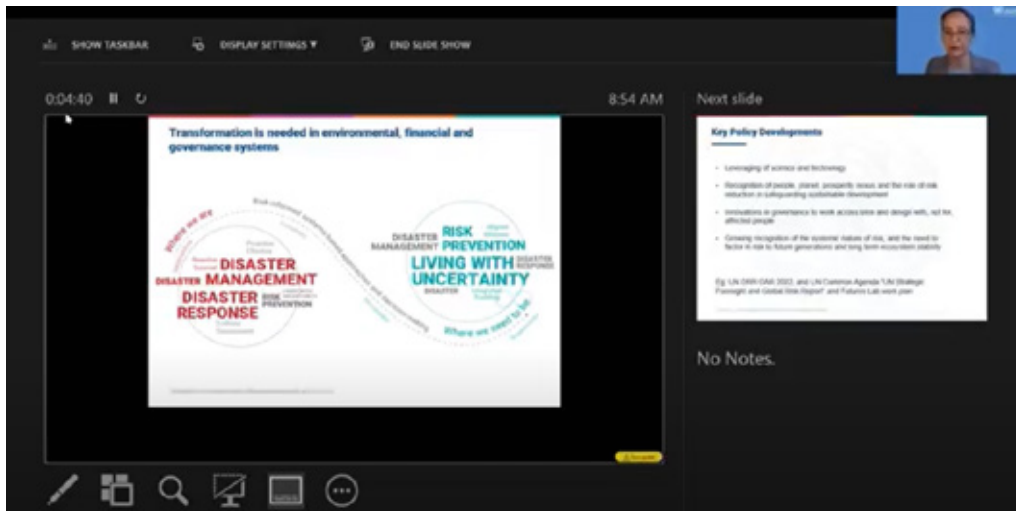
managing particular issues of compound cascading and systemic risk, and defining the types of consequences for those complex risks. He then stated that the report identifies 10 key lessons and defines the types of adaptive strategies including timely intervention and communication with stakeholders, involvement of youth volunteers, young professionals and upgrading different types of data policies and practices. Prof. Shaw stressed the need for high-level investment in the social system for reducing vulnerability, advancing social well-being, encouraging an ecosystem-based approach, as well as different types of innovative and risk-informed planning processes.



#### d. International Policy Developments in Response to Compound and Cascading Risks: A Focus on Systemic Risks in UNDRR

Dr. Jenty Kirsch-Wood presented the UNDRR's recent activities on international policy development in response to compound and cascading risks. She firstly stressed that risks are impacting across the world and are increasing, while the global systems of the use of resources are currently not sustainable. This is because not only the number of disasters but also the losses from those disasters are increasing at the same time, and she noted that transformation is needed in environmental, financial and governance systems, and risks need to be managed in a new way, addressing the issue of uncertainty. She suggested that new types of collaboration are also needed, for example, combining knowledge of the scientific community and the financial sector. One of the key policy developments is the recognition of the nexus between people, planet and

prosperity: if we do not act simultaneously to address each of these issues, we will not achieve sustainable development. She then introduced several research priorities within the global landscape including; understanding root causes; supporting just transitions and enabling transformative governance that would improve overall understanding of compound and cascading risks. Lastly, Dr. Kirsch-Wood called for more investment in understanding how disasters impact countries and communities, thereby improving effective decision-making. She also stated that investments in risk prevention need to be backed up by more flexible, agile consultation and governance systems, as well as stressing the importance of a reworking of financial systems to value sustainable development and take into account the real costs of risk.



## Q&A

At the end of the Session 1, the four panelists responded to questions from the audience about “risk assessment and preparedness” on compound and cascading disasters in comparison with normal, single disasters. The panelists highlighted some important points such as a holistic perspective to assess structural

vulnerability and exposure which has been built into our current systems, proper understanding of the concept of compound and cascading disaster risks including uncertainty at the local level, and multi-stakeholder partnerships beyond sectors and regions.



## Session 2: Implementing Resilience Enhancement Measures by Integrate DRR-CCA

The second session aimed at showing the way forward to translate the e-learning materials into action. The purpose of the second session was to discuss cutting-edge research, technologies and tools that are useful in going beyond the e-learning course and actually designing resilience enhancement measures. In the latter half of the second session, the workshop

divided the presenters and audience members into breakout groups where IGES researchers led interactive discussions among participants. This breakout session gathered ideas from participants and identified future difficulties and needs for the launch of this e-learning course. The session was chaired by Ms. Akane MATSUO, Policy Researcher at IGES, and had four speakers.

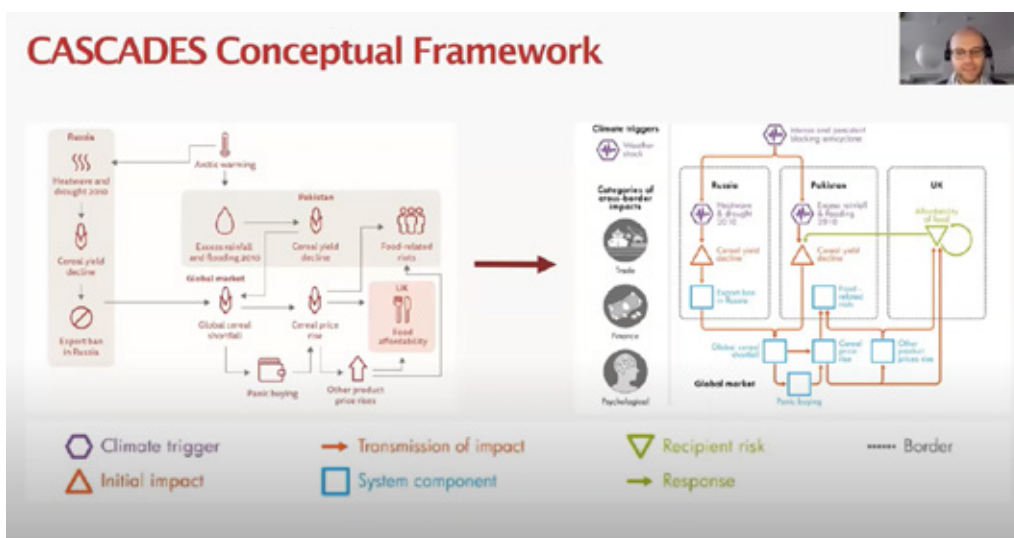
### a. Transboundary Climate Impacts on Europe: Early Insights from CASCADES

Dr. Christopher Reyer gave a presentation based on the EU research project CASCADES. First Dr. Reyer introduced the objective of the research project in terms of the urgency and very strong commitment in the European Commission to better understand how external climate can have cascading impacts to the EU. In response to this objective, the conceptual framework for CASCADES was set out in a flowchart to help the audience visualise and understand the impact pathways

of climate impacts. As an example, he discussed how arctic warming is impacting food affordability in the UK through local, national and international pathways. The conceptual framework is composed of several key concepts such as climate trigger, transmission of impact, systemic component and recipient risk, which all inform how certain climate impacts create transboundary effects.

After introducing the conceptual framework of CASCADES, Dr. Reyer went on to explain how this framework can be instrumental in analysing compound and cascading disaster risks. For example, it sheds light on how impacts can be transmitted transboundary. As an illustration, he discussed how drought in Argentina, Paraguay and Brazil has cascading effects on Europe. He underlined that even when direct impacts from climate change are small in a recipient country, the impacts also reach a recipient country through implications for

migration, knock-on effects on livelihoods and human security, and knock-on effects on peace and conflict. In sum, the CASCADES framework will help to identify both direct and indirect climate change impacts, which is extremely helpful in the context of globalisation and interconnectedness of the world. Lastly, he explained how CASCADES intends to make this scientific finding into actionable policy recommendations through online simulation platforms and interactive workshops.



## b. Implementing the DRR-CCA Integration Through the Idea of Adaptive Governance

Dr. Indrajit Pal discussed the integration of disaster risk reduction and climate change adaptation with the concept of adaptive governance. First he introduced the importance of discussing cascading disasters with the acknowledgement that the new e-learning course on AP-PLAT is filling a critical gap in disaster management. He underlined the necessity to look at both cascading hazards, where one hazard triggers another, and cascading impacts, where the impacts of hazards trigger escalating impacts. To illustrate the difficulty to handle cascading hazards and cascading impacts, Dr. Pal mentioned the diagram prepared by UNESCAP which presents the cascading scenario planning-intersections of multiple hazards. He pointed out that the diagram grasps risk drivers, natural hazards, recurring biological hazards and novel biological hazards/large shocks, and shows the convergence of different hazards and cascading risks.

Then Dr. Pal introduced the concept of adaptive governance. Adaptive governance is a range of interactions between actors, networks, organisations, and institutions emerging in pursuit of a desired state for social-ecological systems. It is increasingly called upon to coordinate resource management regimes in the face of the complexity and uncertainty associated with rapid environmental change. Adaptive governance also pays attention to multiple governance levels encompassing global, international, state and non-state levels, as well as cross-scale integrations. With these features, adaptive governance is a model with a high potential to account for and respond to the converging hazards and cascading risks. To facilitate implementation of adaptive governance, he introduced the steps in adaptive governance cycle, and key principles for good adaptive governance. According to

Dr. Pal, there are three key aspects for integrating DRR-CCA through adaptive governance: integration in scale of concerns, integrating multiple actors, and integrating

multiple governance levels. These are the points for local government officers to reflect upon to build resilience in their own local contexts.



### c. Weather and Climate Service with Cutting-Edge Technologies for Climate Change and Disaster Risk Reduction

Mr. Shoichi Tateno from Weathernews Inc. presented how private company can help in responding to disaster risks. He started by introducing the history of Weathernews Inc. It originates from the incident in 1970 in the port of Onahama, Japan, when the lives of 15 crew on vessels were lost due to the lack of sufficient weather information. Since then, the company provides risk communication services. He explained what the private sector is doing in contrast with the public sector. He compared Japan Meteorological Agency and Weathernews Inc. and discussed that there are three contrasting areas. In his view, private companies can complement what the public sector does by providing interactive communication platforms, warning dissemination and solutions for risks, and collecting data from customers.

Then, he presented concrete technologies for climate change mitigation, climate change adaptation and disaster risk reduction. For example, there are services for transportation infrastructure, weather forecast with user communities, and AI chatbot for DRR. For instance, weather forecast with user communities is the mobile application where users are called “Weather Reporters” and provide weather information from their locations, collectively with over 90% of accuracy. This responds to the need for more localized weather forecasts. With other services, Weathernews Inc. shows that effective user communication using the cutting-edge technologies leads to developing and strengthening the social resilience for disasters. Also, Mr. Tateno underlined that the efficient public-private partnerships are required for enhancement of new value creation in weather and climate services for DRR.



## Climate Change Adaptation



### Services for Transportation Infrastructure

In order to prevent and avoid traffic disruption by disaster as much as possible with limited resources, it is important to take efficient measures and methods. WNI has helped companies manage public transportation infrastructure, such as shipping, airways, road, and railways, by providing them solutions to weather related risks for a long time. The services includes high resolution weather forecast and prediction of weather risks, and they minimize the damages on transportation from natural disasters.



### Weather Forecast with User Communities

In recent years, there have been more cases of severe phenomena such as torrential rain, typhoons, heat wave and heavy snow caused by climate change, and demand for more localized weather forecast is increasing. Building up the resilient communities to mitigate disasters, the power of citizens is indispensable. WNI is making weather forecast in communication with mobile app users called "Weather Reporters" since 2005, and the accuracy of forecast achieves over 90%.

Copyright© Weathernews Inc. All rights reserved.

#### d. Global Outreach of Entertaining Disaster Prevention Education from Japan

Mr. Hirokazu Nagata from the NPO Plus Arts discussed his contributions to disaster prevention education in Japan. The essence of Plus Arts is to make disaster prevention education entertaining, and to foster creativity among the participants in education programmes. He first presented his idea that disaster prevention education needs to involve different types of people to be successful, sustainable and entertaining. Plus Arts disaster prevention education, Iza! Kaeru Caravan!, conducted a total of 560 events in 36 prefectures in Japan by 2019, as well as internationally in 21 countries by 2018 collaborating with JICA and

the Japan Foundation. For the international projects, the programme is localised for each country. For example, while it uses a frog character for the training of emergency transportation in Japan, programmes in other countries use local characters so that the children can enjoy it more. Their overseas educational programme has a lasting effect. Following the training in Myanmar, the local fire department team conducted 67 activities within 6 months, and a total of 15,472 children participated. They will continue to expand this educational programme so that more people have a basic understanding of disaster prevention.



## Programs of Iza! Kaeru Caravan!

### Hands-on programs to learn useful skills in times of disaster



● Target shooting game with water extinguisher



● Blanket stretcher time-trial



● Jack-up game

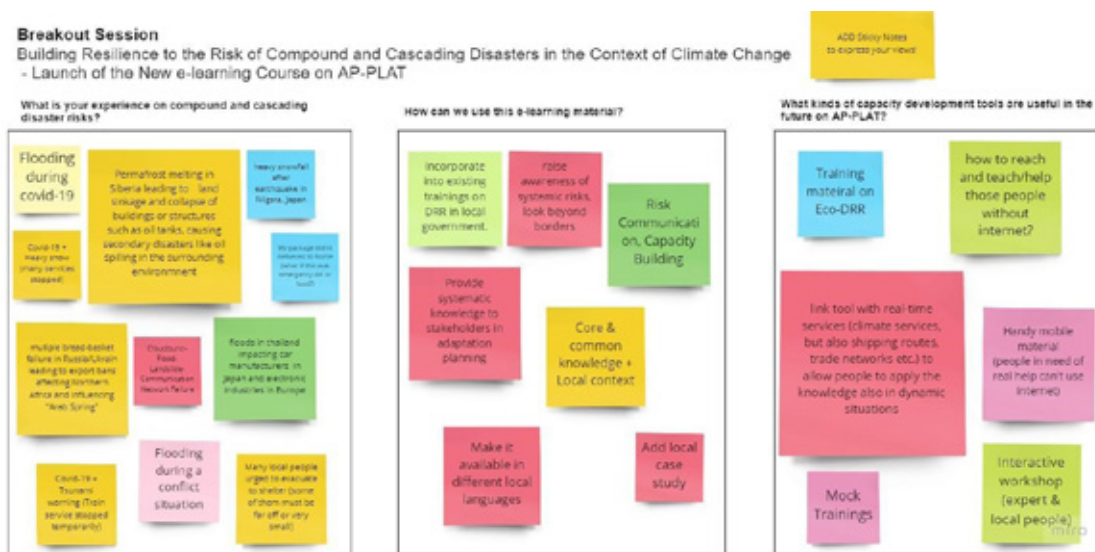


● Paper tray making

## e. Breakout session

In the breakout session, participants were allocated into three rooms to share their views and experiences relevant to compound and cascading disaster risks. Three guiding questions for discussions were: what is your experience on compound and cascading disaster risks; how can we use this e-learning material, and what kinds of capacity development tools are useful in the future for AP-PLAT. The session utilised the online whiteboard tool, Miro, to facilitate the discussion. Participants actively shared their opinions on the pressing issue of compound and cascading disaster risks, as well as their insights into how to conduct capacity development programmes with the new e-learning course, and how to fill future capacity gaps. For example, in one group, participants shared

their actual experience of compound disasters in India, where a cyclone hit a community in the midst of the COVID-19 pandemic, and disaster response measures did not function well due to restrictions on movement. Other participants shared experiences of the intersection between disasters and political crises such as conflicts, as well as impacts on other societal issues such as energy, human settlements and food supply. For instance, the COVID-19 pandemic impacted coordination of food supplies, which caused major economic losses. As a way forward, some participants pointed out that optimising the partnership between the private and public sectors would be essential to prepare for future disasters.



## Comments and reflections on the breakout session

After listening to the outcome report from each breakout session, Dr. Reyer provided reflections and observations. First, participants mentioned that there are various tools and materials available for communities to implement DRR measures and some of them can still be applied to compound and cascading disaster risks. Dr. Reyer underlined that we need to make the most of these available resources to support vulnerable communities against compound and cascading disaster risks. He also shared that there was

an incident in Bangladesh when the compound disaster of flooding and the COVID-19 pandemic caused serious issues because despite social distancing measures, people still needed to evacuate. As an overall synthesis, he emphasised how the pandemic has unpacked a complex and multifaceted risk landscape in the current era. While this is certainly a severe challenge, he pointed out that we can learn lessons from the experience of COVID-19 and complex risks, and apply these to other social issues such as the climate crisis



and transformation to a sustainable society. He also added the perspective that social and cultural issues should be taken into account, such as gender issues, and taking care of children and other vulnerable groups. He concluded that while this workshop focused on adaptation, there is the parallel issue of mitigation.

We should seek to solve mitigation and adaptation through co-benefits and synergetic ways. He further emphasised that the learning platform provided by the e-learning materials and workshops such as this one will help build resilience for these pressing challenges.



### Closing remarks

Mr. Yasuo TAKAHASHI, Executive Director of IGES provided the closing remarks. He thanked all the participants and stakeholders for their active and valuable contributions to the workshop. He underlined that the issue of adaptation is attracting wider attention globally, as marked by COP26. He hoped that the

new e-learning materials on AP-PLAT will be widely disseminated to government officials and disaster management staff in those countries and regions in need. He stressed that IGES would continue to promote global adaptation efforts through various activities including AP-PLAT.



---

## 4. Reflections and way forward

With these inspiring presentations and stimulating discussions, the workshop strongly emphasised the need to understand and prepare for compound and cascading disaster risks, and explored the gaps and needs that the new e-learning course aims to fill. While the e-learning course is a step forward, the workshop also showed that it is just an initial step and it is vital to mobilise people and resources to actually strengthen the adaptive capacities of local communities. There are three outstanding issues that show the future direction for further activities on AP-PLAT.

First, we should foster more cross-regional discussions. While DRR and CCA challenges are localised, there are common challenges and issues to be shared. For instance, the presentation from the EU CASCADES project discussed research activities in the EU, but this has implications for other regions including Asia-Pacific regions. We need to strengthen knowledge and

experience-sharing across regions to respond to the ever-increasing challenges of compound and cascading disaster risks. Second, the workshop highlighted the necessity to strengthen multi-stakeholder cooperation and collaboration. As illustrated by the presentations from Weathernews Inc. and Plus Arts, private and third sectors have unique expertise that contributes to strengthening resilience. They showed cutting-edge technologies and a unique approach to disaster prevention education. Third, we need to tailor disaster risk understanding, assessment and preparation into each local context. As each presenter emphasised, and the stories shared in breakout sessions showed, local challenges vary from context to context and there are huge knowledge and expertise gaps to be filled. Going beyond the e-learning course, more action-oriented programmes and research are necessary to fully prepare for compound and cascading disaster risks.



