

Message from IPCC Sixth Assessment Report (AR6), Climate Change Impact on the Globe and Desirable Actions from Life Insurance Companies

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Scientific Findings from AR6 of IPCC

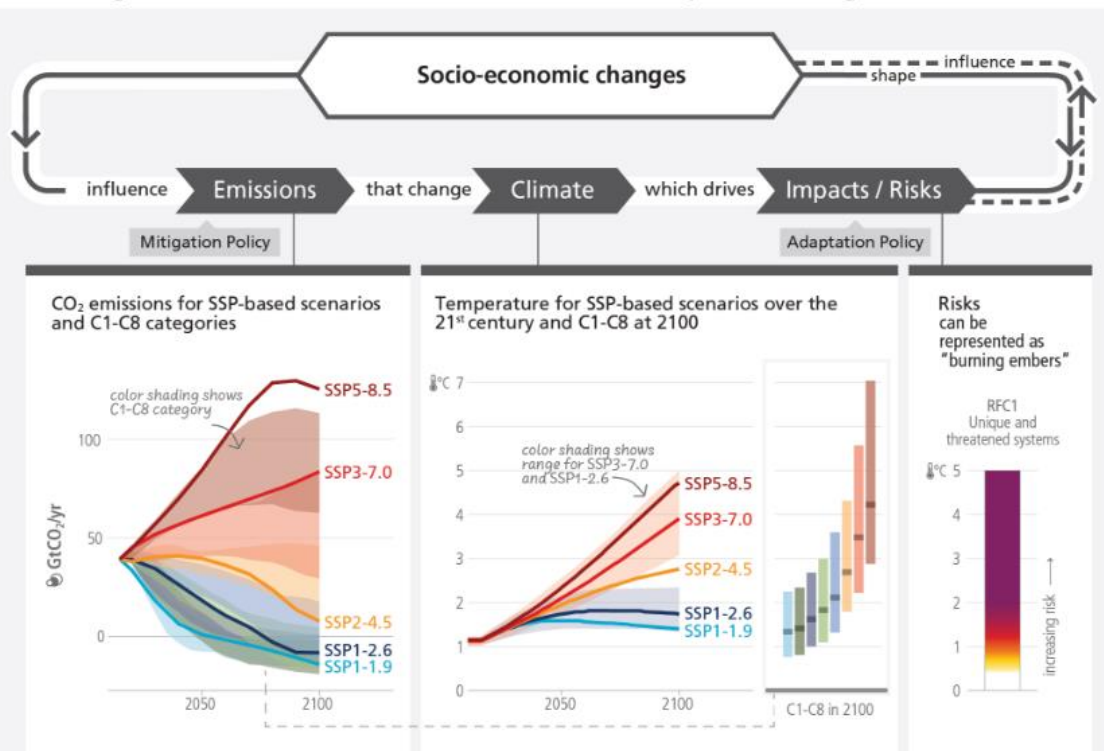
The main point and message from IPCC The Sixth Assessment Report (AR6) is that human-induced climate change is already affecting many aspects of life on Earth and will continue to do so in the future. The report provides the most comprehensive and up-to-date assessment of the physical science basis of climate change, the impacts and risks of different levels of global warming, and the options for adaptation and mitigation. Some of the key messages from the report are:

- It is unequivocal that human influence has warmed the atmosphere, ocean and land.
- Many changes in the climate system are unprecedented in thousands to millions of years, and some changes are now irreversible for centuries to millennia.
- Global surface temperature will continue to increase until at least the mid-century under all emission scenarios considered.
- Unless there are immediate, rapid and large-scale reductions in greenhouse gas emissions, limiting warming to 1.5°C or 2°C will be beyond reach. Climate change is already affecting every region on Earth in multiple ways, and the changes we experience will increase with additional warming under all the scenarios as is shown in Figure 1.
- Climate change is intensifying the water cycle, bringing more intense rainfall and associated flooding, as well as more intense drought in many regions.
- Climate change is affecting food security and terrestrial and marine ecosystems, as well as human health and well-being.
- Coastal areas will see continued sea level rise throughout the 21st century, contributing to more frequent and severe coastal flooding in low-lying areas and coastal erosion.
- Extreme sea level events that previously occurred once in 100 years could happen every year by the end of this century under high emission scenarios.
- Adaptation can reduce climate risks by enhancing resilience and lowering impacts, but it has its limits.
- Mitigation can reduce climate change by limiting or preventing greenhouse gas emissions and enhancing activities that remove them from the atmosphere.

(Figure 1)

Scenarios and warming levels structure our understanding across the cause-effect chain from emissions to climate change and risks

a) AR6 integrated assessment framework on future climate, impacts and mitigation



b) Scenarios and pathways across AR6 Working Group reports

Category in WGIII	Category description	GHG emissions scenarios (SSPx-y*) in WGI & WGII	RCPy** in WGI & WGII
C1	limit warming to 1.5°C (>50%) with no or limited overshoot	Very low (SSP1-1.9)	
C2	return warming to 1.5°C (>50%) after a high overshoot		
C3	limit warming to 2°C (>67%)	Low (SSP1-2.6)	RCP2.6
C4	limit warming to 2°C (>50%)		
C5	limit warming to 2.5°C (>50%)		
C6	limit warming to 3°C (>50%)	Intermediate (SSP2-4.5)	RCP 4.5
C7	limit warming to 4°C (>50%)	High (SSP3-7.0)	
C8	exceed warming of 4°C (>50%)	Very high (SSP5-8.5)	RCP 8.5

c) Determinants of risk



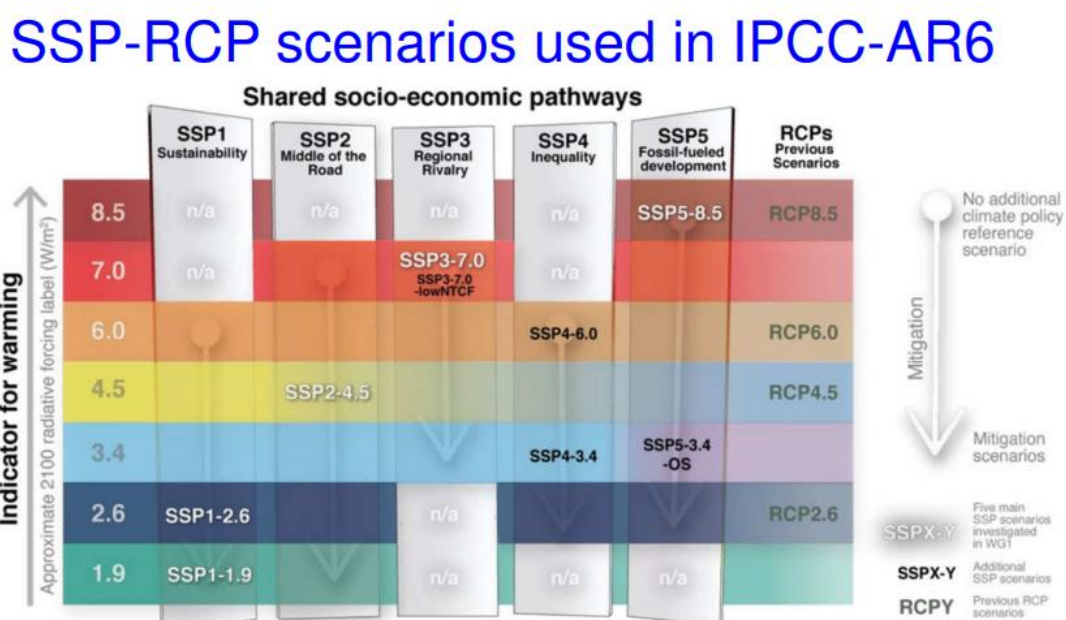
(Reference) IPCC AR6

Assumption of Shared Socio-economic Pathways (SSP) and Representative Concentration Pathways (RCPs)

AR6 is a comprehensive and authoritative source of information on climate change and its impacts. However, it is not easy for people to understand its findings and implications without knowing its underlying assumptions and scenarios. One of these scenarios is based on **five Shared Socioeconomic Pathways (SSPs)**, which describe different futures of human development, governance, inequality,

technology, and environmental degradation, which is illustrated and defined by Figure 2. These SSPs need to be explained concisely and clearly so that people can get interested in AR6 and imagine how it will affect their environment in the future. This is especially important for business people who need to increase their sustainability literacy and take actions to tackle climate change and biodiversity issues in their enterprises. Mr. Kiyoshi Takahashi, Deputy Director of National Institute of Environmental Studies (NIES), one of the creators of SSPs explained in the UNU Intensive Core (IC) courses (2023) that they are continuously revised based on new data and feedback. SSPs have to be focused and disseminated to the public and businesses to raise their awareness and engagement.

(Figure 2)



(Reference) IPCC AR6

SSP1: Sustainability (Taking the Green Road)

"The world shifts gradually, but pervasively, toward a more sustainable path, emphasizing more inclusive development that respects predicted environmental boundaries. Management of the global commons slowly improves, educational and health investments accelerate the demographic transition, and the emphasis on economic growth shifts toward a broader emphasis on human well-being. Driven by an increasing commitment to achieving development goals, inequality is reduced both across and within countries. Consumption is oriented toward low material growth and lower resource and energy intensity."

SSP2: Middle of the road

"The world follows a path in which social, economic, and technological trends do not shift markedly from historical patterns. Development and income growth proceeds unevenly, with some countries making relatively good progress while others fall short of expectations. Global and national institutions work toward but make slow progress in achieving sustainable development goals. Environmental systems experience degradation, although there are some improvements and overall the intensity of resource and energy use declines. Global population growth is moderate and levels off in the second half of the century. Income inequality persists or improves only slowly and challenges to reducing vulnerability to societal and environmental changes remain."

SSP3: Regional rivalry (A Rocky Road)

"A resurgent nationalism, concerns about competitiveness and security, and regional conflicts push countries to increasingly focus on domestic or, at most, regional issues. Policies shift over time to become increasingly oriented toward national and regional security issues. Countries focus on achieving energy and food security goals within their own regions at the expense of broader-based development. Investments in education and technological development decline. Economic development is slow, consumption is material-intensive, and inequalities persist or worsen over time. Population growth is low in industrialized and high in developing countries. A low international priority for addressing environmental concerns leads to strong environmental degradation in some regions."

SSP4: Inequality (A Road Divided)

"Highly unequal investments in human capital, combined with increasing disparities in economic opportunity and political power, lead to increasing inequalities and stratification both across and within countries. Over time, a gap widens between an internationally-connected society that contributes to knowledge- and capital-intensive sectors of the global economy, and a fragmented collection of lower-income, poorly educated societies that work in a labor intensive, low-tech economy. Social cohesion degrades and conflict and unrest become increasingly common. Technology development is high in the high-tech economy and sectors. The globally connected energy sector diversifies, with investments in both carbon-intensive fuels like coal and unconventional oil, but also low-carbon energy sources. Environmental policies focus on local issues around middle and high income areas."

SSP5: Fossil-Fueled Development (Taking the Highway)

"This world places increasing faith in competitive markets, innovation and participatory societies to produce rapid technological progress and development of human capital as the path to sustainable development. Global markets are increasingly integrated. There are also strong investments in

health, education, and institutions to enhance human and social capital. At the same time, the push for economic and social development is coupled with the exploitation of abundant fossil fuel resources and the adoption of resource and energy intensive lifestyles around the world. All these factors lead to rapid growth of the global economy, while global population peaks and declines in the 21st century. Local environmental problems like air pollution are successfully managed. There is faith in the ability to effectively manage social and ecological systems, including by geo-engineering if necessary."

Representative Concentration Pathways (RCPs) which are used in combination with SSPs are radiative forcing scenarios used in the IPCC's AR6 on climate change impacts and adaptation. Radiative forcing refers to factors that affect the Earth's energy balance, including greenhouse gases and aerosols. RCPs are consistent sets of radiative forcing projections for input into climate and atmospheric chemistry models, and are totally different from socio-economic scenarios. RCPs are classified into four types: RCP2.6, RCP4.5, RCP6.0, and RCP8.5, depending on the level of radiative forcing that will be reached by the end of the 21st century. The characteristics of each RCP are briefly explained below.

RCP2.6: In this scenario, radiative forcing peaks in the mid-21st century and then declines to 2.6 Watt/m² (Radiant flux leaving (emitted, reflected and transmitted by) a surface per unit area) by the end of the 21st century. This means that greenhouse gas emissions will decline rapidly and atmospheric carbon dioxide concentrations will stabilize. In this scenario, the impacts of climate change can be minimized, but this requires strong mitigation measures and negative emissions technologies.

RCP4.5: In this scenario, radiative forcing stabilizes at 4.5 W/m² by the end of the 21st century. This means that greenhouse gas emissions will peak in the mid-21st century and then gradually decline. In this scenario, the effects of climate change can be limited to some extent, but this requires moderate emissions reduction measures and improvements in energy efficiency.

RCP6.0: In this scenario, radiative forcing stabilizes at 6.0 W/m² by the end of the 21st century. This means that greenhouse gas emissions will peak in the second half of the 21st century and then decline slightly. In this scenario, the impacts of climate change would be significant, but they would require lower-level emissions mitigation and energy transitions.

RCP8.5: In this scenario, radiative forcing will reach 8.5 W/m² by the end of the 21st century. This means that greenhouse gas emissions will continue to increase throughout the 21st century. In this

scenario, the impacts of climate change will be very severe, but it assumes that few mitigation or adaptation measures will be taken.

The above is an explanation of the contents of the Representative Concentration Pathways used in IPCC's AR6. When you need to estimate the risk arising from climate change, you need to choose the combination of SSPs and RCPs for your assumption. You could refer to the database link for detailed information¹.

IPCC's AR6 indicates that greenhouse gas (GHG) emissions need to be cut 43% by 2030, compared to 2019 levels. This is critical to limit temperature rise to 1.5 degrees Celsius by the end of this century and avoid the worst impacts of climate change, including more frequent and severe droughts, heatwaves and rainfall. However, a new report² from UNFCCC (United Nations Framework Convention on Climate Change) finds national climate action plans remain insufficient to limit global temperature rise to 1.5 degrees Celsius and meet the goals of the Paris Agreement. The report finds that GHG emissions can be expected to fall to 2% below 2019 levels by 2030, in other words GHG emissions can be expected to rise 9% above 2010 levels by 2030 even if Nationally Determined Contributions (NDCs) are fully implemented. We need to understand the current situation of GHG emissions with a great sense of crisis and focus on the discussions during the COP28.

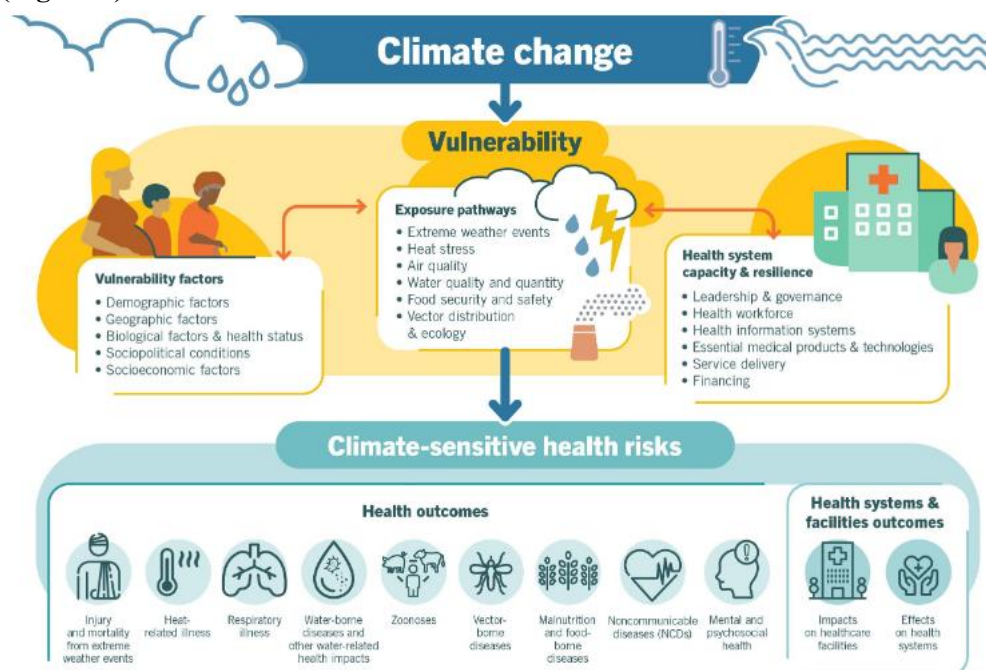
¹ <https://climate-adapt.eea.europa.eu/en/metadata/portals/representative-concentration-pathways-rcps-database-v-2-0>
https://sedac.ciesin.columbia.edu/ddc/ar5_scenario_process/RCPs.html

² <https://unfccc.int/news/new-analysis-of-national-climate-plans-insufficient-progress-made-cop28-must-set-stage-for-immediate>

Impact of Climate Change on Health

Interactions between climate and health create new threats: Climate change is affecting people, animals, and have a negative impact on the health of the entire ecosystem by leading to death and illness from increasingly frequent extreme weather events, such as heatwaves, storms and floods, the disruption of food systems, increases in zoonoses and food-, water- and vector-borne diseases, and mental health issues. Furthermore, climate change is undermining many of the social determinants for good health, such as livelihoods, equality and access to health care and social support structures. These climate-sensitive health risks are disproportionately felt by the most vulnerable and disadvantaged, including women, children, ethnic minorities, poor communities, migrants or displaced persons, older populations, and those with underlying health conditions.

(Figure 3)



(Reference) <https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>

Impact on Food Safety

According to Professor Fumiko Kasuga from Nagasaki University, climate change significantly affects food. Direct effect of climate change on the foodborne pathogens and spoilage organisms is the increase in risk of prevalence, proliferation of pathogenic microorganisms and toxin production in foods due to temperature and humidity rise. Secondary effect of climate change on food safety via changes in ecosystem is the changes in prevalence of vector animals and migration routes,

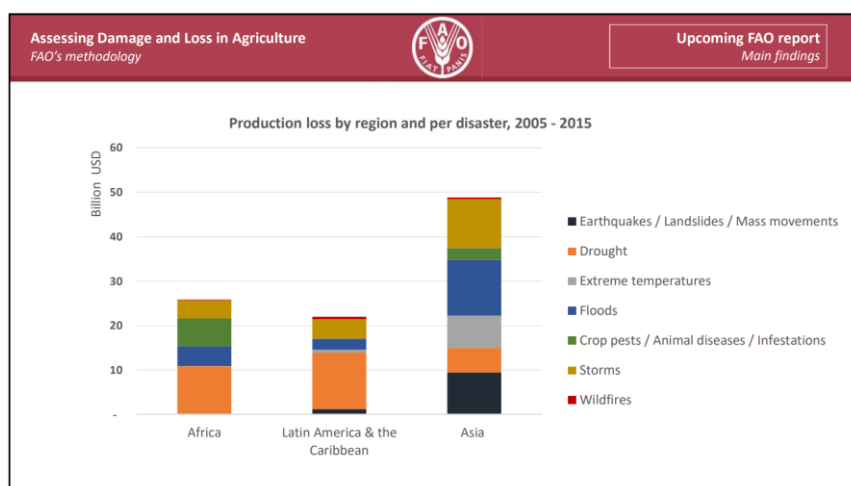
contamination of toxic agents caused by heavy rains and floods, emergence of new strains of microorganisms with high resistance to environmental stresses. And there is also indirect or tertiary effects of climate change on food safety through human and social factors such as;

- Human physiological factors : immunodeficiency due to mal nutrition
- Factors in food supply chain : the increase in animal and crop diseases, increase in pesticides and animal drug use and their contamination to foods, increase in contamination of toxic agents due to changes in crop, cultivation environment and methods, increase in intake of unsafe foods under lower food security
- Human behavior : increase of outdoor activities and related unsafe cooking practices, health diet (basically good but need new care)
- Societal factors : innovation of agriculture system, forced migration

Impact on Food Security

According to Professor Geetha Mohan, Ph.D. of University of Toyama, it is difficult to define food security. Instead, Food Insecurity is defined by Food and Agriculture Organization of United Nations (FAO) as “a situation where some people do not have access to sufficient quantities of safe and nutritious food and hence do not consume the food that they need to grow normally and conduct an active and healthy life”. So food insecurity may be due to lack of food: no availability, lack of resources: no access, improper use: no proper utilization or changes in time: no stability. The way Climate Change has impact on Food Security is illustrated by FAO with Figure 4 as below.

(Figure 4)



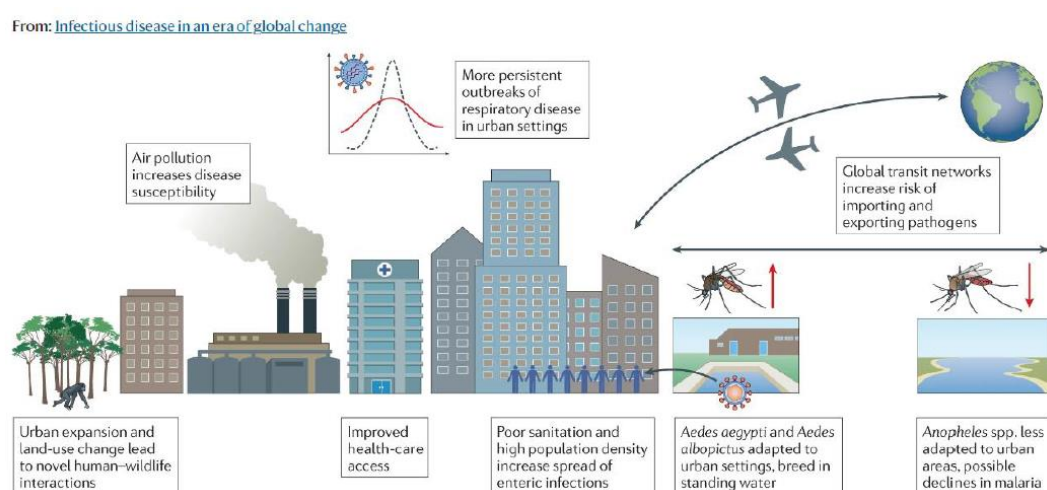
(Reference) https://unece.org/fileadmin/DAM/stats/documents/ece/ces/ge.33/2017/mtg3/5_4_Assessing_Damage.pdf

It seems obvious that Drought will lead to the most significant agriculture loss in Africa and Latin America and the Caribbean. On the other hand, Storms and Floods have the most significant impact to the agriculture loss in Asia. Extreme temperature and drought have the next big impact to the production. Climate change and accompanying Disaster could have significant impact on the agriculture production loss, which surely lead to the food insecurity globally.

Impact on Infectious Diseases

A wave of severe infectious disease outbreaks has been occurring in this century, not least the COVID-19 pandemic, which has had a devastating impact on lives and livelihoods around the globe. The 2003 severe acute respiratory syndrome, the 2009 swine flu pandemic, the 2012 Middle East respiratory syndrome coronavirus outbreak, the 2013–2016 Ebola virus disease epidemic in West Africa and the 2015 Zika virus disease epidemic all resulted in substantial morbidity and mortality while spreading across borders to infect people in multiple countries. At the same time, the past few decades have ushered in an unprecedented era of technological, demographic and climatic change: airline flights have doubled since 2000, since 2007 more people live in urban areas than rural areas, population numbers continue to climb and climate change presents an escalating threat to society. The extent to which these recent global changes have increased the risk of infectious disease outbreaks, even as improved sanitation and access to health care have resulted in considerable progress worldwide. Impact of urbanization on infectious disease is significant as Figure 5 illustrates.

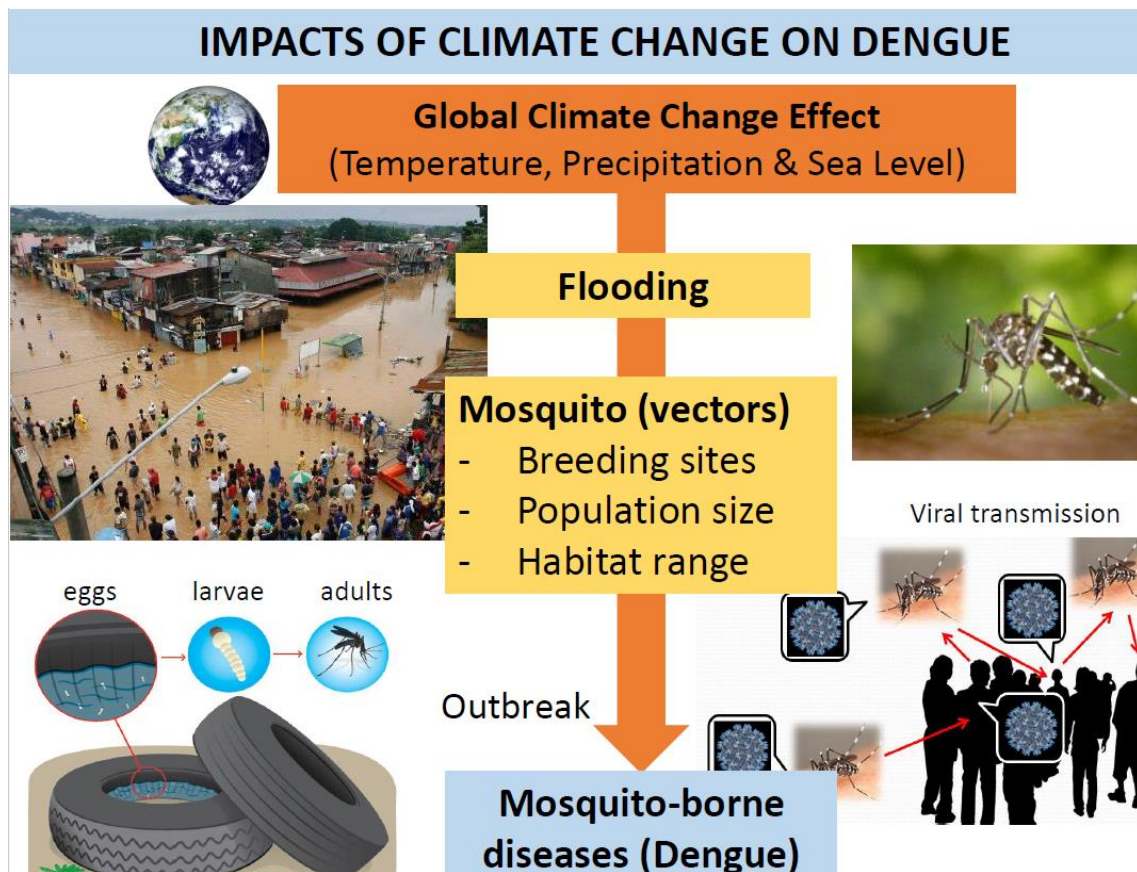
(Figure 5)



(Reference) <https://www.nature.com/articles/s41579-021-00639-z>

During my tenure as a Vice President Director in a life insurance company in Jakarta six years ago, I witnessed regular flooding and Dengue fever outbreaks as is illustrated by Figure 6. Flooding seems to contribute to the appearance of vector mosquitoes by providing suitable breeding sites. Professor Kozo WATANABE from Ehime University conducted sanitation research in Indonesia and found correlations between local climate parameters, vector mosquito abundance, and Dengue incidents. He concluded that both data of vector mosquito and local climate are necessary for better Dengue Prediction and Machine learning can be a powerful tool in environmental epidemiology modelling especially when large data are available. As Dengue will have a significant influence to life insurance industry, it should contribute to data collection of their research on Dengue incidents.

(Figure 6)



(Reference) WHO

According to the news from Nikkei Asia³, Dengue infections are up roughly 200% on the year in Thailand and Cambodia, while Taiwan is seeing a rapid surge. UNICEF reports that a total of

³ <https://asia.nikkei.com/Business/Health-Care/Dengue-fever-sweeps-through-Asia-helped-by-hotter-and-wetter-weather>

206,288 dengue cases were recorded in Bangladesh from January to Oct. 1, 2023. The record-high 1,006 deaths were roughly quadruple the tally for all of last year. Children aged 15 and under accounted for 18% of infections and 11% of deaths. World Health Organization (WHO) estimates that it infects approximately 390 million people and causes approximately 20,000 deaths worldwide each year so far. In case this estimates increase many times more in the near future caused by global warming and the resulting flood, life insurance companies need to anticipate huge payment from their medical insurance coverage and contribute to prevent their policyholders or stakeholders from the infection. Life insurance companies may need to reconsider whether they are sufficiently aware of future climate scenarios.

How should we cope with climate change in response to these scientific findings?

A. Know the scientific findings - Figure out the local impact of temperature rise with help of AP-PLAT -

It is significantly important to know the expected temperature rise in the local community. AP-PLAT is a web-based information platform that provides data and tools on climate change adaptation globally. It can help enterprises to foresee the changes in temperature and precipitation in their areas of operation and incorporate them into their risk scenarios and business decisions. The platform is operated by the Climate Change Adaptation Center of the National Institute for Environmental Studies (NIES) in Japan. AP-PLAT should be promoted to global enterprises so that they can recognize how climate change will affect their locations and influence their business scenarios or sustainability management strategies. This will also have an impact on the sustainability literacy of their employees. In the process of promoting AP-PLAT, SSPs should be used again as a key to deepen the understanding of the scenarios for the business users. AP-PLAT uses one of the climate scenarios called MIROC6, which focuses on Asian areas and seems different from the one used for AR6. I suggest that these model assumptions should be harmonized, especially the ones used for climate change, so that people do not have to compare so many models and assumptions, which would often deter their business decisions and lose their focus on the simulation models.

One of the online tool developed by AP-PLAT Center for Climate Change Adaptation (CCCA) is named ClimoCast. ClimoCast allows users to check future regional climate projections based on the latest climate data (CMIP6 data). The mission of the tool is to provide accessibility of climate

projections to all individuals. Users can compare four major emission scenarios (SSP126–585), compare the results of ten different climate models, and download the corresponding data.

I used ClimoCast to create a table predicting temperature rise in Asia and Africa from 2020 to 2100 in Figure 7. This is on the assumption of MIROC6 and SSP370 CO₂ emission scenario. It shows the temperature in most Asian countries will be expected to increase more than 4 degrees in the end of this century.

I also created the temperature simulation of Hokkaido up to year 2090s in Figure 8. It seems that the temperature increase is expected to be higher in northern area rather than southern area. In Hokkaido, Figure 8 observes a temperature increase of 5 degrees as median value on the assumptions of MIROC6 and SSP370 CO₂ emission scenario. In the worst case, it is shocking to see the temperature hike up to 10 degrees. Businesses need to think imaginatively about how rising temperatures, at least in their own regions, will affect local industries, especially agriculture, tourism, and the health of their employees. In the case of Hokkaido, rising temperatures could shorten crop growing periods and significantly reduce yields, and high temperatures could also reduce crop quality. Additionally, in the tourism industry, there is a strong possibility that the number of tourists will decrease. In terms of residents' health, residents who have been accustomed to the cold climate will be exposed to health hazards such as heat stroke and dehydration.

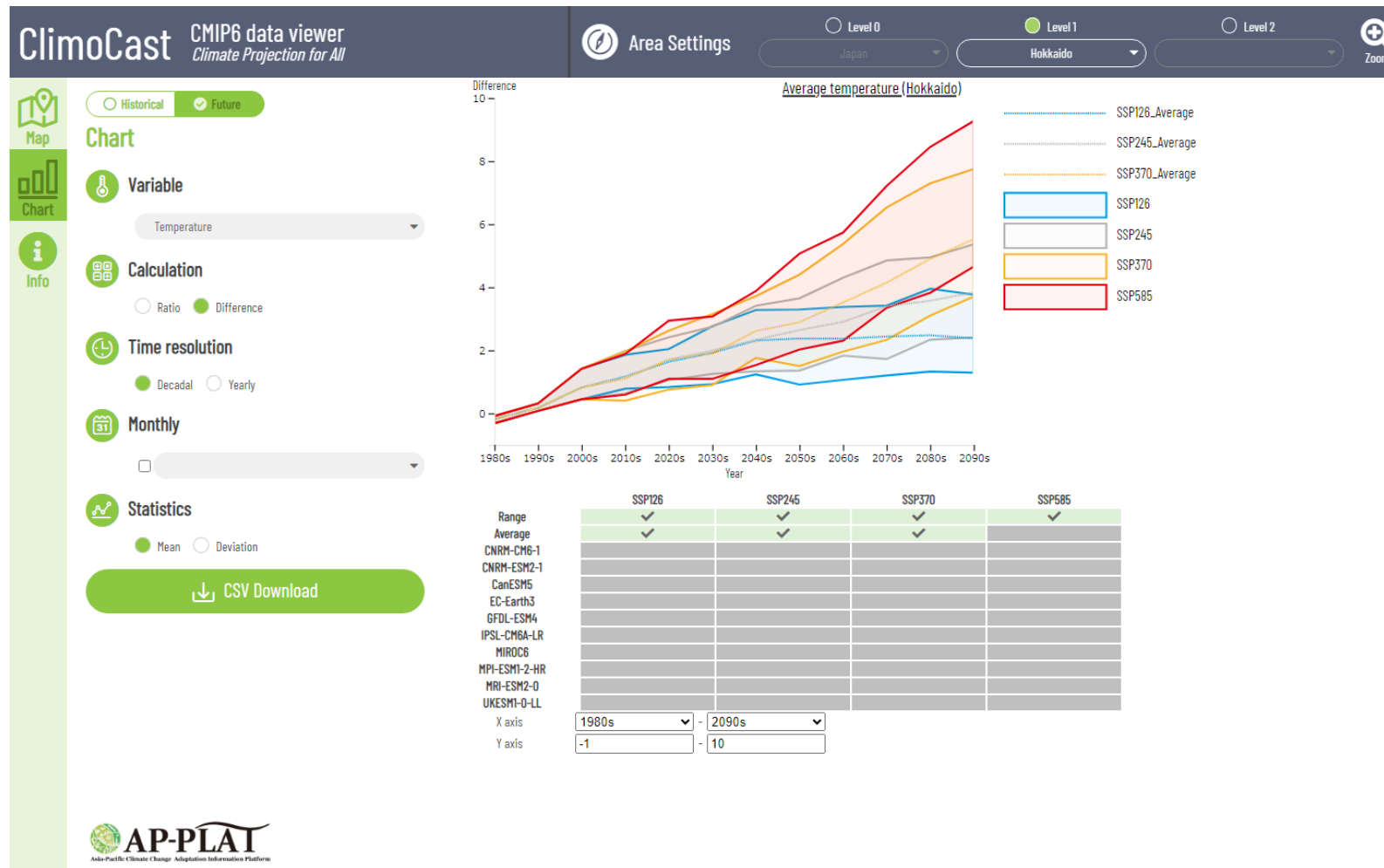
Life insurance companies should share the scenarios of temperature rise with regional governments in the areas where they operate. They should discuss the problems that it will bring to major industries and society in those areas and make efforts to involve local governments to spread the findings to the residents of the areas and help solve the issues caused by the findings. Communication with the regional government is especially important when a life insurance company has a mission of preventing disease and promoting health so that they can contribute to the local community.

(Figure 7)



(Reference) <https://ap-plat.nies.go.jp/index.html>

(Figure 8)



(Reference) <https://a-plat.nies.go.jp/ap-plat/cmip6/global.html>

B. Adaption to the Climate Change and Mitigation of GHGs emissions

There are two primary ways to address the effects of climate change: adaptation and mitigation. **Adaptation** involves adjusting the way nature and humans exist, while **mitigation** suppresses greenhouse gas emissions.

The United Nations Framework Convention on Climate Change (UNFCCC) provides a platform for worldwide governments to develop plans and programs related to climate change adaptation and mitigation. However, the UN does not directly develop these plans.

In Japan, the “Climate Change Adaptation Law” was enacted in 2018. This law stipulates that in order to take the necessary measures for climate change adaptation, it is necessary to formulate a climate change adaptation plan and provide information on climate change impacts and adaptation. Based on this, the Ministry of the Environment formulated the “Climate Change Adaptation Plan” on October 22, 2021.

Local governments in Japan have also formulated plans to address the impacts of climate change and integrate adaptation and mitigation measures into their development plans. As of October 2023, all 47 prefectures, 20 designated cities, and 173 cities, wards, towns, and villages have already formulated their “Climate Change Adaptation Plan”. These plans can help communities increase their resilience and sustainability in the face of changing climate conditions.

So how should businesses interact with **Adaptation Plans**? In the case of Japan, since they are formulated at the national, prefectural, and city levels, the methods of cooperation differ for each. What kind of cooperation can be done needs to be aligned with the sustainability strategy of the businesses, and cooperation should be effective.

As an example, Kawasaki-City, which I live in has advanced activities to tackle with climate change issues in Kanagawa Prefecture. Kawasaki City has formulated the "Kawasaki City Climate Change Adaptation Plan" to respond to climate change. This plan identifies regions and industries that are most susceptible to the effects of climate change and outlines measures to address those risks.

Specifically, the initiatives stipulated in its adaptation plan include the following:

Urban greening: Kawasaki City aims to alleviate the urban heat island phenomenon by creating green areas within cities and installing green curtains.

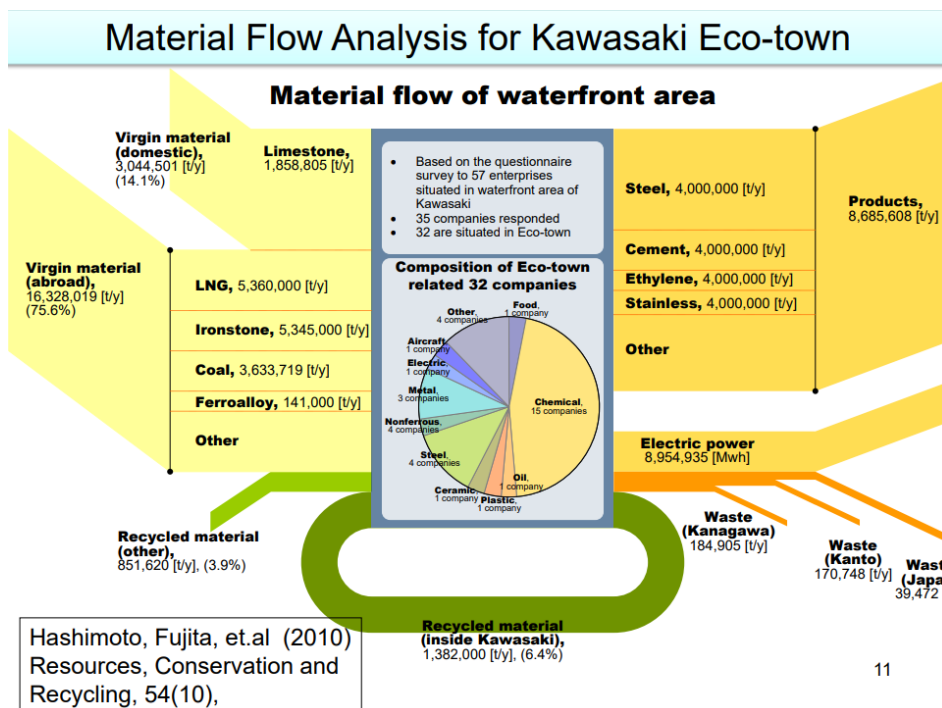
Flood damage countermeasures: Kawasaki City will reduce damage caused by floods caused by

heavy rains, etc. through river improvement and dam construction.

Agricultural measures: Kawasaki City will support the stable development of agriculture through the provision of agricultural irrigation equipment and the restoration of abandoned farmland.

Kawasaki City is also focusing on introducing renewable energy as a measure against global warming. As a matter of fact, Kawasaki City has been emitting the highest amount of GHGs among all the local governments in Japan. Therefore, Kawasaki City has set GHG reduction targets for 2030 and strengthened the measures in its Adaptation Plan. Kawasaki City has been developed as one of Japan's leading industrial cities. In order to share the industrial technologies around the world, Kawasaki City proactively provides information to overseas countries about its history of anti-pollution measures and its process to become Eco-town⁴ as is explained in Figure 8. Eco-town leads resource-recycling-oriented production activities. After Kawasaki City joined United Nations Global Compact in 2006 as the first local government to join the UN initiative, the government has been active in promoting the benefit of Eco-town which should be the excellent practice for recycling and reuse to tackle global warming and mitigation of GHGs.

(Figure 8)



(Reference) Environmental technology transferred from Kawasaki City to the world

https://www.city.kawasaki.jp/en/cmsfiles/contents/0000037/37815/environmental_technology.pdf

⁴ https://sdgs.un.org/sites/default/files/2020-11/UNCRD_10th%20R%20Forum%202020_Webinar%20I-Presentation%20I-Tsuyoshi%20Fujita%20%28long%20version%29_0.pdf

In order to cooperate with Kawasaki City Adaptation Plan, some life insurance companies signed agreement with Kawasaki City called "Comprehensive Agreement on Collaboration and Cooperation". The Comprehensive Agreement is implementing cooperative activities to improve the health of its citizens, and it could also contribute to promote the Adaptation Plan among the citizens. Kawasaki City and the life insurance company aim to advance a wide range of initiatives, including promoting a decarbonized society, disseminating information on prefectural government, and contributing to solving social issues. The life insurance companies are making full use of its strengths, such as the network and know-how of sales staff spread throughout the prefecture, to disseminate various information including the Adaptation Plan. It is a significant duty of regional government to increase the literacy of the Adaptation Law and Plan among its citizens. In addition to raising awareness, the life insurance companies could have opportunities to hold health measurement sessions at events to extend the healthy life expectancy of prefectural residents and promote efforts to create a society in which everyone can live an active life. Additionally, in order to realize a decarbonized society, the regional government and the life insurance companies jointly conserve Kanagawa Prefecture's forests, which promote forest creation that will be passed on to future generations. Furthermore, by leveraging the know-how of the life insurance, it is focusing on the promotion of education, such as conducting on-site classes on "insurance" and "money" called "Financial/Insurance Education" at prefectural high schools etc.

In this way, life insurance companies can contribute to disseminating the Adaptation Plan by forming agreements with regional governments. Furthermore, beyond these examples, there are many cases in Japan where life insurance companies are contributing to adaptation in areas such as food safety, waste prevention, and mosquito control.

It has been confirmed that Climate Change Adaptation Plans have also been formulated in Taiwan, South Korea, Thailand, the Philippines, and Indonesia, etc. As the Adaptation Plans will expand to local governments, the life insurance companies need to take these opportunities to hold Collaboration Agreement to contribute to disseminate the Adaptation Plan through the regions by utilizing their wide networks of sales agents and at the same time they could expand regional sales coverage with the alliance activities with regional governments.

As for **Global Warming Mitigation Plan**, Japanese Cabinet approved the "Plan for Global Warming Countermeasures" in 2021 and made announcement that they will reduce greenhouse gas emissions by 46% (compared to fiscal 2013) by fiscal 2030, and will continue to strive for a further 50% reduction. The Fifth Basic Environment Plan stipulates outline of comprehensive long-term measures

on environmental conservation and sets up six interdisciplinary cross-cutting “priority strategies” (economic, national land, community, life, technologies, international) in order to advance initiatives on environmental conservation including environmental risk management. Among those, the most important priority is to mainstream environmental considerations in the corporate strategy of businesses.

Life insurance companies are working to reduce the burden on the environment and solve environmental problems by reducing resource and energy consumption, promoting resource recycling, and managing assets with ESG factors. The life insurance industry has developed a vision for carbon neutrality by 2050, and the industry is moving forward with a carbon neutrality action plan.

Specific initiatives taken by global life insurance companies to reduce global warming include the following:

Introducing green energy: Many life insurance companies are working to switch to renewable energy to power their facilities and offices. For example, they use renewable energy such as solar and wind power to reduce greenhouse gas emissions.

Environmentally-friendly investments: Life insurance companies contribute to reducing global warming by making environmentally-friendly investments. For example, they support efforts to create a sustainable society by investing in renewable energy and clean technology.

Carbon offsets: Some life insurance companies engage in carbon offsets to reduce greenhouse gas emissions from their activities. Specifically, they invest in forest protection projects and reforestation efforts to offset emissions.

The life insurance association can contribute to reducing greenhouse gas emissions by increasing climate change literacy among people from its neutral status. The Climate Change Starter’s Guide is a document created by the Life Insurance Association of Japan that includes guidelines and methods for responding to climate change. By providing this guide, the Life Insurance Association of Japan also aims to raise awareness of climate change among stakeholders and promote TCFD (Task Force on Climate-related Financial Disclosures) to encourage businesses to apply the environmental disclosure standard. Specifically, the guide includes the following contents:

- The impact of climate change on business sectors
- The background and current situation on political movements concerning the environment
- The summary of the TCFD recommendations and examples of TCFD-type disclosures
- The essential points for life insurers working on climate initiatives

This Guide provides concrete steps and direction for the life insurance industry to respond to climate change. The Life Insurance Association of Japan announced its support for the recommendations of the TCFD in April 2019, and more than half of this Guide is devoted to explaining the TCFD and providing case studies to handle TCFD. The Guide strongly encourages member companies to promote TCFD to the investees through their engagement activities.

As outlined so far, life insurance companies can play a significant role in reducing greenhouse gas emissions. They can do this by taking actions such as promoting ESG-themed investment, investing in renewable energy, conducting stewardship activities with investee companies, and encouraging them to disclose their impact through engagement. Additionally, they can disseminate the mitigation plan of regional governments through their sales agency networks. To become more influential in these contributions, life insurance companies should invest in employee education to improve their literacy on climate change and ecosystem services so that they could actively involve with society to prevent environmental crisis which follows the corporate strategy. The life insurance companies have great opportunities to lift their status in the society by initiating to demonstrate their environmental considerations.

(Reference)

IPCC (2023) Climate Change 2023 Synthesis Report Summary for Policymakers

https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_SPM.pdf

Riahi, K. et al. (2017) The Shared Socioeconomic Pathways and their energy, land use, and greenhouse gas emissions implications: An overview. *Global Environmental Change*, 42, 153-168.

Takakura et al. (2019) Dependence of economic impacts of climate change on anthropogenically directed pathways. *Nature Climate Change*, 9, 737-741

Rachel E. Baker, Ayesha S. Mahmud, Ian F. Miller, Malavika Rajeev, Fidisoa Rasambainarivo, Benjamin L. Rice, Saki Takahashi, Andrew J. Tatem, Caroline E. Wagner, Lin-Fa Wang, Amy Wesolowski & C. Jessica E. Metcalf (2022) Infectious disease in an era of global change

Assessing Damage and Loss From Disasters in Agriculture, FAO's Methodology

Center for Climate Change Adaptation (CCCA) at the National Institute for Environmental Studies (NIES), Japan <https://ap-plat.nies.go.jp/>

Climate Change Starter's Guide by Life Insurance Association of Japan

[https://www.seiho.or.jp/activity/sdgs/climate/pdf/handbook\(en\).pdf](https://www.seiho.or.jp/activity/sdgs/climate/pdf/handbook(en).pdf)