

FORUM: Environmental Commission 2

QUESTION OF: Assessing the effects of the Yellow Dust Phenomenon

STUDENT OFFICER: Charidimos Styliaras

POSITION: President

INTRODUCTION

Almost every year during springtime, the citizens of East-Asian countries face the yellow dust phenomenon. Also known as Asian dust or yellow sand, the yellow dust phenomenon is a meteorological event that heavily impacts the countries of East Asia, mostly China, Japan, and Korea, and occurs during the spring season. This fine dust, originating from the deserts of China, Mongolia, and Kazakhstan, is carried through huge land areas by strong spring winds. Moreover, sandstorms in the region have been increasing in frequency since the 1960s due to rising temperatures and lower precipitation in the Gobi wilderness.

This phenomenon comes with various problems. Yellow dust can cause respiratory issues, aggravate asthma and several other lung diseases, and lead to severe eye irritation. Moreover, the citizens are advised not to stay in the streets for long and remain at home. But even then, because of the lack of air purifiers, many citizens cannot avoid the health damage.

Therefore, assessing the effects of the yellow dust phenomenon can prove to be challenging due to the unpredictability of the phenomenon. Nevertheless, the health and financial issues that come with yellow dust need to be restricted urgently.



Figure 1: The yellow dust phenomenon occurrence

DEFINITION OF KEY TERMS

Desertification

“The process of becoming desert (as from land mismanagement or climate change)”²

Early Warning System

“An integrated system of hazard monitoring, forecasting and prediction, disaster risk assessment, communication, and preparedness activities systems and processes that enable individuals, communities, governments, businesses, and

¹ “Yellow dust phenomenon.” Udayavani, 26 October 2020, <https://www.udayavani.com/english-news/what-is-yellow-dust-that-north-korea-has-warned-could-be-carrying-covid-19>. Accessed 8 September 2024.

² “Desertification Definition & Meaning.” Merriam-Webster, 23 June 2024, <https://www.merriam-webster.com/dictionary/desertification>. Accessed 22 July 2024.

others to take timely action to reduce disaster risks in advance of hazardous events.”³

Meteorological Conditions

“The prevailing environmental conditions as they influence the prediction of weather”⁴

Particulate Matter

“Particulate matter (PM) is made of solid particles and liquid droplets in the air. The PM can come from many places. In general, any type of burning or any dust-generating activities are sources of PM.”⁵

Precipitation

“ Water that falls from the clouds towards the ground, especially as rain or snow”⁶

Transboundary Pollution

“Transboundary pollution is the pollution that originates in one country but is able to cause damage in another country's environment, by crossing borders through pathways like water or air.”⁷

³ “Early warning system.” UNDRR, <https://www.undrr.org/terminology/early-warning-system>. Accessed 22 July 2024.

⁴ “Meteorological conditions.” Vocabulary.com Dictionary, Vocabulary.com, https://www.vocabulary.com/dictionary/meteorological_conditions. Accessed 22 Jul. 2024.

⁵ “What is Particulate Matter?” SCDHEC, <https://scdhec.gov/environment/your-air/most-common-air-pollutants/particulate-matter/what-particulate-matter>. Accessed 7 September 2024.

⁶ “PRECIPITATION | English meaning - Cambridge Dictionary.” Cambridge Dictionary, <https://www.dictionary.cambridge.org/dictionary/english/precipitation>. Accessed 22 July 2024.

⁷ Hancock, Nicole. “Transboundary Pollution — Safe Drinking Water Foundation.” Safe Drinking Water Foundation, 23 January 2017, <https://www.safewater.org/fact-sheets-1/2017/1/23/transboundary-pollution>. Accessed 22 July 2024.

Yellow Dust

“Originating in the deserts of Northern China and Mongolia, Yellow Dust is whisked into the atmosphere by strong winds and carried to the Asian Peninsula via the jet stream.”⁸

BACKGROUND INFORMATION

Historical Background

The yellow dust phenomenon is nothing new to the citizens of East Asia. The first phenomenon of yellow dust in the region was recorded in 174 A.D.. More recordings also mention the disruptions yellow dust caused in their daily lives. From the 16th to the 19th century, the phenomenon occurred more commonly and due to the frequent tourism in East Asia at that time, the phenomenon was brought to broader international attention. Even though the citizens were not informed about what caused the yellow dust phenomenon, they would take measures to protect themselves, such as staying indoors. In the early 20th century, and due to the advancement of technology and technological equipment back then, the scientists began observing the phenomenon closer and the documentation of yellow dust events became more frequent and detailed, shifting the phenomenon from a purely natural curiosity to a recognized environmental issue.

In the 1950s though, industrialization in East Asia became more frequent and popular. It included the construction of numerous skyscrapers and the immigration of many citizens from the countryside to the city. This made the big cities of East Asia very densely populated and the access to clean air more restricted than before. Due to these reasons, at the event of yellow dust, the access to clean and fresh air was minimal, leading to many citizens having developed health issues.

In the late 20th century and the early and mid 21st century, dust storms have been more frequent than ever, leading to several socio economic problems within East Asia. Two key events were the 1995 and 1998 dust storms, which were the biggest ever recorded. They lasted for several days and also turned the sky

⁸ “Hwang Sa (Yellow Dust).” Asia Society, <https://www.asiasociety.org/korea/hwang-sa-yellow-dust>. Accessed 22 July 2024

completely yellow, creating an apocalyptic scenery. Due to these catastrophic events, the East Asian countries decided to collaborate to assess the effects of the yellow dust phenomenon.

Meteorological Background

In East Asia, the winds tend to get stronger in springtime. The strong winds together with the extensive areas of desert in the area such as the Gobi desert in Mongolia give rise to the yellow dust phenomenon. If the wind happens to be Western, then it carries a lot of sand particles and spreads them in the atmosphere, forming a yellowish sky. Low precipitation, and high-pressure systems are the other main reasons for the expansion of yellow dust. Dust particles could be transported by jet streams and cold fronts. Most of the time, deserts or deforestation decrease vegetation cover, hence increasing soil erosion, enhancing this phenomenon. Yellow dust events not only decrease visibility, but they come with major health concerns arising from pollutants such as heavy metals and other toxic matter moving with the dust.

Potential Health Hazards

The yellow dust phenomenon carries several health hazards, particularly fine PM and other pollutants that it transports. These hazards can have an immediate effect and long-term impact on human health, influencing respiratory, cardiovascular, and even neurological systems.

For example, the inhalation of fine dust particles allows irritation of the respiratory tract to cause bronchitis and the exacerbation of asthma.

It has also been established that there is an increase in the rate of heart attacks through exposure to fine particulate matter, as in yellow dust. The particles can easily reach the blood system, where it could cause inflammation and contribute to plaque formation in the arteries, thus causing heart attacks.

Continuous yellow dust exposure can facilitate an increase in blood pressure, which is a causative agent for stroke. Particles could lead to vascular inflammation and rupture of the cerebral vessels, causing stroke.

Socio Economic Impact

Increased Healthcare Expenditures

Yellow dust storms are associated with a range of health problems, particularly respiratory and cardiovascular diseases. The fine particulate matter (PM10 and PM2.5) in the dust can exacerbate conditions like asthma, bronchitis, and other lung diseases. The increase in hospital visits and the demand for medical treatments during dust storm periods lead to higher healthcare costs for both individuals and governments.

Workforce Productivity Losses

Health issues caused by yellow dust can lead to increased absenteeism and reduced productivity in the workforce. Workers affected by respiratory problems or other dust-related illnesses may need to take time off, impacting economic output. In severe cases, long-term health complications from repeated exposure can lead to a decline in the overall health of the working population, further straining economic resources.

MAJOR COUNTRIES AND ORGANIZATIONS INVOLVED

China

China is central to the yellow dust phenomenon, both as a source of the dust and in attempts to mitigate the impact. Geographically, it is located next to major deserts like the Gobi and the Taklamakan which are primary sources of dust storms affecting not only China but also its neighbors like South Korea and Japan.

To monitor the concentration of particulate matter, as PM10 and PM2.5 are the bulk components of yellow dust, China has laid down a very big network of air quality monitoring stations. These data are categorized by date and time and can be used to issue public health warnings and advisories. It also runs early-warning systems to hopefully give advance notice about the predicted onset of a yellow dust storm to prepare and manage impacts on public health and daily life in cities and regions.

China also actively participates in regional initiatives conducted to understand the impact of the yellow dust. Most of these initiatives entail joint research with neighboring countries, such as South Korea and Japan, including

sharing data on dust sources, movements, and health impacts. The TEMM (Tripartite Environment Ministers Meeting) is one of the key platforms on which the cooperation as mentioned above is carried out, where partner countries coordinate their efforts to reduce the frequency and intensity of yellow dust storms not only in the context of scientific research but also policy coordination.

South Korea

Due to the fact that South Korea is a country heavily affected by the yellow dust phenomenon, there have been numerous attempts to enhance the already existing technologies, so as to enhance monitoring and to find solutions to the repeated cases of respiratory issues formed by the inhalation of yellow dust.. South Korea has also built up high-tech air quality monitoring systems along with early warning networks that caution citizens in the event of dust storms. Besides, there is regional cooperation between South Korea, China, and Japan to reduce the impacts of yellow dust through forums like the Tripartite Environment Ministers Meeting. In addition, South Korea is investing in research to understand the impact of dust and developing technological solutions to mitigate its effects on health and the environment. Economic costs of the phenomenon are an increase in health expenditure, disruption of life, and more, raising it to be a major issue in the country.

Japan

Japan is also a country that has been greatly affected by the dust storms and has been trying to find solutions so as to mitigate the effects on the citizens. Japan, besides the public health advisories issued to the citizens, which include protective measures when in contact with yellow dust. For example, they advised people, especially those with respiratory conditions, to minimize their outdoor activities, wear masks that cover the nose, and apply moisturizer and sunscreen to exposed skin. Besides that though, Japan, through collaboration with fellow States in East Asia has developed air quality monitoring systems and is investing in upgrading them. Several Japanese companies invest in technologies that mitigate the effect of yellow dust. Sharp Corporation and Panasonic Corporation developed state-of-the-art air purifiers capable of filtering out fine particulate matter, which highly improves indoor air quality during dust events. Toyota Motor Corporation embeds air filtration systems in their vehicles to protect the passengers during transport from harmful

particles. Hitachi, Ltd. and Mitsubishi Electric Corporation are working on the development of systems that monitor air quality and environmental technology with air purification and conditioning systems. Investments by these firms reduce the potential health effects from, and environmental impacts of, yellow dust in Japan.

Mongolia

Mongolia plays a vital role in the phenomenon of yellow dust, as its huge deserts, mainly the Gobi Desert, is an important source of such dust storms that hit East Asia. This system of dust storms, intensified by desertification and land degradation, extends to affect not only Mongolia but neighboring countries as well, with China, South Korea, and Japan being examples. The Mongolian government has, therefore, been developing several initiatives on afforestation and measures of sustainable land management in an attempt to fight desertification. Mongolia cooperates with international organizations and neighboring countries in efforts to counter the very roots of dust storms; it participates in regional efforts to monitor and diminish the spread of yellow dust. Additionally, research institutions in Mongolia are engaged in studying dust storms in terms of their environmental effects and mitigation measures. The phenomenon has considerable effects on the environment, health, and economy in terms of agriculture and livelihoods in Mongolia.

United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)

The United Nations Economic and Social Commission for Asia and the Pacific is very instrumental concerning the yellow dust phenomenon through regional cooperation and policy initiatives. UNESCAP works with the countries that are affected, on how to come up with strategies for mitigating the impacts of the yellow dust storms. These include promoting sustainable land management practices in combating desertification, improving regional air quality monitoring systems, and facilitating data sharing between the member states. UNESCAP also encourages research into capacity-building for a better understanding of the environmental and health impacts of yellow dust. These are programs by the UNESCAP to build closer cooperation among countries in response to the phenomenon's transboundary

character, intending to mitigate its negative impacts on public health, the environment, and regional economies.

World Health Organization (WHO)

WHO participates in activities that reduce the health impact of yellow dust. It is currently developing the public health and environmental health domains related to this phenomenon. On health risks, WHO collaborates with the countries where this phenomenon of yellow dust is most prevalent, to make projects or estimate health risks due to exposure to airborne particulate matter. It guides on the reduction of exposure to these risks, including recommendations on the monitoring of air quality, the issuance of public health advisories, and the protective measures to be taken for vulnerable populations. WHO also supports long-term research into the health effects of yellow dust for the updating of public health policies and interventions. It also collaborates with the member states to increase their capacity for mitigating the environmental health impact of yellow dust, enhances regional cooperation, and enables information sharing in reducing the impact on public health.

TIMELINE OF EVENTS

Date	Description of Event
1990s	The meteorological equipment in East Asia is advancing, leading to a better understanding of the phenomenon
1958	The campaign Great Leap Forward was launched. Even though it has no direct relevance to the yellow dust phenomenon, the campaign led to deforestation and desertification increasing the amounts of yellow dust in the atmosphere.
1978	China launches the Three-North Shelter Forest Programme, aimed to restore trees and contribute to afforestation.

1999	The first Tripartite Environment Ministers Meeting took place in Korea, where the three countries most affected, namely China, South Korea, and Japan discussed environmental issues, including yellow dust
2005	The Asian Dust and Aerosol Research Network is established to improve the monitoring and forecasting of yellow dust storms
2007	UNEP's Regional Forum on Environment and Health, focuses on transboundary air pollution, including yellow dust, leading to improved data sharing and cooperative mitigation strategies.
2015	The Great Green Wall project was launched once again to counter desertification by planting trees on the borders of the Gobi desert.
2017	The Asian Dust and Sandstorm Project (ADSS) was initiated by the UNESCAP, this project aims to improve the early warning systems and disaster risk reduction related to yellow dust.
April 2021	South Korea introduced stricter regulations on industrial emissions and motor vehicle pollution to address local contributors to air pollution, which combine with yellow dust to create dangerous smog conditions.
May 2023	China launched new initiatives to combat desertification in Inner Mongolia, including irrigation systems and drought-resistant vegetation planting. The United Nations Environment Programme (UNEP) also highlighted the need for global action on desertification, linking it to climate change mitigation efforts.

UN INVOLVEMENT: RELEVANT RESOLUTIONS, TREATIES AND EVENTS

Resolution 62/215⁹

United Nations General Assembly Resolution 62/215, adopted on 22 December 2007, is among the very important Resolutions that deal with the issue of desertification, land degradation, and drought focusing on their effects on human beings and the environment. It resonates with global cooperation in the fight against desertification by emphasizing the essence of sustainable management of lands and the restoration of degraded lands. The heightened action by the international community would lead to the fact that desertification and land degradation concerns would be integrated into the national and regional development strategies. Moreover, the resolution recognizes the UNCCD as a framework of international action on desertification and thus, therefore, appeals to member states to increase their commitment towards such a convention. By acknowledging the linkages between land degradation, health, and environmental sustainability, Resolution 62/215 is urging coordinated approaches to reduce the root causes of desertification, which may be considered closely related phenomena to yellow dust storms. It advances technologies and practices for land degradation neutrality, afforestation, and better soil conservation, thus serving the pursuit of improving resilience in terms of the environment to achieve and maintain public health.

Resolution 63/215¹⁰

The United Nations General Assembly Resolution 63/215, approved on 19 December 2008, reaffirms the commitment of the previous resolution to the struggle against desertification and land degradation and emphasizes the need for the elaboration of comprehensive strategies in the face of environmental challenges. This resolution gives priority to strengthening international cooperation and support for

⁹ UN. 22 December 2007, https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_RES_62_215.pdf. Accessed 22 July 2024.

¹⁰United Nations. "International cooperation to reduce the impact of the El Niño phenomenon." 19 December 2008, <https://www.documents.un.org/doc/undoc/gen/n08/483/69/pdf/n0848369.pdf?token=gtmVBnirbJH D8SQUbk&fe=tru>.

Accessed 23 July 2024.

the United Nations Convention to Combat Desertification and further emphasizes the need for integrated approaches to land management. Resolution 63/215 appeals for an increase in funding and technical assistance in view of the affected countries' establishing efficient modalities and measures to combat desertification. It also emphasizes that land degradation should be addressed in national development plans, with sharing of good practices and innovative solutions. The resolution is aimed at promoting practical means for sustainable land use and the restoration of ecosystems that are critical in mitigating the adverse effects of airborne dust by addressing interlinkages between land degradation and environmental problems like yellow dust storms. In its fullest form, it supports initiatives of soil health, vegetation cover, and community resilience to environmental degradation for improved air quality and public health.

Sustainable Development Goals

Among these, the more significant United Nations Sustainable Development Goals that pertain to the myriad issues brought about by environmental problems such as yellow dust are part of the 2030 Agenda for Sustainable Development, which is ratified in 2015. Specifically, SDG 15 "Life on Land" has the goals of fighting desertification, rehabilitating degraded land, and stopping biodiversity loss—problems directly connected with the diminution of sources of yellow dust. For example, the sustainable management of land and afforestation through SDG 15 helps reduce soil erosion effect and the vegetation cover, hence a reduction in the frequency and intensity of dust storms. It also agrees with SDG 3 - "Good Health and Well-being," as it advocates for a reduction in health impacts caused through environmental risks, such as air pollution that results from dust storms. The SDGs advocate and are designed in such a way that they will promote global partnership and sustainable solutions to the challenges. The interdependency of implementing the SDGs means that the approach to the environment, improvement of public health, and increased resilience toward adversities remain at the very core towards the realization of such goals as those related to the yellow dust. These push countries farther toward the development of lasting solutions to affect the root causes of dust storms and the impacts on human health and the environment.

PREVIOUS ATTEMPTS TO SOLVE THE ISSUE

Tripartite Environment Ministers Meeting (TEMM)

The Tripartite Environment Ministers Meeting, established in 1999, is a tripartite cooperation platform involving China, Japan, and South Korea, under the pretense of tackling regional environmental issues such as yellow dust. TEMM offers a set of discussions and cooperation between the three countries aimed at solving common environmental problems of the region, air pollution, and transboundary dust storms. The platform will help pool research and sharing of data on sources of dust storms and movement patterns, besides developing coordinated response strategies. TEMM promotes the implementation of policies and mitigating measures against yellow dust impacts by enhancing air quality monitoring systems and adopting land management practices that are sustainable. By building regional cooperation, TEMM enables countries involved to address the transboundary nature of yellow dust storms, enhance public health responses, and reduce environmental degradation. On the collaborative front, TEMM provides more effective and unified approaches in the management of yellow dust challenges in efforts to secure better environmental and public health in East Asia. Even though meetings are held annually, the three countries have not yet established specific and permanent solutions to assess the effects of yellow dust.

Three-North Shelter Forest Programme

A major environmental initiative to reduce the effects of yellow dust is the implementation of the "Green Great Wall" project, officially called the Three-North Shelter Forest Program, started by China in 1978. This large-scale deforestation project aims to stop the spread of advancing desertification and to lower the frequency of winds blowing through northern China. This is a project that will involve billions of trees being planted and shelterbelts established on the edge of the Gobi Desert and other arid regions passing through northern China, Mongolia, and some of Kazakhstan. With afforestation in large areas and on degraded ones, the Green Great Wall program wishes to maintain soil in position, so that the savage erosion

caused by wind is lessened, vegetation cover is increased to these areas, hence checking the sources of yellow dust. This long-term move aims to establish a barrier in order to protect the further spread of desertification for ecological benefits like improved air quality and enhanced biodiversity. In that respect, this project has faced many challenges, ranging from plant survival to land management. It is of great significance and worth in reference to the persistent environmental commitment towards the underlying causes behind the yellow dust problem.

POSSIBLE SOLUTIONS

Monitoring the Ecological Impact

An integrated monitoring system for yellow dust's ecological effects could provide a solution. It integrates satellite remote sensing with ground-based observations and models of the ecology to establish the effects of dust storms on ecosystems. Satellites trace the patterns of dust movement and deposition, while ground sensors measure its concentration and the health status of soils and vegetation. Ecological modeling allows predictions of the long-term impacts of yellow dust on biodiversity, soil quality, and water resources. Combining data from these sources will place researchers in a better position to acquire information on how yellow dust affects various ecological components, including plant growth, fertility of the soil, and water quality.

This monitoring system needs to include regular field surveys for measuring vegetation cover and soil degradation. This can, in turn, be encouraged through collaboration with international and regional organizations, which can facilitate improvement in sharing data to make better impact assessments. In such respect, this kind of multi-faceted monitoring would allow better-informed decision-making and strategies developed to mitigate the ecological impacts of yellow dust for sustainable land management and environmental conservation.

Social Impact Assessment

This approach would be all-encompassing in terms of monitoring the social impacts of yellow dust, through a health impact assessment, community surveys, and socio-economic analysis. Health impact assessments can be done through analysis of hospital data or public health studies to monitor increases in respiratory and cardiovascular conditions during dust events. Community surveys collect first-hand data on how dust storms affect daily life, including changes to outdoor activities, school attendance, and quality of life.

Socioeconomic analysis looks at the broader implications for productivity, yields, and economic costs of healthcare and dust-related disruptions. These methods are integrated to provide a clear understanding among the stakeholders of the dimensions of yellow dust effects on health, economy, and community well-being. Consultations with local communities during the monitoring process in an attempt to document their experiences and challenges ensure inclusivity of diverse perspectives and needs. Such collaboration can also be extended to government and non-government organizations to collect further data, which can support the development of interventions targeting the social impacts, thus helping in policy decision-making with some effective strategies to reduce or mitigate the adverse social effects of yellow dust.

Enhance Air Quality Monitoring

An improvement in monitoring for air quality with regard to the effects of yellow dust is through an advanced, multi-tiered monitoring network. This solution allows integration of high-resolution air quality sensors, satellite data, and predictive modeling to provide full and real-time information about airborne particulate matter. Ground-based sensors should be installed in urban and rural areas to measure particulate concentrations, dust deposition, and the efficiency of air quality interventions. Satellite technology can provide broad-scale dust movement and distribution data to give a larger spatial perspective on air quality.

In predictive modeling, however, historical data and real-time inputs can be used to forecast dust events and their potential impacts on air quality, hence availing proactive measures and timely public health advisories. All these monitoring systems augment data accessibility for analysis if integrated into a centralized data

management platform. Sharing information between regional and international agencies may also facilitate data sharing to fine-tune the accuracy of dust forecasting models. It could also make real-time air quality information available to the public through mobile applications and websites for self-protection measures based on informed decisions. A comprehensive air quality monitoring system such as this would therefore ensure better management of the yellow dust impacts and thus support the efforts toward improving the overall air quality and health conditions of the public at large.

Dust Suppression Projects

A valuable solution for addressing the impact of yellow dust is the implementation of large-scale dust suppression projects. Generally, these projects reduce the quantum of dust that is lifted into the atmosphere by stabilizing soil and enhancing the amount of vegetation cover in dust-prone areas. It can be minimized effectively through techniques such as planting vegetation, applying dust suppressants, and land management using terracing and windbreaks, which involve lessening soil erosion and dust generation.

Afforestation and reforestation programs can reclaim degraded lands and create natural windbreaks, which assist in the prevention of wind erosion. Spraying water or biodegradable dust suppressants onto sensitive soils can also minimize dust emissions during dry and windy weather. Finally, coordinating this with the local communities and other relevant stakeholders ensures that the projects are attuned to regional conditions and requirements. Field surveys and remote sensing enable effective measures for dust suppression at varying measures, which can possibly be of help in fine-tuning or implementing strategies. On the large scale, the ability of these measures to suppress dust can play an important role in improving air quality, diminishing the sources of dust, protecting ecosystems, and mitigating their adverse health effects on yellow dust.

BIBLIOGRAPHY

Introduction > Asian Dust > Typhoon / Asian Dust,

<https://www.kma.go.kr/eng/weather/asiandust/intro.jsp>. Accessed 23 July 2024.

- “THE 17 GOALS | Sustainable Development.” *Sustainable Development Goals*,
<https://sdgs.un.org/goals>. Accessed 23 July 2024.
- “Desertification Definition & Meaning.” *Merriam-Webster*, 23 June 2024,
<https://www.merriam-webster.com/dictionary/desertification>. Accessed 22 July 2024.
- “Dirty Haze: What is yellow dust that is agonising China, South Korea and Japan?” *Firstpost*,
14 April 2023,
<https://www.firstpost.com/explainers/yellow-dust-china-south-korea-japan-sandstorms-air-pollution-12455422.html>. Accessed 22 July 2024.
- “Early warning system.” *UNDRR*, <https://www.undrr.org/terminology/early-warning-system>.
Accessed 22 July 2024.
- Hancock, Nicole. “Transboundary Pollution — Safe Drinking Water Foundation.” *Safe Drinking Water Foundation*, 23 January 2017,
<https://www.safewater.org/fact-sheets-1/2017/1/23/transboundary-pollution>.
Accessed 22 July 2024.
- “Hwang Sa (Yellow Dust).” *Asia Society*, <https://asiasociety.org/korea/hwang-sa-yellow-dust>.
Accessed 22 July 2024.
- Otake, Tomoko. “Yellow sand allergy: A health issue made worse by climate change.” *The Japan Times*, 30 April 2024,
<https://www.japantimes.co.jp/news/2024/04/30/japan/science-health/yellow-sand-allergy-explainer/>. Accessed 22 July 2024.
- “PRECIPITATION | English meaning - Cambridge Dictionary.” *Cambridge Dictionary*,
<https://dictionary.cambridge.org/dictionary/english/precipitation>. Accessed 22 July 2024.
- Shin, Judy. “Explainer: What Is the 'Great Green Wall' of China?” *Earth.Org*, 23 August 2021,
<https://earth.org/what-is-the-great-green-wall-in-china>. Accessed 22 July 2024.
- “TEMM DSS.” *TEMM DSS Online Portal*, <http://temm-dss.com/about/>. Accessed 23 July 2024.
- UN. 22 December 2007,
https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_RES_62_215.pdf. Accessed 22 July 2024.
- United Nations. “International cooperation to reduce the impact of the El Niño phenomenon.” 19 December 2008,
<https://documents.un.org/doc/undoc/gen/n08/483/69/pdf/n0848369.pdf?token=gtmVBnirbJHD8SQUbk&fe=tru>. Accessed 23 July 2024.

“Yellow dust: Sandstorms bring misery from China to South Korea.” *BBC*, 13 April 2023,
<https://www.bbc.com/news/world-asia-65247927>. Accessed 22 July 2024.

Takemi, Tetsuya. “Dust storms and cyclone tracks over the arid regions in east Asia in spring.”
AGU Journal, *AGU*, 19 March 2005,
<https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2004JD004698>. Accessed 13
August 2024.

TANAKA, NOBUAKI. Expert: Measures against yellow sand same as for pollen allergies | *The
Asahi Shimbun: Breaking News, Japan News and Analysis*, 13 April 2023,
<https://www.asahi.com/ajw/articles/14884717>. Accessed 15 August 2024.

“Corporate Overview | Sharp Corporation.” *Sharp Global*,
<https://global.sharp/corporate/info/outline/organization/>. Accessed 15 August 2024.

“Great Leap Forward | Definition, Facts, & Significance.” *Britannica*, 31 July 2024,
<https://www.britannica.com/event/Great-Leap-Forward>. Accessed 15 August 2024.

“Three-North Shelterbelt Program | Department of Economic and Social Affairs.” *Sustainable
Development Goals*, <https://sdgs.un.org/partnerships/three-north-shelterbelt-program>.
Accessed 15 August 2024.