

Environmental Sciences

Question:-

Air pollution is a severe issue for ecological landscape of Pakistan keeping in view adaptation and mitigation practice. How air pollution can be minimized?

Air pollution is any undesirable change in the physical, chemical or biological characteristics of air which may or will harmfully affect human health, plants, animals, our industrial processes, living conditions and cultural assets.

According to WHO, Atmospheric pollution is about situations in which the out door atmosphere contain pollutants in such an increased concentration that remain harmful to human health, plants, animals, aquatic life, micro-organisms and environment.

Air pollution is rapidly growing environmental problem in Pakistan.

According to the Pakistan Environmental protection agency (Pak-EPA), air pollution levels for the major Pakistani cities

have been recorded seven times higher than those prescribed by the World Health Organization.

According to US-Air Quality Index AQI-2022 Pakistan had the 3rd worst air quality in world.

Causes: Highly inefficient energy use, accelerated growth in vehicles number and vehicle kilometers traveled increasing industrial activity without adequate air pollution control and open burning of solid waste including plastic are some key-factors for declining ambient air quality in Pakistan. At the same time, the expansion of economic activities also spurs green-house gases (GHGs) emission.

⇒ Adaptation and mitigation practices to minimize air pollution:-

Air pollution is indeed a severe issue in Pakistan and it requires a combination. It is critically important to limit the increase or even reduce emissions of air pollutants

that deteriorate the air quality in Pakistan. As air and water has no national boundaries, pollution in one part of the world has effect on other part of the world due to trans-boundary movement of air and water. To control pollution we have to follow the mantra "Think Globally and Act locally". Some of the strategies to control air pollution are given as:

1 → Source Controls:-

i- Substitution or Alternative of Raw materials:-

We should use the purer grade raw materials instead of impure raw material to reduce the formation of pollutants. So,

a) Low sulfur fuel can be used instead of high sulfur fuel, having low pollution potential.

b) More refined LPG or LNG can be used instead of traditional high contamination fuel such as coal.

ii- Process Modifications

Modern and more efficient

methods can be used to control emissions at source. For example: If coal is washed before pulverisation, the fly-ash emission can be reduced.

iii- Modification of existing equipments:

Air pollution can be reduced by the modification of existing equipments. For example hybrid cars and electric vehicle should be used instead of the fuel or diesel cars.

iv- Maintenance of equipments:

A large amount of pollution can be caused due to the poor maintenance of equipment which includes the leakage around (ducts due to negligence) ducts, pipes, valves and pumps etc.

Emission of pollutants due to negligence can be minimised by a routine check-up of the seal and gaskets.

Further measures:-

- a) Using unleaded petrol
- b) Discarding of old vehicles
- c) Plant trees along busy streets

and roads.

2-Control Measures in Industrial centers:

i- Improve Industrial emissions control

Incorporate air ^{pollution} control

equipment in design of plant layout must be made mandatory to control the emission of industries. Implementation of strict regulations and monitoring techniques for industries can control emissions. Encourage the adoption of cleaner production techniques, energy efficient technologies and the use of pollution control devices such as scrubbers and filters.

ii- Strengthening of Industrial waste management:-

Improved Industrial waste management system can reduce the air pollution, like proper burning of solid waste of industries. Encouraging recycling, composting and waste-to-energy initiative can be helpful in reducing air pollution. Establish proper land-fill sites with gas

capture mechanisms to prevent the release of methane, a greenhouse gas, ^{can} proves very helpful in the reduction of air pollution.

iii- Control Brick kiln Emissions:-

Brick kilns are significant sources of air pollution in Pakistan. Implement strict regulations on brick kilns, including the use of cleaner technologies such as zig-zag kilns, which are more efficient and produce fewer emissions. Provide incentives and support for brick kiln owners to transition to cleaner technologies can reduce the air pollution.

3 → Use of pollution control Equipments:-

Installing following devices which reduce release of pollutants:-

i- Filters:-

Filters remove particulate matter from the gas stream in industries.

ii- Electro-static precipitators (ESP):-

ESPs take the soot, ash, ashes and unburned carbon-dioxide from the smoke using an electric

charge and release clean air or smoke into the atmosphere. Extraction of these harmful particles is important since they can cause harm to buildings, the environment and people.

iii- Inertial separator:

Inertial separators separate dust from gas streams using a combination of forces, such as centrifugal, gravitational and inertial.

iv- Scrubbers:-

Scrubbers are wet collectors.

They remove aerosols from a stream of gas either by collecting wet particles on a surface followed by their removal or else the particles are wetted by a scrubbing liquid.

These particles get trapped and reduces the pollution in atmosphere.

All the above equipments controls air pollution, if work properly.

4 → Other Control measures:-

i- Address indoor pollution:-
Indoor pollution caused

by the burning of solid fuels for cooking and heating, is a significant health concern. Promote the use of clean cooking technologies such as liquefied petroleum gas (LPG), biogas and improved cookstoves. Raise awareness about the health risks associated with indoor pollution and provide access to cleaner alternatives for vulnerable communities.

ii- Strengthen Environmental Impact Assessments:

Air pollution can be minimized by ensuring that all major development projects undergo rigorous environmental impact assessments. This will help identify potential air pollution sources and implement necessary mitigation measures during the planning and construction phases.

iii- Promote International Co-operation:

Seek assistance and co-operation from international

organization, such as the United Nations Environment program (UNEP) to support capacity building, knowledge sharing and funding of air pollution control initiatives in Pakistan.

iv- Promote Reforestation and Green Spaces-

Increase the number of trees and green spaces in urban and rural areas. Trees act as natural filters and absorb pollutants from the air. Promote urban forestry projects and create incentives for afforestation initiatives.

v- Raise public Awareness:-

Conduct public awareness campaigns to educate the general population about harmful effects of air pollution and the importance of adopting cleaner practices. Encourage individuals to take actions such as reducing vehicles use, practicing energy conservation, and avoiding open

Day: _____

Date: _____

burning.

All these above mentioned solutions should be implemented in conjunction with each other, as a part of a comprehensive and integrated approach to address air pollution effectively.