**Executive Summary**

 The report on the state of the environment presents the states of environmental quality by sectors and related information including the prediction of future changes and policy recommendation on natural resources and environmental management

**1. Change overview**

 **1.1 The change in social and economic situation in Thailand**

 In 2021-2022, Thailand economy has improved from 2020, which has been affected by measures to prevent and reduce the spread of COVID-19. The government has implemented a broad range of measures prioritizing the monetary and tourism sector to deal with the crisis including recovery of global economy. Consequently, the Gross Domestic Product (GDP) was worth 16.18 trillion baht in 2021, an increase of 1.5% from 2020. In 2022, economic growth is expected to increase similar to the economic growth over the past 10 years. However, the percentage of household debt that had declined during 2011-2019, was found to be rising in 2021.

In 2021, the population in Thailand was 66.17 million people, decreased by 0.03% from the same period in 2020. During the past 10 years, the population had a tendency to decline, while aging population was expected to account for 20% of the total population. This is projected that Thailand will become a complete-aged society within the next 9 years. During that period, migration has declined while unemployment has been increasing. Although COVID -19 pandemic situation of the country has improved, the impact is still in a serious concern. In term of physical and mental illness of people are generally found at less level.

**1.2 Global and regional environmental situation and operations:**

 The average global temperature has been continuously rising, Climate change becomes a global concern. In 2021, the average global temperature was around 1.11±0.13 degrees Celsius and the cumulative heat brought about various global changes such as melting of polar ice, rising sea levels, and severe natural disasters resulted in loss and damage to agriculture sector and infrastructure. Southeast Asia is one of the most vulnerable regions to the effects of extreme weather and heat waves, from climate change.

 In 2020, the world had 4.06 billion hectares of forest resources remained, or roughly 31% of total land area. During the last 10 years, the net loss in forest was 4.7 million hectares per year and the rate of loss was lower than that of the previous decade. Rapid loss of forests was found in Southeast Asia due to increasing population and clearing forest for agricultural use, particularly cultivation of oil palm. Causes of air pollution occurred from forest fire in the Republic of Indonesian, the average annual concentration of suspended particulates was, however, found to remain below the acceptable standard.

Thailand has cooperated with the global and regional countries to address environmental problems and achieve the Sustainable Development Goals by implementing international and regional conventions and treaties. This includes the country's commitment to attain Carbon Neutrality by 2050 and Net Zero Greenhouse Gas Emission by 2065, providing that international support for such endeavors are acquired.

 **1.3 The management of natural resources and environment in Thailand**

 Thailand attaches great importance to the management of natural resources and environment as the fundamentals for production and for good quality of life. ***Environmental Fund*** is a financial measure that has been providing funds and loans for works on the environment since 1992. In fiscal year 2021, The Fund provided a total support of 241.62 million baht and allocated 300 million baht for works in 2022. In addition, taxation measures were adopted in 2021-2022 to promote reduction of carbon dioxide emission, environmentally friendly investment and development of Carbon Capture, Utilization and Storage (CCUS). The allocation of expenditure budgets for the amount of 119,107.46 million baht for the National Strategy on Eco-Friendly Development and Growth, or 3.84% of the country's total fiscal budget in 2022, increased from the fiscal budget of 2021.

 ***Social measures*** adopted during2021-2022 include the continuation of promotion to reduce and phase-out plastics consumption. The action was initiated in 2019 and integrated public mechanisms to use for comprehensive management of plastic wastes. So far, approximately 113 tons of single-use plastics were collected and returned for reuse and recycling and follow-up actions were taken to improve the effectiveness of waste collection and recycling.

**2. Environmental quality situations**

The state of the environmental quality duringthe year 2021 to 2022 can be summarized as follows;

**1) *Soil resources***: Most soils suitable for agriculture were found to account for 46.35% of the country's landmass. However, the soils in some areas are not good for plant growth and have low fertility, due to their pre-existing natural conditions, cash crops plantation on inappropriate land use, and the use of hazardous chemicals for agricultural use. The imports of chemical fertilizer and agricultural hazardous substances increased from 2020 due to the need to replace banned substances. In terms of ***land use***, farming land area declined during 2019-2021 with expansion of areas used for settlement and construction.

**2) *Mineral resources***: Mineral export and import in 2021 increased by 22.6% and 7.35% respectively from those in 2020. The mineral with the highest amount of import was coal for use as fuel and industrial sector. Continued decline in domestic mining may further increase imports in the future.

**3) *Energy:*** In 2021, primary energy production decreased from 2020 by 3.73%, with all types of decline except lignite where its production at Mae Moh Mine was reportedly increased. The net import of primary energy rose by 7.53%. The increase was noted for every kind of fuel except refined petroleum products which fell by 3.8% due to the drop in transportation and other related activities. Similarly, use of alternative and renewable energy dropped by 12.25% and 19.07%, respectively. More efficient use of energy was noted, resulting in reduction of carbon dioxide emission in the energy sector by 0.63% in 2021 (from that in 2020).

**4) *Forest resources and wildlife***: Over the past 10 years, the overview of the forest area was quite stable. In 2021, the forest area decreased from 2020 by 0.158%, it was found that burned areas caused by forest fires in the Northern were increased. **Wildlife** species continue to be threatened. Wildlife conservation, especially, was threatened at 21.65%. However, Illegal acts related to forest encroachment and wildlife trade were declined.

**5) *Water resources***: After a decade the average rainfall in Thailand had decreased, However, in 2021, the average rainfall was 11% above the normal and higher than 2020. The amount of natural runoff in 2020/2021 was increased by 40.23% to 213,447 million cubic meters. Annual safe groundwater yield was noted to be 45,386 million cubic meters with its quality met the standard of consumable groundwater.

**6) *Marine and coastal resources***:In 2021, the rising abundance of fishery resources, Catch Per Unit of Effort (CPUE) had increased from 2020 by 1.47%. In 2020, The mangrove areas increased from 2018 by 12.93%. The seagrass resources were in moderate fertility. Meanwhile, The tendency of conditions of coral reefs that most of them were in moderate fertility while the coastal erosion was improved. In 2021, eight hundred and eighteen marine endangered species were run aground with the majority of them such as sea turtles, dolphins, whales and dugongs, respectively.

**7) *Biodiversity***: In 2021-2022, surveys found 28 new plant species, 3 new vertebrate species, 10 new invertebrate species and 2 new microbe species. Most new invertebrate species were discovered in caves and on limestone mountains which are unique habitats. In 2020, 676 threatened species were included to the previous listing in 2017.

**8) *State of Pollution***: Air qualityin 2021 was likely to improve. The average annual concentration of the particulate matter less than 10 microns (PM10) and the fine particles less than 2.5 (PM2.5) did not exceed the standards, except in Saraburi and some other provinces. Northern Thailand’s smog and haze problem became less severe. Most noise levels were within the standards. Most water surface sources were in good level of water surface quality, an increase from 2020. Over the last 10 year, water surface quality was in moderate to good quality while most coastal water sources were in good levels. Amount of solid waste in 2021 was 24.98 million tons, decreased 1.54% from 2021 due to the COVID -19 pandemic situation and lower number of tourists, however, the amount of plastic waste increased. Amount of recyclable waste was reduced 7.81 million tons. Waste was improperly disposed and dropped from 2020. Amount of household *hazardous waste*, industrial waste, and *infectious waste* increased 1.65%, 2.88%, and 87.67%, respectively. The top ten imports of *hazardous industrial substances* increased 5.23%, Similarly, the top ten imports of *hazardous agricultural substances* rose 34.69%.

**9) *Urban environments***: In 2021, 35.9% of the population lived in urban areas, the share of urban population increased from 2020. The number of slums in Bangkok were unchanged. The ratio of green areas per capita in 2022 was 4.31-8.59 square meters per person, which was still below standard.

**10) *Natural environments***:In 2021, the majority of conservation areas were in generally good quality. Kaeng Krachan Forest Complex has been listed as the World Heritage site. An ancient petrified wood, found in the Doi Soi Malai National Park in the western province of Tak, has been recorded by the Guinness World Records as the longest petrified log in the world. The **cultural environments** declared three new old towns to the listing of the Old Towns, bringing the total to 36 declared the Old Towns while 613 old communities have been officially registered.

**11) *Climate change and disasters***: In 2021, the average annual temperature in Thailand was 27.5 degrees Celsius, or 0.4 degrees Celsius higher than the normal temperature level but slightly below the average annual temperature in 2020. In addition, the average amount of precipitation was higher than normal by 11%. Landslides and earthquakes occurred more frequently. Current information shows that the energy sector is the key contributor to greenhouse gas (GHG) emissions by 71.65%. However, in 2020-2021, domestic industry's carbon dioxide emission per GDP declined.

**3. Projection of future changes**

**3.1 Environmental conditions in the short-term trend** (1-2 years)by considering from the past 10 years

***Land usage changes from expansion cultivation of cash crops and urban communities***: Cultivation of cash crops, particularly oil palm, cassava and sugarcane, is likely to expand with the rise in their price and energy demand and contribute to the increase in soil contamination by chemical fertilizer and other hazardous substances. Expansion of communities in major cities may also contribute to soil deterioration in absence of any impact mitigation measures.

***Increase in greenhouse gas emission from energy sector***: Increase in energy use from economic expansion and resumption of transports are likely to raise greenhouse gas emission from power generation and road traffic. Energy use may expand at a slower rate due to higher price of oil and renewable energy could become prominent with greater demand for energy in general and advancement in technology associated with renewable energy.

***The continuing concerns over waste problems***:Quantity of packaging wastes from urban communities is rising with adoption of modern life. Lack of waste segregation has made recycling difficult. Stimulation of tourism is likely to accelerate waste accumulation at tourist sites while local administrations have remained incapable of ensuring appropriate waste collection and disposal.

***Biodiversity on land and in marine is under threat***: With less COVID-19 restrictions, utilization of natural habitats is likely to increase, particularly at popular tourist sites. This could be a threat to biodiversity unless measures are taken to lessen its impacts. Climate change, inappropriate waste disposal and pollution all will continue to have impacts on ecosystems while invasive alien species will likely put more native species at risk from extinction.

***More visible in the rising threat of climate change and natural disasters***:Weather turbulence and natural disasters are likely to become more frequent and severe. This will have direct impacts on water usage in various sectors and on other aspects of livelihoods. Those who are particularly vulnerable to impacts of climate change include farmers, coastal communities and city residents with lower income.

**3.2 Environmental conditions in long-term future trend** may happen over the next 10 years

***Socio-culture Component:*** The population structure tends to enter the complete-aged society, and food and products delivery and urban expansion in various regions of the country are likely to increase the quantity of waste, particularly from packaging, as well as the scope of waste disposal problems. Severity of the problems will vary in accordance with effectiveness in waste management of local administrations, the public's behaviors on consumption and waste segregation and provision of information on the issues to the public.

***Technological Component:*** Technological advancement will improve efficiency in energy and resources utilization, increase use of renewable energy, mitigate waste generation and greenhouse gas emission, create more opportunity to access relevant information and enable environmental surveillance and monitoring. However, adopting new technology may also deplete natural resources at greater rate and generate waste products that are difficult to dispose.

***Environmental Component:*** Increased sea temperature affects coral reefs and other marine ecosystems while change in atmospheric temperature and precipitation will affect agricultural production. To meet greenhouse gas emission mitigation targets and to increase carbon sequestration in forests should be encouraged. However, these policies take a certain amount of time and need support from developed countries.

***Economic Component:*** The commitments to the Paris Agreement in greenhouse gas emission mitigation and limitation of global temperature created international trade conditions and measures aimed at protecting and preserving the environment. On the other hand, recovery of tourism may lead to natural resource and environmental degradation.

***Political Component:*** The national development may place more emphasis on adoption of BCG models, mitigation of greenhouse gas emission and implementation of other global and regional conventions and agreements of relevance. However, political changes may affect policy and budgetary support.

**4. Policy recommendations on natural resources and environmental management**

**4.1 Short-term measures** that can occur over the next 1 - 2 years byconcerning critical environmental issues and creating collaboration for more effective management.

**1) *Developing waste management systems at tourist sites in marine and coastal areas*:**Waste regulations should be adopted for operators of relevance. Moreover, coordination mechanisms should be established for the local level. Promoting use of environmentally friendly products and services, and should be provided for waste reduction and segregation whereas improvement should be made on systematic waste management in order to reduce disposing wastes into the environment.

**2) Assessing the area and establishing measures for environmentally important or sensitive areas:**Criteria to assess environmentally important or sensitive areas should be developed that accompany the declaration of environmental protection area to achieve concrete implementation. In addition, effectiveness of law enforcement should be enhanced and additional measures may be adopted with authority of local administrations or by using pre-existing environmental laws.

**3) *Promote water management at the local level*:**Localmechanisms and models of water management should be promoted. Eco-based Adaptation (EbA) measures have been adopted for vulnerable groups to build capacity for resilience and climate change adaptation.

**4.2 Long-term measures** concern changes in environmental situations and the direction for national development in the next decade.

**1) *Increasing forest and green spaces for carbon capture and storage***: a particular focus should be placed on urban green spaces where significant carbon dioxide emission, energy use and combustion. Increasing commercial forest plantation and reforestation, engaging the private sectors and local communities to participate in efforts to increase forest areas in pursuit of carbon neutrality.

**2) *Promoting the roles of the private sectors in mitigating greenhouse gas emission*:** Private sectors should be promoted and provided incentives to mitigate greenhouse gas emission, particularly among small and medium enterprises (SMEs). SMEs generally lack means to alter their productions and services delivery and should access to financial mechanisms to enable environmentally sound investment, develop and build on products and services with qualified levels and gain access to the government's green bidding.

**3) *Promoting responsible tourism*:**Cooperation should be forged in developing tourist sites. Networks of community-based tourist sites should be linked with those for natural and agricultural based tourism in order to reduce crowding and enhance effectiveness of environmental management at the sites. To this end, supervision and capacity building should be provided to tourist operators at every level and measures to prevent and reduce environmental impacts should be adopted and enforced.

**4) *Promoting environmentally friendly consumers' behaviors*:**Environmentally friendly behaviors should be promoted to mitigate impacts from daily life of consumers. This may include providing information tailored to specific target groups, offering consumers' choices, creating examples and pursuing consumers' voluntary commitment for actions in pre-designed directions. The target groups of the actions would consist of executive, elder, woman, youth and public.