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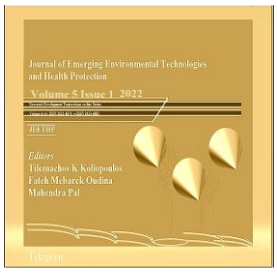

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Environmental health utility for air pollutants monitoring at construction facilities – promotion of safe sport green tourism infrastructures at post COVID-19 era

Tilemachos Koliopoulos [1] Dimitris Papakonstantinou [2] Slavoljub Hilcenko [3] Mahendra Pal [4]

[1] Managing Director Telegeco Development Research Center, Collaborator University of West Attica, Athens, Greece

[2] Telegeco Research Development Center, Athens, Greece

3 Director, Akademija Obrazovno-zdravstvenih strukovnih studija, Subotica, Vojvodina, Serbia, Academy of Vocational Studies for Educational and Health Professionals Autonomous, Subotica, Province of Vojvodina, Serbia

[1] Narayan Consultancy on Veterinary Public Health and Microbiology, Anand, India

Abstract

In this working study useful monitoring tools have been presented for the environmental health monitoring at outdoors, at construction facilities. The results are useful for stakeholders in relation to environmental health topics for public health protection. Useful training topics about monitoring schemes, safety, and promotion of sustainable tourism and clean technologies. Conclusions are made for environmental protection, sustainability, environmental chemistry, public health including safe sports activities in post COVID-19 era. This working study could be the base for future useful technologies and environmental health protection at indoors, outdoors in terms of safety, sports tourism, and alternative types of tourism, chemical hazards, community health, risk assessment and public health protection.

Keywords: Air pollutants, monitoring, Sustainable designs, Sports Tourism, Environmental Health, Community Health, Public Health, COVID-19.

Corresponding Author: Tilemachos Koliopoulos, Telegeco Research Development Services, www.telegeco.gr , Greece
E-mail: tilkolgr@gmail.com

1. INTRODUCTION

The monitoring schemes are necessary at outdoors to mitigate risks from chemical air pollutant hazards that can be met at construction facilities from several anthropogenic activities. In this way that will encounter to use proper tools so as to mitigate associated risks related to dealing with the post COVID-19 in relation to particular sports tourism activities and alternative types of tourism. Sports tourism activities as well as alternative types of tourism are necessary for psychological support to several population groups at post COVID-19 era for public health protection [1, 4, 6, 10, 11, 13, 15, 16, 19, 20, 24, 29, 35, 44].

However, as well as the fact that during the post COVID-19 pandemic era several psychological problems for some people may exist due to lock downs or people that injured. Alternative types of tourism such as sports tourism, community health tourism are necessary within the realization of sustainable designs for environmental health protection and community health protection. These problems are the following:

 Social distancing: refers to avoiding close contact with other people, maintaining a safe distance (usually one to two meters) from other people, as well as avoiding gathering in places such as schools, shops, churches and means of transport.

 Quarantine: involves absolute avoidance of contact with other people in case someone has been exposed to the virus, to determine whether or not they will manifest the disease.

 Isolation: means removing someone infected with the virus so that they do not spread it to others. These measures, although considered necessary by all the scientists dealing with the pandemic, may, in combination with the ongoing threat arising from the spread of the pandemic, cause you strong and negative emotions, such as:

 Fear and anxiety. It is very common for you or your loved ones to worry and fear about the possible occurrence of the disease and its transmission, as well as its severity and outcome. It is also normal to have concerns about procuring goods, taking a break from work or meeting family obligations. Some people may experience problems sleeping or even performing everyday tasks. You may also notice an increase in alcohol consumption, an increase in smoking, or even the abuse of psychoactive substances.

 Sadness and boredom. Interruption of work and activities that give meaning to each of our lives and reduced contact with other people disrupts our daily life, which can lead to low mood and intense boredom.

 Anger and irritation. The isolation and quarantine of you or your loved ones, as well as the gradual closure of shops and recreational areas, can lead you to a sense of restriction of your personal freedom, resulting in increased tension and irritation. In some cases, you may also feel anger or disgust at the medical services that put you in quarantine or isolation, or at other people if you believe that you were exposed to the virus because of someone else's negligence.

 Stigma. If someone gets sick or has been exposed to SARS-CoV-2, they may feel stigmatized by people who fear contracting it. The same feelings may be felt by family members of a person with COVID-19, as they feel differentiated from the rest of their social group. Each person's reaction is influenced by many factors, such as personality, their micro-environment (family, friends, workplace) and the community in which they live. The population groups that seem to be most affected and show stronger manifestations of stress are:

 Older people or people who have a chronic illness and show an increased likelihood of getting seriously ill from COVID-19

 Children and teenagers

 Those on the front line of dealing with the virus, such as doctors and nursing staff People who already suffer from a psychiatric disorder Possible causes of increased stress are considered: The reduction of activities and stimuli received Reduced social contacts

 Financial difficulties and the financial burden due to the weakness for work

 The lack of effective stress coping strategies

 The length of time social isolation lasts. Longer duration is associated with burdened mental health and post-traumatic stress symptomatology

 Another factor may be insufficient supply of goods (eg, water, food, clothing, medicine), as well as the inability to access medical care and prescriptions.

 Finally, incomplete information can cause confusion in the general population. Ways to safeguard mental health:

1. Correct information about the virus from authoritative sources and limit exposure to mass media: repeated and non-stop exposure to information (TV, internet, social media) increases levels of anxiety and discomfort. It can also be a source of misinformation.

2. Maintaining communication with important people. Most people find it comforting to be able to talk about their worries with friends or family.

Communication often creates a strong support network of mental protection for the person whose psyche is being significantly tested.

3. Physical health care for emotional regulation: balanced diet, adequate sleep, rest, physical exercise at home as much as possible, avoiding alcohol consumption, smoking and drug use.

4. Psycho education for stress and mental discomfort (emotion management):

➢ Help in recognizing and accepting emotions to normalize emotional reactions ("Recognize to yourself that you are experiencing a serious and extreme stressful event and that some emotional reactions will follow. You have every right to feel and allow yourself to feel sadness or any negative emotion. But remember the strengths and abilities you have to cope with this difficult time.")

➢ Observing and recognizing symptoms of stress, mental distress and risky behaviors health to yourself and to your loved ones → gaining awareness of your mental health status and preventing deterioration.

➢ Psychoeducation in specific strategies/skills to reduce discomfort, such as diaphragmatic breathing, relaxation, use of cold water, through texts with detailed instructions and/or audio-visual material on the internet

➢ Basic skills of practicing self-centeredness (mindfulness) through short-term exercises available available online

➢ Preparation of an action/emergency plan to deal with the pandemic at a personal and family level.

➢ Communication and expression of feelings and concerns to loved ones and trusted persons.

➢ Mobilization by planning activities during the day to increase positive emotions: effort to include pleasant activities in the changed everyday life.

➢ Trying to create and maintain a daily routine without being demanding and stressful. What can I do when I feel stressed:

1. Look for the reason why you feel stressed.

✓ Divide the possible causes into three categories: a) those for which there is a practical solution, b) those that will improve over time, and c) those that you can't really do anything about.

✓ Try to put aside your worries about issues that fall into the second and third category. Try to think, "What good is it to worry about something I can't fix?" 2. Strengthen your self-focus.

✓ Self-centeredness is related to our ability to focus attention on the here and now, and remove ourselves from thoughts and feelings that are not related to the moment in which we live, but to the distant future or the past.

✓ Take a break from the barrage of news we receive from everywhere.

Distract yourself by doing things that relax and entertain you. For example, contact familiar people, watch a series or a movie that interests you, read a book, go out for a short walk making sure to follow the protection instructions.

In cases where the anxiety persists, contact the appropriate mental health agencies. For people suffering from a psychiatric disorder:

 You should follow the treatment plan agreed with your therapist to manage distress and emotional outbursts.

 You should continue to have regular contact and therapeutic follow-up, even remotely using internet communication technology, to prevent a serious relapse/worsening of symptoms or even possible hospitalization.

 Ensure as far as possible that you have an adequate supply of your medication.

2. RENEWABLE RESOURCES AND SAFE GREEN CONSTRUCTION DESIGNS FOR PROMOTION OF ALTERNATIVE TYPES OF TOURISM

In addition to the above useful monitoring schemes should exist in terms of particular air pollutant emissions next to batch biomass bioreactors

from waste water units or landfill bioreactors or other anthropogenic activities like road transport networks, others [5, 6, 7,]. Renewable resources and proper sustainable designs should be applied in transport, or other facilities for the promotion of safe green tourism and public health, community health protection at post COVID-19 era [2, 3, 6, 8, 21, 22, 23, 25, 27, 32, 49, 53].

Also proper design in building openings should exist at particular health care units, community health infrastructure services and sports tourism facilities, associated building infrastructures for the good operation and safe storage of goods at post COVID-19 pandemic era. The latter should exist within the safe earthquake design of openings at shear walls that should be taken into account in relation to hazardous explosive emission from nearby batch bioreactors [6, 7, 10].

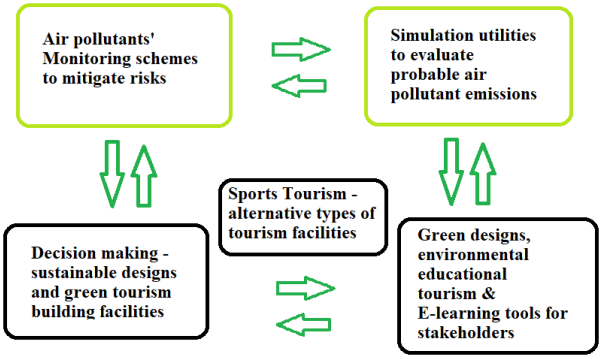

Fig. 1. Monitoring Schemes for Air pollution protection, project management and promotion of safe travel destinations through environmental tourism education, green designs, and public health topics.

In figure are presented measures to mitigate air pollution risks and decision making for safe travel destinations promoting sustainable safe tourism destinations within the use of useful utilities. In this way, several useful methodologies and simulation tools have to be taken into account in terms of monitoring schemes, sustainable designs, e-learning tools and health - safety at building facilities, sports – agricultural facilities [10, 11, 12, 14, 17, 18]. Safe construction facilities should exist at particular construction designs like greenhouses and particular safe sport construction facilities that support alternative sports tourism facilities as well as agricultural tourism infrastructures so as to promote unique travel destinations at post COVID-19 era supporting particular events within alternative types of tourism [30, 31, 33, 34, 36, 38]. Particular measures for flood protection, building fire safety and others should exist following the principles of right designs that should be applied properly at several tourism facilities. Greenhouses could exist either on open ground levels or on last level at green tourism building that promote unique travel destinations with safe building openings for good indoor air quality avoiding associtated health hazards, risks, pools, safe mobility infrastructures, safe shear wall designs, green construction facilities and other safe sports tourism facilities [4, 9, 13, 26, 28, 37, 39, 40, 41, 42, 45].

3. PROJECT MANAGEMENT

A proper project management should exist in cases of air pollutants that may have magnitudes higher than thresholds for public health. Moreover, an educational program should exist to stakeholders in order to be taken the right measures in emergencies. Right utilities could exist at particular sports tourism facilities based on their topographical datasets and meteorological field data [7, 50, 51, 52]. In case that high air pollutants exist close to community health tourism unit then simulation utilities based on statistical models could be applied properly so as to take right monitoring schemes and actions at places that tourists or others, stakeholders are located there.

Therefore, useful project management statistical based simulation utilities are presented below to mitigate risks from air pollutants and take actions for sustainable tourism infrastructures, safe sports tourism activities, protecting community health at selected topographies.

The concentration C of an examining air pollutant along the cross section to the central line at location (x,y) from selected boundary, could be calculated by the following equation (1), for the examining comprehensive

spatial analysis diagnostic model, taking the source of air pollutant on a height difference H related to the location (x,y) of the receptor [7, 48, 50, 51, 52].

$$C(x,y,0,H) = \left[\exp\left(-\frac{1}{2}\frac{y^2}{\sigma_y^2}\right)\right]\frac{Q}{\pi u \sigma_y \sigma_z}\exp\left(-\frac{1}{2}\frac{H^2}{\sigma_z^2}\right) \quad (1)$$

where

Q gas emissions from the source (Kg/sec)

C air pollutant concentration at location χ, y

from a height H (Kg/m3)

u wind velocity (m/sec)

x is defined by the respective x distance on x axis, from the source of air pollutant to a nearby civic, industrial or agricultural land use receptor area, based on the particular spatial data of the examining proposed investigating areas.

The selected x distance is applied on the relative statistical disperioncoefficients variables graphs so as to determine the respective dispersion coefficients in relation to atmospheric stability conditions A, B, C, D, E or F, see table 1 [7].

y is defined as the transverse distance to the above selected x location for which is calculated the air pollutant concentration.

The y distance is based on particular map data of nearby land uses next to the examining proposed landfill sites' areas. The selected y distance is applied on the graph of σz dispersion coefficient versus distance so as to determine the respective value of dispersion σz coefficient in relation to atmospheric stability conditions A, B, C, D, E or F.

σy, σz dispersion coefficients dependent on x, they are calculated based on relative statistical graphs applying corresponding least squares fitting curves based on datasets from relative statistical graphs for the dispersion coefficients.

Hence, relative formulas are presented below for numerical models as simulation utilities according to categories A, B, C, D, E, F of atmospheric stability:

σy, for A atmospheric stability condition

σy = -3 10-16 x4 + 5 10-11 x3 – 4 10-06 x2 + 0.2031 x + 10.581, R2 = 0.9997;

σy, for B atmospheric stability condition

σy = 2 10-16 x4 – 2 10-11 x3 + 3 10-08 x2 + 0.1133 x + 36.938, R2 = 0.9973;

σy, for C atmospheric stability condition

σy = -8 10-17 x4 + 1 10-11 x3 – 1 10-06 x2 + 0.0922 x + 12.849, R2 = 0.9984;

σy, for D atmospheric stability condition

$\sigma_y = 6\ 10\text{-}17\ x_4 - 1\ 10\text{-}11\ x_3 + 2\ 10\text{-}07\ x_2 + 0.0581\ x + 17.218$, $R_2 = 0.9986$;

σy, for E atmospheric stability condition

$\sigma_y = -2\ 10\text{-}17\ x_4 + 6\ 10\text{-}12\ x_3 - 5\ 10\text{-}07\ x_2 + 0.0472\ x + 9.9535$, $R_2 = 0.9979$;

σy, for F atmospheric stability condition

$\sigma_y = -4\ 10\text{-}17\ x_4 + 9\ 10\text{-}12\ x_3 - 6\ 10\text{-}07\ x_2 + 0.0333\ x + 3.8686$, $R_2 = 0.999$;

σz, for A atmospheric stability condition

$\sigma_z = -6\ 10\text{-}11\ x_4 + 3\ 10\text{-}07\ x_3 + 1\ 10\text{-}05\ x_2 + 0.1812\ x - 5.1457$, $R_2 = 0.9999$;

σz, for B atmospheric stability condition

$\sigma_z = 1\ 10\text{-}13\ x_4 - 3\ 10\text{-}09\ x_3 + 2\ 10\text{-}05\ x_2 + 0.0899\ x - 1.7552$, $R_2 = 0.9988$;

σz, for C atmospheric stability condition

$\sigma_z = -1\ 10\text{-}15\ x_4 + 1\ 10\text{-}10\ x_3 - 3\ 10\text{-}06\ x_2 + 0.0742\ x - 7.5725$, $R_2 = 0.9982$;

σz, for D atmospheric stability condition

$\sigma_z = -3\ 10\text{-}17\ x_4 + 7\ 10\text{-}12\ x_3 - 5\ 10\text{-}07\ x_2 + 0{,}0183\ x + 12.887$, $R_2 = 0.9965$;

σz, for E atmospheric stability condition

$\sigma_z = -1\ 10\text{-}17 x_4 + 3\ 10\text{-}12\ x_3 - 3\ 10\text{-}07\ x_2 + 0.0093\ x + 11.559$, $R_2 = 0.9899$;

σz, for F atmospheric stability condition

$\sigma_z = -1\ 10\text{-}17\ x_4 + 2\ 10\text{-}12\ x_3 - 2\ 10\text{-}07 x_2 + 0.0062\ x + 6.3454$, $R_2 = 0.9868$.

A, B, C

D, E, F atmopheric stability categories that are selected based on meteorological conditions which are described in Table 1.

where A is high unstable; B is medium unstable; C is low unstable; D neutral; E low stable and F very stable type of atmospheric stability [7, 50, 51, 52].

Wind velocity at 10m height from G.L. (m/s)	High solar radiation during day	Middle solar radiation during day	Low solar radiation during day	Cloudiness of sky, n, during night, covered (n ≥ 4/8)	Cloudiness of sky, n, during night, clear (n ≤ 3/8)
>2	A	A-B	B	E	F
2-3	A-B	B	C	E	F
3-5	B	B-C	C	D	E
5-6	C	C-D	D	D	D
>6	C	D	D	D	D

Table 1. Categories A, B, C, D, E, F of atmospheric stability that applied for relative statistical based simulation utilities to mitigate risks from air pollutants and take actions for sustainable tourism infrastructures, safe sports tourism activities, protecting community health [7].

However, an application of above simulation utilities, based on above presented equations is given below [7]. A CO emission is examined for x = 600 m, y = 60 m distances from landfill boundary to a nearby industrial land use area with CO 6615.56 μg/s air pollutant emission and applying equations (4) and (5) for D atmospheric stability category, H = 15 m the height difference from the source of air-pollutant to the examining location and wind velocity 5.5 m/sec at 10m height above (G.L.), it yields 0.307 μg/m3 at x = 600 m distance from the source on x axis and 0.126 μg/m3 at y = 60 m transverse distance to x axis. The results which were found above both are under the health and safety limits for a human working on that location avoiding any epidemiologic public health effect (limit<10 mg/m3 in 8-hour base).

All the above project management statistical based simulation utility should be useful to mitigate risks from air pollutants from particular anthropogenic activities next to sports tourism facilities. The above utilities could be linked with digital drawing utilities and e-learning tools not only for stakeholders but also for tourists so as to participate at several activities. either they are elderly people or young based on their knowledge interests so as to promote contents and activities based on their interests within unique travel destinations [19, 33, 35, 43, 46, 47, 49]. In this way several actions could be taken for safe alternative types of tourism, agricultural tourism and safe sustainable sports tourism activities at indoors – outdoors facilities, promoting green tourism facilities, sustainable community health tourism that should take place at post COVID-19 era [10, 33, 35, 36, 43].

4. CONCLUSIONS

In this working study several useful topics were investigated. Useful simulation utilities have been presented so as to mitigate air pollutants' risks from particular anthropogenic activities next to sports tourism facilities.

Useful simulation utilities results presented based atmospheric stability that could be applied for relative statistical based numerical simulation utilities to mitigate risks from air pollutants and take actions for sustainable tourism infrastructures, safe sports tourism activities, protecting community health and public health. The results are useful and should be combined with other digital drawing utilities, other useful applications for stakeholders as well as modern e-learning technologies so as to promote sustainable tourism activities at post COVID-19 era. This working study could be the base for future useful educational tourism contents and activities to stakeholders for safe green tourism facilities, sustainability and public health protection.

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