Hub of Talent on Air Pollution and Climate

HTAPC Newsletter

Issue 9, October 2024

Highlights

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Image: Peggy Anke

Source: https://unsplash.com/photos/aerial-photography-of-buildings-GmUjprCVxBo

Accomplished Activities of Hub of Talent on Air Pollution and Climate (HTAPC)

Issue 9

International Conference on "Strengthening Regional Cooperation for Clean Air and Public Health"

October 25, 2024, The Hub of Talents on Air Pollution and Climate (HTAPC), under the National Research Council of Thailand (NRCT), Ministry of Higher Education, Science, Research, and Innovation, participated in the international conference "Strengthening Regional Cooperation for Clean Air and Public Health", which was organized by Korea's National Institute of Environmental Research (NIER) in collaboration with the Korean Society for Atmospheric Environment (KOSAE). This conference aimed to address urgent issues related to air quality and public health in the Asia-Pacific region. It also served as a platform to foster collaborative efforts towards achieving improved air quality across the region. The conference was held at the Landing Convention Center, Jeju Shinhwa World Hotel, on Jeju Island, Republic of Korea.

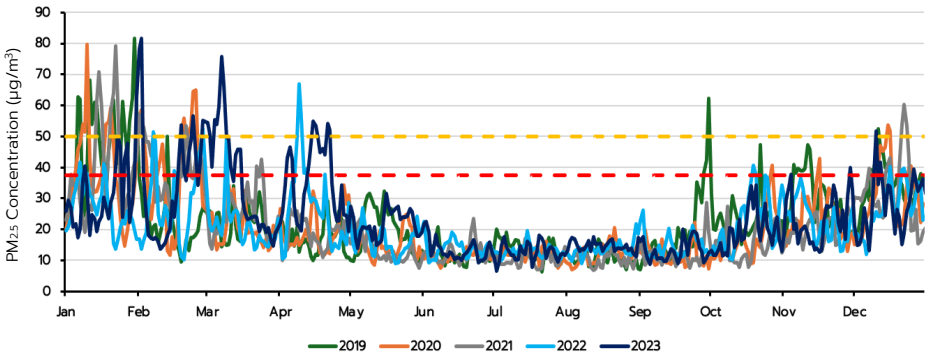
Representatives from various countries attended the meeting to share their experiences in the practice of air pollution management. The discussion was held under the theme "Joint Efforts of the Region for Clean Air and Public Health." Dr. Supat Wangwongwatana, Director of HTAPC, participated in the meeting to address Thailand's past efforts in air pollution management. The presentation also highlighted the development of a draft Clean Air Act, which introduces legal mechanisms to address air pollution in the country.

HTAPC, in collaboration with CCCACC, organized a field visit at the Faculty of Public Health, Thammasat University (Rangsit Campus), for the participants from Samsenwittayalai School

On October 10, 2024, the Faculty of Public Health, Thammasat University (Rangsit Campus), in collaboration with the Hub of Talents on Air Pollution and Climate (HTAPC) under the National Research Council of Thailand (NRCT), Ministry of Higher Education, Science, Research, and Innovation, and the Collaborating Center for Clean Air and Climate Change (CCCACC), welcomed teachers and students from Samsenwittayalai School, Bangkok. The field visit provided an opportunity for those participants to explore and learn about the educational processes of the Faculty of Public Health. HTAPC and CCCACC played a key role in creating a learning space focused on air pollution management for those participants. This initiative offered participants about hands-on experiences and practical knowledge to address air quality issues effectively.

Dr. Supat Wangwongwatana introduced the CCCACC and HTAPC centers before conducting a demonstration on how to create a DIY air filter, which include the principles of air filter's operations, maintenance methods, and its benefits. Dr. Supat emphasized that making a DIY air filter can significantly reduce costs compared to purchasing commercial ones while maintaining high filtration efficiency. He encouraged students to adapt this practical knowledge for daily use, making it both cost-effective and impactful. Moreover, HTAPC invited students to participate in various activities, such as a Kahoot quiz based on a video about air pollution and a matching game to pair images with corresponding descriptions. These activities provided students with hands-on experiences, enhancing their understanding of air pollution and its management. Additionally, the activities served as an inspiration and guidance for students considering their higher education in related fields.

Factors Affecting the Concentration Levels of $PM_{2.5}$ in Bangkok



Explanation of Symbols

The 24-hour standard for $PM_{2.5}$ concentration (Before June 1, 2023) = 50 µg/m³ (Previous standard)

The 24-hour standard for $PM_{2.5}$ concentration (After June 1, 2023) = 37.5 µg/m³ (New standard)

Figure 1: Daily Average of $PM_{2.5}$ concentrations in Bangkok from 2019 to 2023

Source: Collaborating Center for Clean Air and Climate Change (CCCACC)

The $PM_{2.5}$ issue in Bangkok constitutes a significant public health concern, particularly during the dry season (December to February), when elevated $PM_{2.5}$ concentrations are observed annually (Figure 1). The levels of $PM_{2.5}$ in the atmosphere are influenced by meteorological factors, including temperature, relative humidity, wind speed, and precipitation. Moreover, key contributors to air pollution include emissions from transportation, open burning, industrial activities, and construction.

The Hub of Talents on Air Pollution and Climate (HTAPC) under the National Research Council of Thailand (NRCT), Ministry of Higher Education, Science, Research, and Innovation, in collaboration with the Collaborating Center for Clean Air and Climate Change (CCCACC), has developed an academic article addressing factors influencing $PM_{2.5}$ concentrations in Bangkok. This article synthesizes findings from various research studies. Cheewinsiriwat et al. (2022) highlighted the significant role of meteorological factors in determining $PM_{2.5}$ concentration levels in Bangkok, particularly during the rainy and winter seasons, when weather conditions exhibit distinct variations. The study indicated that increases in rainfall, wind speed, and relative humidity directly reduce $PM_{2.5}$ concentrations through rain-wash mechanisms and enhanced dispersion of particles under stronger winds. Furthermore, during the rainy season, high humidity facilitates the aggregation and deposition of $PM_{2.5}$ particles onto surfaces. Conversely, during winter, high atmospheric pressure and stagnant air conditions result in the accumulation of $PM_{2.5}$ near the ground, leading to elevated concentration levels. Additionally, land use patterns influence $PM_{2.5}$ concentrations, particularly in industrial zones and high-traffic areas. These areas experience increased $PM_{2.5}$ emissions due to fuel combustion from industrial operations and transportation, significantly contributing to the overall levels of $PM_{2.5}$ concentration in the atmosphere.

Roadside (Din Daeng National Housing Authority)

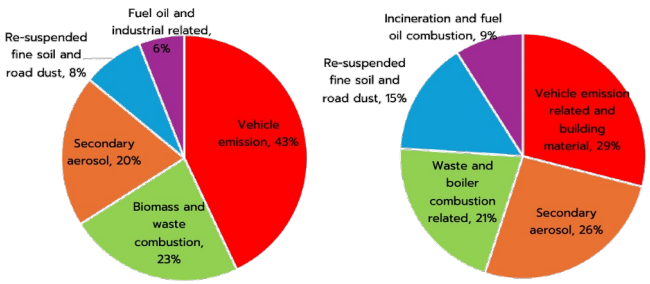


Figure 2: Analysis of the proportion of $PM_{2.5}$ sources in roadside
Source: Air Quality and Noise Management Division, PCD (2022)

Ambient (Public Relations Department)

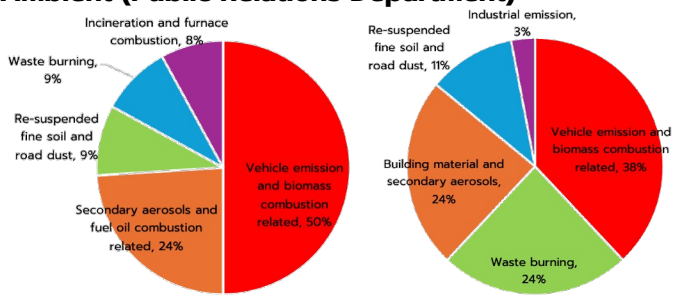


Figure 3: Analysis of the proportion of $PM_{2.5}$ sources in ambient
Source: Air Quality and Noise Management Division, PCD (2022)

An analysis of $PM_{2.5}$ sources using the Positive Matrix Factorization (PMF) Receptor Model, conducted in collaboration between the Pollution Control Department, Thai researchers, and Japanese experts (Air Quality and Noise Management Division, PCD, 2022), revealed significant findings regarding the sources of $PM_{2.5}$ during different periods. During high $PM_{2.5}$ concentration periods (December to February), the primary sources of $PM_{2.5}$ in roadside areas were vehicle emissions (43%), followed by biomass and waste combustion (23%), secondary aerosol (20%) and re-suspended fine soil and road dust (8%). In contrast, during low $PM_{2.5}$ concentration periods (March to April), the proportions of emission sources shifted. The main contributors included vehicle emission related and building material (29%), secondary aerosol (26%), waste and boiler combustion related (21%) and re-suspended fine soil and road dust (15%) (Figure 2). In ambient, during high $PM_{2.5}$ concentration periods, the primary sources were vehicle emission and biomass combustion related (50%), followed by secondary aerosols and fuel oil combustion related (24%) and re-suspended fine soil and road dust (9%). However, the proportion of $PM_{2.5}$ emissions from vehicle emission and biomass combustion related significantly decreased during low $PM_{2.5}$ concentration periods (Figure 3).

Meteorological conditions and $PM_{2.5}$ emission sources are essential considerations for developing effective $PM_{2.5}$ management strategies in Bangkok. The rainy season, characterized by frequent rainfall, high humidity, and stronger winds significantly reduces and disperses $PM_{2.5}$ concentrations, while the dry season often experiences elevated levels due to stagnant atmospheric conditions. Seasonal variations in emission sources, such as transportation and biomass burning, underscore the need for targeted interventions. Comprehensive management approaches should integrate continuous monitoring of $PM_{2.5}$ levels, emission source analysis, and an understanding of seasonal dynamics. Key measures may include optimizing land use, enforcing stricter emission standards, regulating open burning and expanding urban green spaces to mitigate $PM_{2.5}$ pollution effectively.

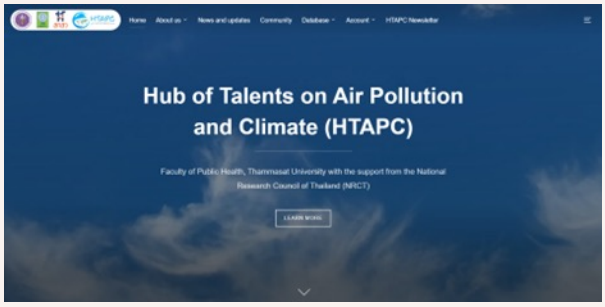
We cordially invite you to join us

Hub of Talents on Air Pollution and Climate

HTAPC Membership Form for Experts

Official website of Hub of Talents on Air Pollution and Climate (HTAPC)

https://www.htapc.info



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Monthly Newsletter

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