Secretary Emmanuel De Guzman
Climate Change Commission

CLIMATE CHANGE AND NATIONAL SECURITY

Executive Course on National Security
05 June 2018
NDCP Honor Hall, Camp General Aguinaldo, Quezon City

Good afternoon to all of you. First of all, allow me to extend my sincerest gratitude to NDCP for according me the honor to address you today on a very important aspect of national security: Climate change.

PART I. CLIMATE OUTLOOK

Climate change

We have been perennial witnesses to the vulnerability of our communities to disasters and the prevalence of risk throughout the country—not only from the impact of hazards but also from human-induced disasters.

According to a 2015 report by the United Nations Office for Disaster Risk Reduction, some 90 percent of recorded major disasters caused by natural hazards from 1995 to 2015 were linked to climate and weather anomalies. And during this twenty-year span, the Philippines was one of top five countries hit by the highest number of disasters.

Indeed, climate change is one of the major drivers of disaster risks alongside poverty and rapid urbanization. It magnifies the impacts of natural hazards to the lives of our people and to the livelihood of our communities.

Although it is true that there are natural processes, which lead to very significant climate change, scientific evidence indicates that most global warming in recent decades is due to the great concentration of greenhouse gases or GHGs in the atmosphere, which are released mainly as a result of human activities.[i]

In fact, for the first time in recorded history, the average monthly level of CO2 in the atmosphere exceeded 410 parts per million in the month of April this year, according to the Keeling Curve measurement series made at the Mauna Loa Observatory in Hawaii.

This means that the atmosphere and the air that we breathe has never had as much carbon dioxide in it as it does today.

Climate inaction will lead to 4-degree world

In a 2013 study, the United Nations Intergovernmental Panel on Climate Change or IPCC—the leading international body for the assessment of climate change—has already warned that the world could not afford to keep emitting carbon dioxide as it has been doing in recent years.[ii]

However, data from the United Kingdom's Met Office showed that the rise in global average temperature in 2015 and 2016 had breached 1-degree Celsius above pre-industrial levels (1850-1900 reference period).[iii]

Scientists warn that policies being currently being implemented around the world or business-as-usual practices are expected to deliver a 4-degree Celsius level of warming by 2100.

We experienced Yolanda at a global warming level of less than one degree. Imagine how much more intense and devastating typhoons would be at four degrees.

The following impacts are expected at this warming level:

- Small islands and low-lying coastal cities and regions would be at severe risk of inundation with a projected sea level rise increase of up to 1 meter by 2100 and a multi-meter sea level rice in the centuries that follow;
- Risk to food production would increase dramatically on the global scale particular in tropical regions, including across sub-Sahara Africa;
- Substantial glacier loss; substantial risks of glacier lake outburst and flooding, reduced river flow for agricultural production;
- Water availability would decline sharply, particularly in sub-tropical regions, such as Central America and the Caribbean, South and North Africa, the Middle East and parts of Central Asia, with a 20 percent reduction in most places and 50 percent reduction in some, and an increase in drought risk;
- Unprecedented heat waves the new norm in tropical regions, with detrimental impacts on human livelihoods, health and labor productivity, ecosystems;
- Increased frequency of high-intensity tropical cyclones projected;
- Irreversible loss of biodiversity, including reef systems; and
- Trend toward more extreme El Niño Southern Oscillation conditions, which could lead to more extreme drought or flood conditions in tropical regions, and affect regional sea level rise.

Sectoral impacts in the Philippines

This outlook for a four-degree world is definitely not a welcome news, especially for a country like ours that remains to be highly vulnerable to climate change impacts.

The effects of climate change are not myths. In fact, its consequences are already in motion in the different sectors of the country. Allow me to elaborate:

5th Floor, First Residences, 1557 J.P. Laurel Street, Malacañang, San Miguel, Manila, Philippines 1005
info@climate.gov.ph | www.climate.gov.ph

Annual GDP loss by 2100. Within the last two decades, our country experienced an annual average loss of 2.89 billion US dollars, which is equivalent to .6% of our GDP.[iv]

The latest IPCC Assessment Report concluded that climate change will create new poor between now and 2100.[v]

Major rainfall changes in patterns and distributions. A 2011 PAGASA report suggests a decrease in rainfall by 2020 in most parts of the country except Luzon. As far as extreme rainfall is concerned, however, the number of days with heavy rainfall (e.g., greater than 200 mm) is expected to increase with global warming by the year 2020 and 2050.[vi]

Threats to natural ecosystems. Approximately 1 million hectares of grasslands in the Philippines are highly vulnerable to climate change in the future. Most grasslands in the uplands are prone to fires particularly during extended periods of dryness and lack of rainfall during summer.[vii]

Dying corals. The 2016 Low Carbon Monitor Report foresees that 98 percent of coral reefs in Southeast Asia will die by 2050, practically an extinction by the end of the century if current global warming trends will continue.[viii]

The IPCC projects that by years 2051 to 2060, the maximum fish catch potential of Philippine seas will decrease by as much as 50 percent compared to 2001-2010 levels.[ix]

Declining rice yields. An analysis of temperature trends and irrigated field experiments at the International Rice Research Institute shows that grain yield decreased by at least 10% for each 1°C increase in growing-season minimum temperature in the dry season.[x]

Higher sea level rise. We pride ourselves as a beautiful archipelago with 7,107 islands. Soon that number will be reduced due to rising sea levels, which have also led to constant flooding in areas such as in Davao City, Navotas, Malabon, Cavite, and Legazpi City.

Many coastlines will vanish due to sea level rise, which means that thousands of coastal communities—which are mostly the poorest will be affected.

Observed sea level rise[xi]is remarkably highest at 60 centimeters in the Philippines, about three times that of the global average of 19 centimeters.[xii]

This puts at risk 60 percent of LGUs covering 64 coastal provinces, 822 coastal municipalities, 25 major coastal cities, and an estimated 13.6 million Filipinos that would need relocation.

More intense droughts. Global warming exacerbates the effects of El Niño[xiii] the most recent of which was experienced in the country from 2015 to 2016.[xiv]

5th Floor, First Residences, 1557 J.P. Laurel Street, Malacañang, San Miguel, Manila, Philippines 1005
info@climate.gov.ph | www.climate.gov.ph

The Department of Agriculture estimated that 413,456 farmers have been directly affected by El Niño-associated drought and dry spells during the last El Niño period.[xv]

In 2016, the drought ignited a protest by 6,000 affected farmers that resulted in violence in Kidapawan, North Cotabato.[xvi]

Water scarcity. Climate change, rapid urbanization, and population growth drives water scarcity worldwide.

A study conducted by the World Resources Institute predicts the Philippines will experience a "high" degree of water shortage in the year 2040.

The country ranked 57th likely most water stressed country in 2040 out of 167 countries. The sector that will bear the brunt of water shortage by that year is agriculture, a major component of the country's economy.[xvii]

Labor productivity declined. According to a 2016 United Nations study, climate change-induced heat in the country's workplace is projected to render 1% loss in working hours by 2025, 2% by 2050, and 4% by 2085.[xviii]

More public health emergencies. Higher temperatures also trigger the surge of diseases such as dengue, malaria, cholera, and typhoid.[xix]

In 1998, when the Philippines experienced the strongest El Nino phenomenon to-date, almost 40,000 dengue cases, 1,200 cholera cases, and nearly 1,000 typhoid fever cases, were recorded nationwide.

Adaptation would be key to survival

The damages of these climate change impacts to the lives of our people can be reduced by adaptation practices.

Poverty breeds vulnerability. If we fail to address this risk driver, sustaining our people's livelihood and wellbeing will take a long time, or perhaps, will remain elusive forever.

It is therefore critical that we strengthen our adaptation and disaster risk reduction strategies at national and local levels to address the key drivers of disaster risk and vulnerability, namely:

(i) poor local risk governance;
(ii) weak and vulnerable rural livelihoods;
(iii) fast declining ecosystems; and
(iv) unprotected cultural heritage and indigenous peoples.

While adaptation mitigates the impacts of climate change, "residual damages" remain at all levels of adaptation.

Paris Agreement

I need to emphasize that the world is only getting warmer as each day passes by.

In fact, data from the World Meteorological Organization shows that 2015, 2016, and 2017 were the three warmest years on record—continuing a long-term trend of record-breaking temperatures around the world.

Only greater ambition and urgent action in reducing the GHG emissions could help us meet the necessary scale and pace to evade the catastrophic effects of our changing climate.

Fortunately, after two decades of debates, the international community has found the Paris Climate Agreement in 2015—a common ground for global climate action, which was adopted by 197 countries and entered into force last year.

"Common but differentiated responsibilities and respective capabilities" is the core principle of the accord, recognizing the different circumstances, and responsibilities of countries.

This principle means that developed countries should take the lead in mitigating climate change and would support vulnerable countries in reducing emissions by providing finance and capacity building and by facilitating technology development and transfer.

Moreover, developing countries are given leeway in the implementation of their contributions and provided with the tools and means to do so.

Understanding the 1.5 goal

The Paris Agreement aims to limit global temperature rise to well below 2 degree Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degree Celsius.

The nod to 1.5 degree Celsius recognized that many low lying island nations are already feeling the impacts of climate change and that coral reef and Arctic ecosystems face high risks well below 2 degree Celsius.

Let me emphasized that half a degree makes a very big difference when judging how different parts of the world will feel the effects of climate change.

For example, an extra 0.5 degree Celsius could see global sea levels rise 10centimeters more by 2100, water shortages in the Mediterranean double and tropical heatwaves last up to a month longer.

The difference between 2 degree Celsius and 1.5 degree Celsius is also “likely to be decisive for the future of coral reefs”, with virtually all coral reefs at high risk of bleaching with 2 degree Celsius warming.

5th Floor, First Residences, 1557 J.P. Laurel Street, Malacañang, San Miguel, Manila, Philippines 1005
info@climate.gov.ph | www.climate.gov.ph

Limiting warming to 1.5 degree Celsius reduces risk of crossing tipping points, such as the irreversible melting of the polar ice caps and glaciers, permafrost collapse, leading to methane releases, and Antarctic and Greenland ice sheet melt.

Aligning policies to the 1.5 goal

Scientific findings show that it is both physically and economically feasible to limit warming to below 1.5 degree Celsius by 2100, after temporarily exceeding 1.5 degree Celsius in the 2050s but still staying well below degree Celsius.

But doing so involves relying on being able to "suck" carbon dioxide out of the air, using so-called negative emissions technologies.

For the world to get onto a 1.5°Cpathway, the first and most urgent measures include the rapid scaling up of renewable energy systems, energy efficiency, electrification of transport systems, and improvements of industrial and building efficiency.

This is why the Philippine delegation to the recently concluded United Nations Climate Change Conference, called for an increased global climate ambition.

We emphasized that the pursuit of climate justice necessitates the international community to act now before the window of opportunity on achieving the 1.5 degrees Celsius goal of the Paris Agreement closes.

The way forward is to make sure that the big industrialized developed nations would actually walk their talk.

Commitments made by countries in 2015 through the submission of Intended Nationally Determined Contributions or INDCs still lead to a three-degree world, which is almost uninhabitable. This is simply unacceptable.

Hence, what we have been contending in the international climate negotiation arena is for countries to enhance their NDCs to be 1.5-compatible—in particular t he NDCs of developed and industrialized countries, who need to do far more, far earlier.

Philippine NDC as the country's new industrial strategy

On our part, as a vulnerable nation that only contributes 0.3 percent of global greenhouse gas emissions, we don't consider reducing further our carbon emissions as a sacrifice, but an opportunity.

We are a non-emitter country, but we are fully advocating for green growth.

We continue pursuing this development path consistent with 1.5 degrees not only because we know it is the best way to protect our people and climate, but also because we know it will spur economic growth.

5th Floor, First Residences, 1557 J.P. Laurel Street, Malacañang, San Miguel, Manila, Philippines 1005
info@climate.gov.ph | www.climate.gov.ph

This is what we have been telling the business sector: Climate action makes business sense because investing in climate-friendly development is where the smart money is headed.

The pursuit of a low carbon development pathway generates more jobs, offers more economic opportunities than the business as usual.

As part of the requirements as Party to the Paris Agreement, the Climate Change Commission is currently developing Philippine NDC for submission to the UNFCCC within the year.

Our NDC will stand for nothing less than the country's new industrial strategy. It shall convey our commitment to pursuit a low-carbon development pathway.

It will provide convergence points where the government, the business sector, the academe, development partners, CSOs, and other stakeholders could collaborate in implementing climate-smart initiatives in all our sectors.

Moreover, it will pursue mitigation efforts as a function of adaptation, which is the country's anchor climate action strategy.

PART II. CLIMATE CHANGE AND NATIONAL SECURITY

Ladies and gentlemen, these evolving changes in climate and environment have reshaped our approach to national security and have broadened our methods to address these concerns.

In recent years, the country has experienced severe loss and damage caused by extreme weather events, which may have been exacerbated by climate change.

The massive loss and damage of the Philippines in recent years shows that climate change is a clear and present threat to the country's national security and sustainable development pursuit.

The 2017-2022 Philippine National Security Policy or NSP—which was crafted by the National Security Council to create an enabling environment conducive for the successful implementation of the Philippine Development Plan—articulates the nexus of climate change and national security.

Our NSP recognizes climate change and global warming as achallenge to attaining national security, together with environmental degradation and disasters.

Likewise, the NSP recognizes the need to address the threats of climate change on two fronts: in the area of climate change mitigation and in the field of climate change adaptation and disaster risk reduction.

Climate change mitigation is articulated in the NSP's 12-Point National Security Agenda, specifically on the agenda of energy security.[xx]

The said agenda stipulates that we shall pursue the development of alternative sources of energy to contribute to the global efforts to address climate change. This pertains to the use of renewables and other low-carbon energy systems that are needed to decarbonize the primary energy supply system rapidly.

Meanwhile, the institutionalization of climate change adaptation and risk reduction measures is regarded by the NSP as one of the strategic objectives to attain in our national security goal of protecting and preserving ecological balance, among others.

In line with this, allow me to share that a study released by the Asian Development Bank noted that investing at least 0.5 percent of our GDP by 2020 in climate change adaptation will avert losses of up to 4 percent of its GDP by 2100—clearly a short-term investment with a long-term eight-fold gain.

Other national development policies, plans and programs

Aside from the NSP, climate change is also mainstreamed in other national development policies, plans and programs.

Under the Duterte Administration, the 2017-2022 Philippine Development Plan recognizes the widespread impacts of climate change[xxi] and the need for a nationwide climate and disaster vulnerability and risk assessment to deal with the impacts of natural hazards.[xxii]

Pursuant to the Climate Change Act, the Climate Change Commission promulgated the National Framework Strategy on Climate Change (NFSCC) for 2010-2022. The NFSCC aims to build a roadmap for a national program on climate change.[xxiii]

In 2011, the CCC translated the NFSCC into the National Climate Change Action Plan or NCCAP.

The NCCAP sets directional plan for the government on implementing short, medium, and long-term climate actions in seven thematic areas, which includes food security, water security, ecological and environmental stability, human security, climate-smart industries and services, sustainable energy, and knowledge and capacity development.[xxiv]

The NCCAP also addresses national security interests and agenda.

Climate change mandate by agencies

We must also note that national government agencies are mandated by the Climate Change Act of 2009 and other pertinent laws to address climate change.

Allow me to show you the agency mandates according to the law vis-à-vis their mandates according to the NCCCAP and the PDP. In this table, we also show the corresponding provisions of these mandates in the 2018 General Appropriations Act.

Five-point convergence agenda

With mandate and funding, national government agencies could pool their technical expertise and resources and partner with civil society organizations to strengthen local climate adaptation and resilience.

AFP resilience

With climate change affecting national security, adaptation and disaster risk reduction should also be mainstreamed within or Armed Forces. In line with this is the three-point we propose to the AFP:

- Peer-to-peer learning on current good practices in AFP
- Capacity building on DRR-CCA
- Risk sensitive defense planning and budgeting in AFP

PART III: CCC PROGRAMS

Ladies and gentlemen, we can only achieve security and prosperity if we can anchor our development pursuits on reducing climate and disaster risks and building community resilience.

The guideposts are all up and lit. Aside from the Paris Agreement, other post-2015 global development frameworks such as the Sendai Framework for Disaster Risk Reduction and the Agenda for Sustainable Development should help us to do more, do better, and sustain our gains.

To this end, we in the CCC, together with other national government agencies and developing partners, are pursuing the following adaptation and mitigation initiatives:

First is enhancing and sustaining awareness and understanding on climate change and associated risks, through all media platforms and formal education system.

The CCC has been working with the Department of Education to mainstream climate change and DRR in the K-12 Curriculum.

In line with our efforts to link science, policy and practice, we are also holding experts' forums in different regions of the country on top of our annual observance of the Climate Change Consciousness Week.

Second is promoting sustainable urban planning and development in view of the continuing trend of rapid urbanization, increasing urban population density, and unabated rural to urban migration.

The high concentration of economic activities and assets in cities and expanding carbon footprints are expected to result in increased urban disaster risk and vulnerability turbo-charged by climate change.

This is why the government's Build Build Build Program will be complemented by the 'Green Green Green' Program initiated by the Department of Budget and Management, which the CCC supports through inter-agency and multistakeholder convergence.

The initiative aims to update the comprehensive land use plans based on greening concepts.

We need to build low-carbon and resilient critical infrastructure assets. The rule should be simple: Infrastructure projects that are not green and sustainable should not see the light of the day.

Third is accelerating capacity building for LGUs and local communities on CCA-DRR, including ensuring that local development plans are based on science and sensitive to risk.

We need to ensure that these plans are updated and implemented to respond effectively to the adaptation and resilience needs of our communities.

To ensure climate-resilient planning and programming at the local level, we have initiated also the development of a set of standard training modules for local development planning founded on science and aimed at reducing risk or loss and damage from the impacts of disasters and climate change. We have called these training modules Communities for Resilience or CORE Module Series.

This year, we continue to train faculty members from higher education institutions on the use of these standard training modules. These institutions shall, in turn, use the modules to train local government executives and planners, and to help them prepare LCCAPs which the Climate Change Act asks of LGUs.

Heeding the directive of the President for agencies to look into climate change and food production issues, we in the Commission supported last year the efforts of the Department of Agriculture to scale up climate information services and climate-resiliency field schools in 17 municipalities, effectively doubling the number of such schools in the country.

We are likewise coordinating with the Presidential Commission on Urban Poor and the National Commission on Indigenous Peoples to develop frameworks for comprehensive climate actions for the poor and marginalized, specifically the urban poor and the indigenous peoples.

Fourth is investing in social preparation for the implementation of the NDC and the transformation of all sectors towards low-carbon development and a green economy.

In line with this, through whole-of-nation consultations, we are now updating our National Climate Change Action Plan to include and articulate our NDC and our National Adaptation Plan.

5th Floor, First Residences, 1557 J.P. Laurel Street, Malacañang, San Miguel, Manila, Philippines 1005
info@climate.gov.ph | www.climate.gov.ph

We are also engaging the private business sector and the chambers of commerce in awareness raising and action planning across industries for low-carbon development and green economy.

To address the fragmentation and shortage of risk information in the country we are now facilitating the establishment of a National Integrated Risk Information System or NIRIS by various government agencies concerned.

A singular platform for risk information will let national and local government stakeholders access risk data that inform policy and planning processes.

The risk information platform will also strengthen multi-hazard early warning system and impact-based forecasting in the country, an innovative approach to saving lives and property, especially in disaster-prone communities, through effective early warning.

On top of that, we are also working with the Office of Civil Defense to develop a loss and damage registry, which could provide the insurance sector with better profiles of risk in the country.

Just last week, we launched the National Integrated Climate Change Database Information and Exchange System or NICCDIES—a web-based, "one-stop-shop" information portal for climate change mitigation.

This platform shall benefit the private business sector by providing risk information that informs climate-resilient investment planning.

With the International Labor Organization, we are developing a set of standards for certification of green jobs and ensuring a just transition.

With the Philippine Hospital Association and the Philippine Medical Association, we are advocating for the greening of hospitals.

With the Department of Tourism, we are working on the greening of resorts and hotels.

With the Department of Energy, we are promoting renewable energy, energy efficiency, and clean energy solutions.

We are likewise helping the Department of Transportation in modernizing public utility vehicles, such as jeepneys.

Through a series of consultations with different stakeholders, we have also successfully facilitated the national policy review and framework development on energy.

The energy policy framework, which is now being finalized, will be our guide on how we could introduce reforms and make our energy policies more relevant and more responsive to climate change and sustainable development challenges.

5th Floor, First Residences, 1557 J.P. Laurel Street, Malacañang, San Miguel, Manila, Philippines 1005
info@climate.gov.ph | www.climate.gov.ph

A report recently published by the Institute for Energy Economics and Financial Analysis indicated that replacing diesel generation with renewables in small islands can save the Philippines over 10 billion pesos per year while replacing coal can save the Filipino people from 1 trillion pesos.

This should inspire us to accelerate our efforts in reforming our energy policies to get rid of diesel generation and invest more in renewable energy.

Fifth is facilitating the efficient access of our communities to international and domestic climate finance and the transfer of technology and knowledge on adaptation and mitigation.

Pursuant to the provisions of the Paris Agreement and in accordance with the principle of climate justice, the CCC is committed to ensure capacity building on needs-based climate financing in the country through the help of the UNFCCC Standing Committee on Finance.

According to our NDC, mitigation actions will come from the energy, transport, waste, forestry and industry sectors. The cost estimate to implement the identified mitigation actions from these sectors alone amount to 4.12 billion US dollars for the period of 2015 to 2030.

Hence, to unlock international climate finance mechanisms, we are working with other agencies in preparing the country to access the Green Climate Fund.

On domestic climate finance, we are capacitating our local government units to access the People's Survival Fund, through the conduct of learn-write workshops—where we invite experts from various agencies and the academe, as well as resource personnel to guide officials in the process.

We are also pursuing efforts to mainstream green financing within the banking sector.

In the past year, we were able to assemble leaders of the finance sector through a series of high-level and multi-stakeholder forums that identified the gaps that hinders climate finance investments, as well as the measures that could fill it in.

Closing

Ladies and gentlemen, before I close, allow me to reiterate the following points that I have discussed:

- Climate change is threat to national security.
- The consequences of climate change are already in motion as evident in its impacts in the country.
- It is an imperative for us to adapt and build the resilience of communities against climate change.
- Failure to address climate change will lead to 4-degree world—which will bring catastrophic effects, rather than just dangerous.

- The Paris Agreement aims to pursue efforts to limit the temperature increase even further to 1.5 degree Celsius.
- It is both physically and economically feasible to limit warming to below 1.5 degree Celsius by 2100.
- We are a non-emitter country, but we are fully advocating for green growth because the pursuit of a low-carbon development pathway generates more jobs and offers more economic opportunities than the business as usual.
- We have already done a lot. But we need to do more, do better, and sustain our gains.

All the programs and capacity building initiatives I have discussed will be nothing without the full support and cooperation of all sectors of society.

There is a need to streamline climate actions at all levels. Convergence will be our key to building resilience.

We need everyone on board for a healthier, more equitable, and more sustainable development for the country.

Hopefully, this lecture inspire each and every one of you to take a more active role in our collective mission of ensuring a more secure, more equitable, and more sustainable future for the country.

Thank you for your kind attention.

---

[i] (n.d.). Retrieved January 23, 2018, from https://www.ipcc.ch/report/ar5/

[ii] Harvey, F. (2013, September 27). IPCC climate report: human impact is 'unequivocal'. *The Guardian*. Retrieved January 19, 2018, from https://www.theguardian.com/environment/2013/sep/27/ipcc-climate-report-un-secretary-general

[iii] Taylor, L. (2017, September 19). Rise in global warming triggered by Pacific 'flip': UK Met Office. *Reuters*. Retrieved January 29, 2018, from https://www.reuters.com/article/us-global-climatechange/rise-in-global-warming-triggered-by-pacific-flip-uk-met-office-idUSKCN1BT20P

[iv] 2018 Global Climate Risk Index, Germanwatch. https://germanwatch.org/de/download/20432.pdf

[v] (n.d.). Retrieved January 23, 2018, from https://www.ipcc.ch/report/ar5/.

[vi] Cruz, R. V. O., Aliño, P. M., Cabrera O. C., David, C. P. C., David, L. T., Lansigan, F. P., Lasco, R. D., Licuanan, W. R. Y., Lorenzo, F. M., Mamauag, S. S., Peñaflor, E. L., Perez, R. T., Pulhin, J. M., Rollon, R. N., Samson, M. S., Siringan, F. P., Tibig, L. V., Uy, N. M., Villanoy, C. L. (2017). 2017 Philippine Climate Change Assessment: Impacts, Vulnerabilities and Adaptation. The Oscar M. Lopez Center for Climate Change Adaptation and Disaster Risk Management Foundation, Inc. and Climate Change Commission. Retrieved January 23, 2018, from http://climate.gov.ph/images/knowledge/PhilCCA-WG2.pdf.

[vii] *Ibid.*

[viii] Schaeffer, E., Rocha, M., & McKinnon, M. (2016, November 16). *The Low Carbon Monitor*.

[ix] IPCC Fifth Assessment Report. (2013-2014). Retrieved January 23, 2018, from https://www.ipcc.ch/report/ar5/.

[x] Peng, S., Huang, J., Sheehy, J., Laza, R., Visperas, R., Zhong, X., . . . Cassman, K. (2004, May 27). *Rice yields decline with higher night temperature from global warming*. Retrieved January 24, 2018, from http://www.pnas.org/content/101/27/9971.abstract?tab=author-info.

[xi] Aside from climate change, the estimated sea level rise is also caused by the Pacific Decadal Oscillation (PDO).

[xii] Coastal infrastructure, disaster, sea-level rise, climate ... (2015, October 19). Retrieved January 24, 2018, from http://www.homelandsecuritynewswire.com/dr20151019-philippines-coastal-areas-go-underwater-due-to-sea-level-rise.

[xiii] Thompson, A. (2017, May 18). El Niño Again? This Is Why It's Hard to Tell. Retrieved January 25, 2018, from http://www.climatecentral.org/news/el-nino-again-why-its-hard-to-tell-21451

[xiv] El Niño 2015-2016 | GOVPH. (n.d.). Retrieved January 25, 2018, from http://www.officialgazette.gov.ph/laginghanda/el-nino/2015-2016/.

[xv] *2015–2016 El Niño Early action and response for agriculture, food security and nutrition*. (2016). *Food and Agriculture Organization.* Retrieved January 25, 2018, from http://www.fao.org/3/a-i6049e.pdf.

[xvi] Macas, Trisha. (2016, April 4). How the protest of hungry farmers turned into a deadly dispersal in Kidapawan. *GMA News.* Retrieved January 25, 2018, from Retrieved January 25, 2018, from

http://www.gmanetwork.com/news/news/regions/561478/how-the-protest-of-hungry-farmers-turned-into-a-deadly-dispersal-in-kidapawan/story/.

[xvii] Luo, T., R. Young, P. Reig. (2015). Aqueduct Projected Water Stress Country Rankings. *World Resources Institute*. Retrieved January 24, 2018, from www.wri.org/publication/aqueduct-projected-water-stresscountry-rankings.

[xviii] Kjellstrom, T., Otto, Matthias, Lemke, Bruno, et al. *Climate Change and Labour: Impacts of Heat in the Workplace* (p. 15, Tech.). (2016). *United Nations Development Programme*. Retrieved January 28, 2018, http://www.ilo.org/global/topics/green-jobs/publications/WCMS_476194/lang--en/index.htm.

[xix] Climate change blamed for increasing number of dengue, typhoid cases. (2008, November 20). *GMA News*. Retrieved January 24, 2018, from http://www.gmanetwork.com/news/news/nation/134739/climate-change-blamed-for-increasing-number-of-dengue-typhoid-cases/story/.

[xx] National Security Agenda No **8: Energy Security:** Secure and protect energy supply throughout the country and pursue the sustainment of existing sources and the development of alternative sources of energy to support the demands of economic enterprises and households and contribute to the global efforts to address climate change. (Based on the 2017-2022 National Security Policy of the National Security Council.

[xxi] National Economic and Development Authority. (2017). *Philippine Development Plan 2017-2022* (p. 27).

[xxii] National Economic and Development Authority. (2017). Philippine Development Plan 2017-2022 (p. 176).

[xxiii] Climate Change Commission. (2010). National Framework Strategy on Climate Change 2010-2022. Retrieved January 28, 2018, from http://www.neda.gov.ph/wp-content/uploads/2013/10/nfscc_sgd.pdf.

[xxiv] Climate Change Commission. (2011). National Climate Change Action Plan 2011-2028. Retrieved January 28, 2018, from http://climate.emb.gov.ph/wp-content/uploads/2016/06/NCCAP-1.pdf.

5th Floor, First Residences, 1557 J.P. Laurel Street, Malacañang, San Miguel, Manila, Philippines 1005
info@climate.gov.ph | www.climate.gov.ph