

WILEY

Edited by Majeti Narasimha Vara Prasad

Handbook of Ecological and Ecosystem Engineering



24

Air Quality Improvement Using Phytodiversity and Plant Architecture

D.N. Magana-Arachchi¹ and R.P. Wanigatunge²

¹ National Institute of Fundamental Studies, Kandy, Sri Lanka

² Department of Plant and Molecular Biology, Faculty of Science, University of Kelaniya, Kelaniya, Sri Lanka

24.1 Introduction

Air quality can be defined as the degree to which air is suitable for humans, animals, and plants – that is, any living organism – to remain healthy. Good air quality means the air is clean, clear, and free from pollutants. The air quality in an area is not static and can be changed within hours.

Recent reports predict that by 2050, almost 9.7 billion people will inhabit the earth [1], and two-thirds of them are expected to live in urban areas [2]. Globally, many countries monitor their air quality by maintaining an Air Quality Index (AQI). However, air quality maintenance cannot be achieved by a single country: it requires universal cooperation since air pollution does not follow geopolitical boundaries. Air pollution is defined as the earth's atmosphere being polluted by anthropogenic or naturally occurring substances at higher concentrations than their normal ambient levels, causing adverse effects on human health and the ecosystem. It is a universal problem, and people who live in cities are more vulnerable than those who live in rural areas or villages.

The World Health Organization (WHO) estimates that globally, 3 million people die each year due to exposure to air pollution [3]. With the current global coronavirus pandemic, more attention has been directed to air pollution. It is assumed that the causes of death in COVID-19 patients and their conditions have been or can be aggravated by long-term exposure to air pollutants.

The concentrations of pollutants, the rates at which they are released into the atmosphere, and the length of time they stay trapped in a particular location are the three main factors that affect air quality in a specific area. Major air pollutants are particulate matter (PM₁₀ and PM_{2.5}), volatile organic compounds (VOCs) like benzene, toluene, ethylbenzene, and xylenes (BTEX), and inorganic pollutants (CO₂, CO, SO₂, NO, NO₂). Many of these outdoor air pollutants are also found indoors, but concentrations can be higher. The role of trees in removing air pollutants has been well documented. This chapter summarizes the influence of plants in improving air quality with particular emphasis on phytodiversity and plant architecture.