INNSPUB

International Journal of Biosciences | IJB |
ISSN: 2220-6655 (Print), 2222-5234 (Online)
http://www.innspub.net
Vol. 19, No. 6, p. 20-34, 2021

RESEARCH PAPER OPEN ACCESS

Comprehensive environmental sustainability survey study in Pakistan contemplating environmental issues, pollution problems, and sustainable solutions approaches

Sunila Kanwal[1,2*], Omm-e-Hany[1], Syed Shahid Shaukat[1], Aamir Alamgir[1]

[1]*Institute of Environmental Studies, University of Karachi, Pakistan*

[2]*Sindh Environmental Protection Agency (SEPA), Pakistan*

Key words: Environment, Environmental pollution, Sustainability, Sustainable solution approaches.

http://dx.doi.org/10.12692/ijb/19.6.20-34 Article published on December 18, 2021

Abstract

Environmental problems are the major concerns and talk of the town of every nation around the world. Indeed, legislations are the most important tool for implementing the obligations in a unified and harmonized manner in every state, even considered as developed or underdeveloped. Unfortunately, inadequately financed, mismanaged, insufficient coordination, poor strength and capacity building, self-centered attitudes, discriminations, lack of knowledge and holistic decisions enlarge the problems rather diminishing, although progressive thoughts persist. Pakistan is also one of the affected countries, among others, facing these issues. Therefore, in keeping the severity of the environmental issues and considering the importance of the constitution of Pakistan (1973), environmental importance in the legislative list in terms of environmental pollution and ecology is highlighted. The first time Pakistan conducted the comprehensive environmental survey study to know about knowledge and opinions of the learned Pakistani people about environmental problems and their solutions. In this regard, results are statistically analyzed and show that the participants are sensitively thinking over the protection of the environment and have more trepidations about local issues rather than global ones. The green suggestive action behavior in the restoration of natural environs are also noted, discussed through ESS and found considerately helpful and obliged response towards sustainability of bionetwork. Therefore two models are also framed with the support of a detailed literature review, provided as ESM-SS and IMF-ESM- that in fact, translates the conclusive views of the valuable contributors on Environmental Sustainability Survey (ESS). These models act as supportive tools in the formulation of better improved, symbolic and thought-provoking strategies for sustainable solutions to the environmental problems in Pakistan.

* **Corresponding Author:** Sunila Kanwal ✉ sunilaabdulwassey@gmail.com

Introduction

The environment has been a topic of each age since the creation of the world. Currently, it is counted as the highest priority and serious matter of the 21st century**.** The environment is a challenging field and multidisciplinary subject that encompasses practically every aspect of the earth's biological and physical environment, as well as environmental chemistry (Ortolano, 1984). Pakistan has been seriously thinking over many decades on solutions to environmental problems despite having so many environmental crises. There need quite a lot of methods that society uses to restrict dangerous or negligent behaviors, to protect people from danger, to protect the rights of citizens and to ensure the health and safety of the people. The most formal way to tackle these practices is through laws. However, many industry representatives and the current presidential administration are calling for and indeed implementing a policy that relies more on voluntary compliance and self-regulation and less on traditional enforcement of Federal Environmental Protection Laws (Candace, 2004).

Environmental pollution

Pollution is the adulteration of an environment and one form of corruption perpetrated by the earth's corruptors. There are numerous concerns about contamination and environmental damage. Climate change, global warming, overpopulation, deforestation, mining, nuclear issues, increased carbon footprint, extinction of endangered species, genetic modification, obliteration of marine life, health and medical waste issues, household and industrial waste, acid rain, landfills and littering are all caused by anthropogenic activities**.** Pollution has a crucial role in causing such problems; either directly or indirectly, it is one of the major contributors. The introduction of harmful or unwanted substances intentionally or unintentionally into the system of the natural environment that distressing the perfect order of the intact universe and annoying the balance of the ecosystem via un-even anthropogenic activities is, in fact, called environmental pollution. We, in particular, cannot classify exactly the types of pollution, but if the change in the universe, whether transforming or transfiguring the natural entities causing a change in the form of damage or disturbing the balance of an environment., it is pollution, which would be affecting human beings, animals, marine, marine animals, water, air, agriculture, weapons, noise, dust, volcanic eruptions, floods, hurricanes, earthquakes municipalities, industries and hospitals. The severity of the contamination depends on the types of pollutants. Contaminants can be bio-degradable, non-degradable, or persistent. Unfortunately, pollutants in an atmosphere are of both types, natural and man-made, but mostly man-made activities give rise to greenhouse gases, particulate matter and heavy metal pollution and also increase the average temperature of the earth's atmosphere, ultimately leading to climate change issues (Alley *et al.,* 2007).

Sustainable solutions and integrated approach

There is an urgent need to discover a long-term solution using an integrated approach. Environmental pollution, integration, and long-term solutions are the three main pillars that must be merged to eliminate pollution problems. All sectors must work together to strengthen an integrated approach to overcome complicated problems. Sustainability can be accomplished if economic progress, social fairness, and environmental quality are all balanced. Each parameter should be composed of the others to preserve sustainability.

According to Mr. Jim Mac Neill, the former Secretary-General of the World Commission on Environment and Development, "sustainability" is defined as "development based on forms and processes of advancement that do not jeopardize the integrity of the environment on which they have an impact" (Pillai *et al.*, 2011). No doubt, environmental, economic, social, and political concerns are intertwined on our planet in order to achieve environmental sustainability - both locally and worldwide (Bierbaum *et al.*, 2018). However, where industrialization and technological advancements gave rise to modern civilization, such as modern

technology, mass production of goods, and rapid expansion of businesses, they also created a wide range of global challenges due to inequitable natural resource management, exploitation, and depletion of the earth's resources and minerals. Unfortunately, such efforts had a global impact on ecological balance, climatic circumstances, and human health. The best way to manage sustainable environmental approaches is, to integrate basic principles of sustainable development in developing environmental systems and policies that can act as catalytic action for any organization towards sustainability (Saha *et al.*, 2009). Pakistan, being an under-developed state, should draw serious thoughtfulness to overcoming environmental glitches because, as per EPI report, Pakistan ranked among the worst countries in environmental pollution (Pakistan Today, 2018). We should work on practical and realistic environmental models. Two models are also modeled and presented in this research paper to fill the gaps of negligence and inter-connected the dots for sustainable solutions. Society, development and environment in terms of technical, economic, ethical and philosophical aspects, local, regional and global sustainability, their implementation, applications, verification, and monitoring of policies in practically for sustainable use of water, energy, land, forestry and agriculture activities on soil, aquatic ecosystems and biodiversity, poverty reduction and climate change (air& water pollution and energy and food security) are required with applied attitude for sustainable environmental development (Hens and Ren, 2021).

The aim of this study is to create information about the integrated approaches on environmental issues and their sustainable solutions locally and globally. This study also focused on the unified approaches of the learned personnel, environmentalists, and young generation on the environmental concerns for the strong coordination with broad array of private sector, governmental, media, civil societies, stake holders and international developmental associates for practical efforts towards environmental sustainability.

Methodology

The Environmental Sustainability Survey form was generated technically. The data collection procedure was carried out both electronically and traditionally. This research is comprehensively comprised of survey-based studies and literature reviews. The studied population is composed of 201 individuals, including Environmental Protection Agencies, Environmental specialists/ experts, coastal/oceanographic institutes, department of energy and alternative energy, department of mines and minerals, industrialists, educators, economists, academics, national and local government officials, young people, student of renowned colleges and universities and few of them were also well-educated housewives. The distinguished age groups were taken as samples, i.e., 18 to 65. Their perceptions of Pakistan's environmental problems and solutions, along with the environmental challenges of Pakistan's urban areas studied and statistically analyzed. To find the association between two things/values and between multiple parameter values on respondent's findings, contingency and simple chi-square methods were used. The values were calculated as non-significant and significant at p-values ($p < 0.001$, $p < 0.01$ and $p < 0.05$) by using the basic package developed by SS Shaukat on computer programs in BASIC FORTRAN and C++ (Shaukat and Siddique, 2005). The concepts and views of respondents of different age groups on the environmental status of urban areas in Pakistan and their level of understanding of environmental problems and sustainable solutions are statistically deduced. The results of the ESS have evaluated the severity of the problems and their eradication ways. Whereas, concluding discussion is conducted on the statistical analysis of the environmental importance of each environmental situation of the ESS. The research's results are presented in Table 1 (column a to c) and Table 2 connotation are a) Statistical analysis between respondents' tests on environmental concerns for each environmental parameter b) Association formed between four age groups of participants, participated in ESS (18-25, 26-35, 36-45 and 46-65), c) Association established between two age groups of participants i-e young people of age, 18-25 and Professionals as well Experts having age 26-65 d) Finally, the environmental importance of each environmental situation of ESS was statistically analyzed.

Results

Among respondents' tests of the environmental concerns of each environmental parameter, 92.68% of the tests were found to be significant and the rest were non-significant. Non- significant does not mean that the null hypothesis is false because results may also show no major differences between their responses. Almost all respondents seemed to be well aware of environmental concerns (Table 1, column "a"). After the test analysis, associations were made between four age groups (Table 1, column "b"). The main purpose of this involvement was to verify the level of knowledge of each age group about the impact and causes of environmental problems and the approaches to environmental solutions through ESS. So, the 80.48% results were non-significant and only 19.51% were significant, which observed that the insignificant results may be due to the priority, opinions, experience and professional attitude of the interviewees.

Table 1. Statistical analysis results of environmental sustainability survey.

Sr.no.	Environmental concerns	Test Parameters (a)	Association among four age groups (b)	Association among two age groups (c) (c)
1	The two most pressing urban environmental problems of today	Significant p<0.001	Significant p< 0.01	Significant p<0.001
2	The two top causes of environmental pollution and climate change	*P*<0.001significant	Non-significant	Non-significant
3	These two sectors are most responsible for air emissions	*P*<0.001Significant	Non-significant	Non-significant
4	Would environmental deficit cause food Insecurity?	*P*<0.001 Significant	Non-significant	Non-significant
5	Types of air pollutants are same in each country?	*P*<0.001significant	Non-significant	Non-significant
6	Is there any strong relation between weather and climate?	*P*<0.001 significant	Non- significant	Non- significant
7	Is the changing weather pattern, cause of climate change?	*P*<0.001 significant	Non-significant	Non-significant
8	Are global warming and climate change the same problem?	*P*<0.001significant	Non-significant	Non-significant
9 9	The most responsible air pollutants for environmental damage:	*P*<0.001significant	Non-significant	Non-significant
10	Air pollutants most affect the human health	P<0.001 Significant	Non-significant	Non-significant
11	Is the government honestly fighting against climate change?	P<0.00 Significant	Non-significant	Non-significant
12	Is the government's efforts in reducing environmental issues are satisfied	P<0.001 Significant	Non-Significant	Significant p<0.05
13	International Standards of environmental quality parameters should be implemented in all nations	P<0.001 Significant	Non-significant	Non-significant
14	The continent is the most responsible for climate change other than the USA?	P<0.001 Significant	Non-significant	Non-significant
15	International Agenda 21 is the action plans for the environment and development:	P<0.001 Significant	Significant p<0.05	Significant p<0.01
16	The media is alarmist about the issues of climate change more often than other environmental issues:	Non- significant	Non-significant	Non-significant
17	Which is the most severe Environmental issue?	P<0.001significant	Significant p< 0.01	Significant p< 0.01
18	These factors alarms human health?	p<0.05 significant	Significant p<0.05	Significant p<0.01
19	Human behavior is the cause of climate change	P<0.001 significant	Non-significant	Non-significant

20	Is there strong connection between energy consumption and climate change?	P<0.001 significant	Non- significant	Non-significant
21	Fossil fuels can be reduced by	P<0.001significant	Non-significant	Non-significant
22	Discourage to fossil fuel favors		Non- significant	Non- significant
23	Imposition of carbon tax is	P<0.001significant	Non- significant	Non- significant
24	The most sustainable alternative energy sources in the next 10 years?	P<0.001signoficant	Non- significant	Non- significant
25	The ecosystem can be sustainable if one of the major problem Is solved	p<0.01signi	Significance p<0.05	Significance p<0.05
26	Water shed management is	P<0.001significant	Non-significant	Significant p<0.01
27	The endocrine system is badly affected by	P<0.001significant	Non-significant	Non-significant
28	Pollutants are responsible for the destruction of water quality and human health.	P<0.001significant	Non-significant	Significant p<0.01
29	Recycling and segregation activities are the sustainable solution.	P<0.001sig	Non-significant	Non-significant
30	Buying green products is an environmental sustainable approach:	P<0.001significant	Non-significant	Non-significant
31	Preservation of the environment is the right of everyone:	P<0.001significant	Non-significant	Significant p<0.05
32	Self-centered nations or selfish people of the nations are the main cause of rigidity in environmental issues.	P<0.001sig	Non-significant	Non-significant
33	Humans are abusing the planet-the earth	P<0.001significant	Non-significant	Significant p<0.01
34	The two most effective‘s due to environmental changes is	P<0.001significant	Non-significant	Non-significant
35	The severity of the threat to the survival of humankind is due to:	Non-significant	Non-significant	Non-significant
36	The largest problems to the alteration of life-styles:	Non-significant	Non-significant	Non-significant
37	The two most important parameters for the preservation of biodiversity and environment are:	P<0.001significant	Significant p<0.05	Non-significant
38	Two most effective strategies for improving citizen awareness:	P<0.001significant	Non-significant	Significant p<0.01
39	One of the most important means of environmental awareness.	P<0.001sig	Non-significant	Non-significant
40	The two most practical solutions for environmental problems:	P<0.001 significant	Significant p<0.05	Non-significant
41	Two most problems will be resolved sustainably at the end of 21stcentury	P<0.001 significant	significant p<0.05	significant p<0.05

Therefore, to check the reasons for the large difference between significant and insignificant values in the association of four age groups, another null hypothesis was made to verify whether these results are really due to age differences or experience/professional attitudes. Hence, associations were made between two groups, i.e., Youngers (18-25) studying at renowned colleges/universities and highly qualified professionals/individuals (26-65) (Table 1, column "c"). Hence, the results concluded that 34.14% of the results were significant and 65.83% appeared to be insignificant. Approximately 65.86 % of the differences were found in the opinions of respondents across two age groups and hence these differences were believed to be due to the level of ages, experiences and knowledge/awareness. Therefore in keeping the importance of each parameter (options) of the environmental situations, the statistical analysis was conducted among the previous two age groups (young people aged 18 to 25 and highly qualified professionals/individuals, aged 26 to 65) (Table 2) to know about the value of each environmental concern among the today's young

generation and seniors. Thus, the results analyzed and significant values were 64.81% and non-significant found 35.18%.

This means that the importance of each parameter in the eyes of each respondent is much greater than the differences in their opinions or specialized approaches. From the systematic results of all submissions and findings(Table 1 and 2), it also observed that the participants were given priority to air pollution as a major and most significant environmental problem of Pakistan over water pollution, whereas climate change was found insignificant. However, other associated issues in ESS have equal importance and also conversed methodically below. However, overall results show that the people of Pakistan are more focused and concerned about local issues relative to global ones.

Table 2. Environmental situations after combining the row categories of two age groups.

Association among two age groups(18-25 and Professionals as well Experts having age 26-65)to know about the importance of environmental parameters of each concern			
Environmental concerns	options	Environmental parameters	Results
1	a	Air ,water and solid waste	air, Water, SW, Congestion & overcrowding collective replied found Significant ($p<0.01$)
	b	Congestion and overcrowding situation	Significant $p<0.05$
	c	Explosive population growth	air, Water, SW & Explosive growth replies found (Significant $p<0.001$)
2	a	Natural disaster	Non-Significant
	b	Agricultural Activities	Significant $p<0.01$
	c	Industrial activities	Significant $p<0.001$
	d	Mobility	Non-Significant
3	a	Vehicular emission	Significant $p<0.001$
	b	Industrial sector	Significant $p<0.001$
	c	Residential	Non-Significant
	d	Commercial	Non-Significant
4	a	Agree	Significant $p<0.001$
	b	Disagree	Non-Significant
5	a	True	Non-Significant
	b	False	Significant $p<0.05$
6	a	yes	Significant $p<0.01$
	b	No	Non-Significant
	c	May be	Non-Significant
7	a	yes	Significant $p<0.05$
	b	No	Non-Significant
8	a	yes	Significant $p<0.01$
	b	No	Non-Significant
	c	May be	Non-Significant
9	a	Greenhouse gases (Sox, NOx, CO_2, CO,)	Significant $p<0.05$
	b	Particulate matters (PM, PM 10, PM 2.5)	significant $p<0.05$
10	a	Organic pollutants	Significant $p<0.01$
	b	in organic	Non-Significant
11	a	yes	Non-Significant
	b	No	Significant $p<0.01$
	c	May be	Non-Significant
12	a	yes	Non-Significant
	b	No	Significant $p<0.001$
13	a	yes	Significant $p<0.001$
	b	No	Non-Significant
14	a	ASIA	Significant $p<0.05$
	b	EUROPE	Non-Significant

15	a	yes	Significant p<0.001
	b	Don't know	Non-Significant
16	a	Agree	significant p<0.05
	b	disagree	significant p<0.05
17	a	Air pollution	significant p<0.001
	b	Water pollution	Non-Significant
	c	Climate change	Non-Significant
18	a	Air pollution	significant p<0.001
	b	Water pollution	significant p<0.001
	c	Climate change	non-significant
19	a	100%	significant p<0.05
	b	75%	significant p<0.01
	c	50%	non-significant
	d	25%	non-significant
20	a	yes	significant p<0.001
	b	No	Non-significant
21	a	Carbon Tax	non-significant
	b	Discourage	non-significant
22	a	Economical sustainability	non-significant
	b	Environmental sustainability	significant p<0.05
23	a	Good	significant p<0.01
	b	Bad	non-significant
	c	Don't know	non-significant
24	a	Renewable energy	significant p<0.01
	b	Non- renewable energy	non-significant
25	a	Water pollution	significant p<0.001
	b	Air pollution	non-significant
	c	Climate change	non-significant
26	a	Sustainable approach	significant p<0.01
	b	Don't know	Non-significant
27	a	Biological pollution	non-significant
	b	Chemical pollution	significant p<0.01
	c	both	non-significant
	d	Don't know	non-significant
28	a	Biological pollution	significant p<0.001
	b	Chemical pollution	significant p<0.05
29	a	Agree	significant p<0.001
	b	Disagree	non-significant
30	a	Agree	significant p<0.01
	b	Disagree	non-significant
31	a	Strongly Agreee	significant p<0.001
	b	Strongly disagree	non-significant
32	a	Agree	significant p<0.01
	b	Disagree	non-significant
33	a	yes	significant p<0.001
	b	No	significant p<0.05
	c	May be	non-significant
34	a	Humans	Humans &Ecosystem(significant p<0.01)
	b	Civilization	civilization & Eco-system (significant p<0.05)
	c	Ecosystem	Non-Significant
35	a	Energy consumption	non-significant
	b	Waste management	significant p<0.01
36	a	Implementing solutions troublesome	significant p<0.001
	b	Be short of scientific knowledge	significant p<0.001

37	a	Technical information	Technical information Legislative (significant p<0.05)
	b	Legislative framework	legislative& political will (significant p<0.001)
	c	Political will	non-significant
38	a	Promote attractive and alternative ideas	promote alternative ideas& Green product Awareness (significant p<0.05)
	b	Scientific researches	scientific research &environmental education (significant p<0.01)
	c	Green products awareness	scientific research & green product awareness significant p<0.05
	d	Environmental education from kindergarten	promote alternative ideas & education from kindergarten significant p<0.001
39	a	Communicable media	significant p<0.05
	b	Conferences /workshop	significant p<0.05
	c	Governmental activities	non-significant
40	a	Education	significant p<0.05
	b	Awareness	Education & awareness (significant p<0.05)
	c	Technology advancement	education &technology advancement (significant p<0.05)
	d	Imposition of tax	technology and imposition of tax (significant p<0.05)
41	a	Population/ poverty problems	Non-significant
	b	Urban/transport problems	Non-significant
	c	Drinking water quality	DWQ, water &air pollution significant (p<0.001)
	d	Water pollution/Air pollution	Non-significant

Discussion

As it is deduced from the findings that the people of Pakistan are more considerate about local issues rather than global problems. Most of the death rates are due to both outdoor and indoor air- pollution as stated by World Bank and it is recorded that about 163,432 daily lost and 22,000 premature adult deaths/yr due to outdoor pollution, whereas 28,000 deaths / year and 40 million cases of acute respiratory infections found in Pakistan because of indoor air pollution.[2] A medical journal also described in the Lancet report that about 22% of the deaths in Pakistan every year are attributed to air pollution (Rehman, 2018).

The top five highest death rates are recorded in the Asian continent: China, India, Pakistan, Indonesia and mobility activity in Pakistan has been counted as pollution-intensive category (Ilyas, 2007) whereas, 40% of deaths are due to water pollution due to the contamination of freshwater bodies and drinking water sources with the industrial waste, hospital waste, arsenic, wastewater, and others (Hanif, 2018). Therefore, statistical analysis proved that air pollution should be Pakistan's priority issue that needs instant solutions, then water and afterward climate change. In general, in urban areas, air, water, solid waste, explosive growth compared to congestion and overcrowding were found highly significant. Emissions from vehicles and industries were found to be highly significant sources compared to agricultural activities, but commercial, residential and natural disasters were found to be insignificant. In response to such problems, multiple issues arise like food insecurity, implementation of solutions to problems, lack of scientific knowledge, waste management (solid and liquid), biological pollution, organic pollutants, chemical pollution, greenhouse gases, particulate matter, endocrine-disrupting chemicals (EDCs).[2] The US EPA declared endocrine-disrupting chemicals disrupting the reproduction, homeostasis, and the development process (Erkekoglu and Kocer - Gumusel, 2016) because these compounds are unnatural (Gore *et al.*, 2014). Mostly in low-developed countries, most of the priority is given to food production over environmental protection and, in the same way, food security over poverty intrinsically defines the degree of protection of the natural environment (Falvey, 2004). Pakistan is among some other countries affected by climate

change. Climate change, changing weather patterns and global warming are not alike problems, but their sporadic changes cause a number of problems (Linnenluecke and Griffiths, 2010). While global warming refers exclusively to the increase in the earth's surface temperature, climate change encompasses both warming and the "side effects" of warming. Climate change is causing melting glaciers, more frequent droughts, and more violent storms, to name a few examples (Kennedy and Lindsey, 2015).

Fig. 1. Environmental Sustainability Model for Sustainable Solution.

In comparison to Asia and Europe, the United States was the largest CO_2 emitter and the worst in terms of greenhouse gas emissions (Irfan, 2019). China is now the world's greatest CO_2 emitter, accounting for more than a quarter of global emissions, followed by the United States, the European Union, India, and Russia. While the United States accounts for 25% of total emissions and has contributed mostly to global CO_2 emissions, which are then followed by the European Union and China (Ritchie and Roser, 2017). Nations with self-centered peoples have enslaved the entire environment and mistreated the earth. Humans are responsible for the degradation of water quality, air quality, human health, marine life, plant life, visual/natural beauty, and living / non-living resources. Climate change is also a result of nations' rash strategies and self-centered attitudes. Most countries and businesses are also constrained in their

willingness to share their technologies with other countries rather than environmental management and knowledge; such nations or individuals accept the notion of planetary management.

As a result, human action is the primary contributor to climate change but, the human persons themselves and the ecosystem, most affected by climate change. The literature endorses the replies of EES that there should not be equal rights between humans, plants, animals, and other organisms. Though plants, primarily trees, account for about 82 percent of biomass and have dominant life on the planet, small bacteria account for 13% of the biomass, despite the fact that our knowledge often relates to the animal kingdom, which accounts for only 0.4 percent of the biomass, and the human contribution is only 0.01 percent. Humans make up only 0.01 percent of the world's population (Bar-On *et al.,* 2018). Humans, on the other hand, are superior to all other creatures and must work together as responsible citizens to maintain the environment.

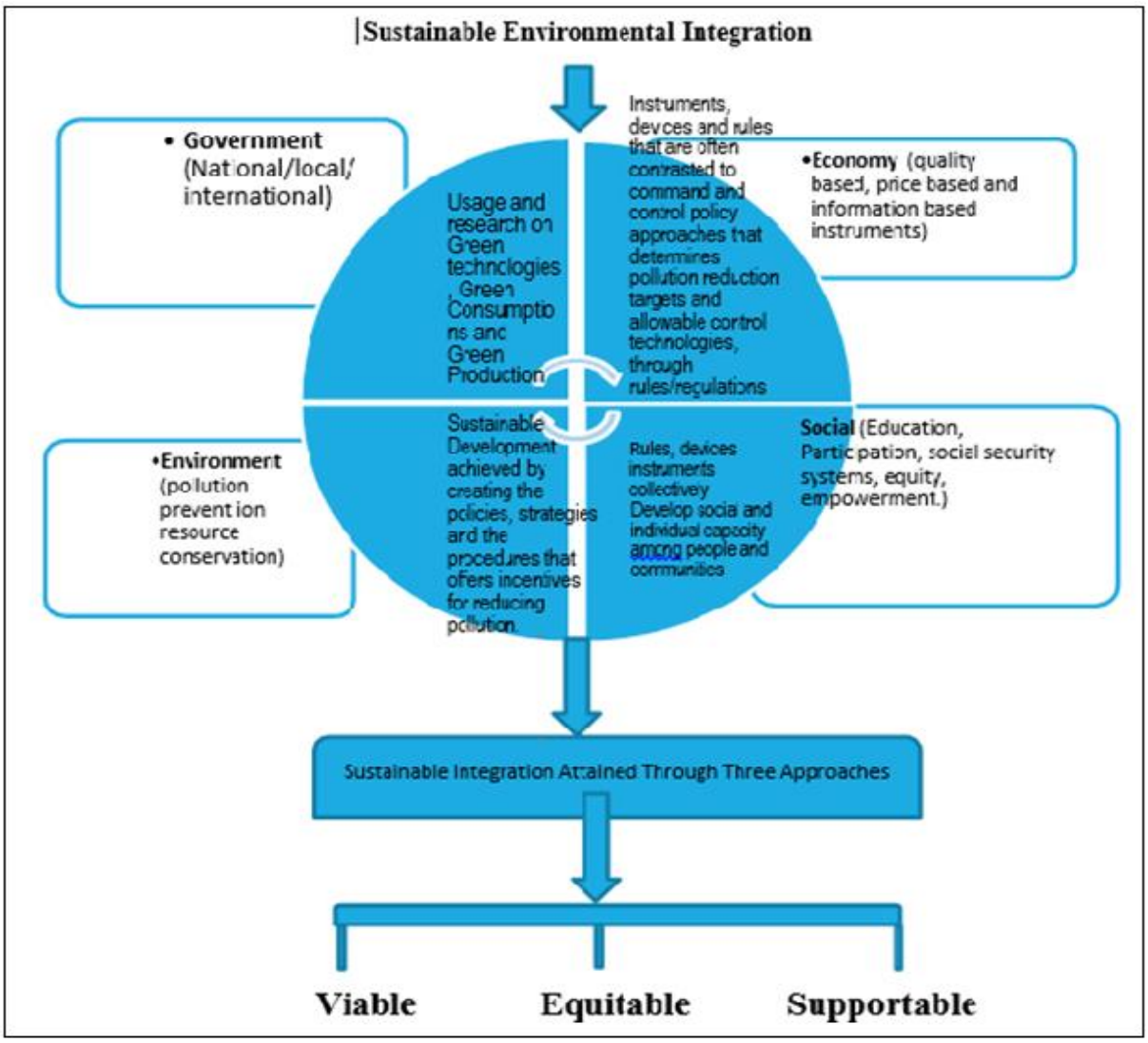

Fig. 2. Integration Mechanism framework for Environmental Sustainability Model.

The sustainable solutions of asked environmental challenges are also documented. According to them, the best cure for trash management is segregation and recycling, and solid waste vendors are a fairly common form of waste segregation in Pakistan. Unfortunately, there is no reliable quantitative data in the literature. As a result, the data from the three areas of Chennai might be used as an example, given its significance. Kabadiwallas generate only 1/3 of all recyclable garbage and dispose of around 35% of all

paper, plastic, and glass waste generated in landfills. As a result, simply separating recyclable materials from organic ones can triple the informal sector's income while simultaneously saving 21,829 tonnes of landfill waste per month (Khazvini, 2015). Using green products is a long-term strategy. Green products' comprehensive nature is now preferred by corporate environmental plans over cleaner processes achieved through technology innovation. The International Federation for Human Rights (FIDH) believes that a safe, clean, healthy, and sustainable environment is critical to the realization of the rights to life, food, health, water, and shelter. Similarly, since human rights and environmental protection are interdependent on Monday, March 5th, 2018, incorporating human rights considerations into environmental strategies/policies critically in protecting populations from global warming and ensuring the safety of future generations (Fidh, 2018). Effective tactics and practical solutions can be used to help conserve biodiversity and the environment. Legislators and politicians, technical knowledge, alternative concept promotion, green product awareness, Kindergarten education, scientific research and environmental education, awareness, education, and taxes are covered in this study. Legislative and political will, as well as the promotion of alternative views and education beginning in kindergarten, are all important factors.

Renewable energy is promoted as a sustainable alternative to non-renewable energy in Pakistan to prevent air pollution and climate change. There is also found a clear link between energy usage and climate change and fossil fuels discouraged by the participants. They are ever since harmful to the environment. Climate change kills roughly 128,000 people in Pakistan every year, recently told by the Senate committee to the ministry of climate change and one of the reasons is the import of substandard oil for use in the energy and transportation sectors which is responsible for about 43% of pollution. It is disappointing for the Pakistanis that green fuels will not be able to use until 2021 as a result of the country's oil sector's lack of effective policies since 1997 (The Express Turbine, 2020). Most of the participants were not in favor of the carbon tax and strongly deterred the use of fossil fuel, but few of them also understood the benefits of taxation. Whereas, the literature review shows that carbon taxes are found to be effective in lowering CO_2 emissions in most of the developed countries. According to a recent Swedish study, emissions in the transportation sector decreased by 6.3 percent every year between 1990 and 2005. Following the implementation of a carbon tax in 2013, CO_2 emissions in the United Kingdom plummeted to their lowest level since 1890. For Pakistan, a carbon tax might provide extra benefits in the form of increased revenues, which could aid the government in reorganizing its taxation (Afzal, 2019). Many countries have enacted carbon taxes, including Canada, Chile, Ireland, and South Africa, to mention a few. The tariff almost always attempts to encourage consumers of hydrocarbon fuels to use them more efficiently (Dawn Editorial, 2015). What's the harm in that? Mexico is developing a SAM-based pricing model to examine the implications of the carbon tax, which was enacted as part of the 2014 financial reform. Coke, refined oil, and nuclear fuel have the biggest price increases as a result of the carbon tax's direct impact; additionally, air and land transportation are the most impacted industries indirectly **(**Chapa and Ortega, 2017). Pakistan's provinces are empowered by the constitution to develop strategic plans for power, policy, and infrastructure. A well-coordinated Integrated National Energy Plan for the renewable energy sector[5] could be used to arrange or accomplish this. Despite the immense potential of its energy resources, Pakistan is a country short on energy and heavily reliant on imports to meet its demands. As a result, in this situation, renewable energy production can play a critical role in alleviating energy emergencies. Mega- and micro-hydropower, wind, solar, cogeneration, biomass, biogas and other solid waste cities, geothermal energy, sea waves and tides, and low-height channel levels are all possibilities.

As a result, effective planning and timely implementation of alternative ecological resources in

Pakistan help to decrease poverty and promote a cleaner environment (Aamir, 2005). A sustainable method includes river basin management and WWTP extension, improvement, and installation. In Pakistan's watershed areas, policy-makers should anticipate and support Integrated River Basin Management (IWSM) strategies. Well-explained policies and action plans for the environment and sustainable development are quite useful in identifying a path to long-term environmental solutions under Agenda 21 (The News, 2020). Industrial waste minimization measures, sludge disposal control, waste/environmental audits, monitoring, and adherence to environmental quality requirements are all viable options for reducing, conserving, and managing water pollution as well as water resources. This research also raised the contentious quarries like: Are the Pollutants that affect air quality and environmental health the same all across the world or differ. In response to this, literature is in favors of the similarity of pollutants all around but primarily focused on the NO_2, CO, SO_2, lead, and O_3, as well as additional factors such as dioxins (PCDD), arsenic, mercury (Hg), arsenic (As), and cadmium (Cd). Whereas, as per participants, the pollutants should differ in each country because the sources of pollution varies in most countries and due to geographical area, economic and environmental conditions, and the customs of the nations. Whereas the question about International Environmental Standards, the significant results (Table II) shows that the participants are in favor of following the International Environmental Standards in Pakistan. But, according to the literature study, South Asian countries and the World Health Organization's ambient air quality standards (AAQS), Southeast Asian countries' AAQS, and other countries' AAQS have developed their own air quality standards rather than emphasized on International standards like World Bank, WHO, EPA of the United States (Shams and Khwaja, 2019). To deliver environmental sustainability in Pakistan with a realistic approach, regulatory agencies must use a systematic technique with a definite ideology for producing or up-grading their environmental standards.

The Pakistan can only be move towards Environmental Sustainability , if there will be strong assimilation of sustainable development practices with sustainable society (Industry, Government, community and ecosystem) as exhibited in Model I (Figure 1) . Whereas sustainable development practices is mechanized in Model II (Figure 2) that portraying the system and supposition of environmental sustainable solution approaches of interviewees for integrity of better environment.

The Pakistanis are getting most of the information about environmental issues through the media, workshops, and conferences. Through significant investigation, it is observed that the media should play an important role to emphasizing or promoting sustainable environmental techniques or alternative solutions. The Pakistani people still believe that environmental issues will be resolved by the end of the twenty-first century. The drinking water quality, air pollution, and water pollution are foremost critical issues to address, but Pakistan is one of the countries among others that are most affected by climate change. It is also noted that the changing weather patterns, global warming, and climate change are not the same issues, yet they are all caused by changes in weather patterns, and they must be battled in order to lessen their global influence. The growing magnitude of human-induced global warming and climate change as a result of unforeseen catastrophic weather events has serious impacts on society, industries, and organizations, according to scientific forecasts (Linnenluecke and Griffiths, 2010). While global warming refers exclusively to the increase in the earth's surface temperature, climate change encompasses both warming and the "side effects" of warming. Climate change is causing melting glaciers, more frequent droughts, and more violent storms, to name a few examples (Kennedy and Lindsey, 2015). United States accounts for 25% of cumulative emissions and has contributed the most global CO2 emissions to date; the EU-China-Russia-Japan are the next largest emitters. At present, China is the world's greatest CO2 emitter, accounting for more than a quarter of global emissions, followed by the

United States, the European Union, India, and Russia (Ritchie and Roser, 2017 and 7). In comparison to Asia and Europe, the United States was the largest CO2 emitter and the worst in terms of greenhouse gas emissions (Irfan, 2019). In Pakistan, population, geographical location, and transboundary issues are accelerating the environmental tribulations. Statistically, it is determined that primarily, air and water pollution counted as the most severe environmental concern than climate change. Participants are well aware that climate change is a global issue, not a local one and Pakistan is not a contributor but the most affected country. So, air and water pollution needs to lessen at the regional level, which would ultimately reduce the problem of environmental pollution in general and climate change problems in particular. At a broader level, it has also seemed that COVID 19 brought a drastic change in the repair of the ozone layer due to the reduction of air pollutants during lockdown worldwide (The Economic Times, 2020). This also proved that air pollution is not only a local problem of Pakistan but has equally international importance and is considered as the major root cause of ozone depletion, global warming and climate change. So, there is a great need for an integrated environmental sustainable approach to cope up with the problems of environmental pollution.

Conclusion

To accomplish long-term solutions, the government must be powerful enough to support environmental education from kindergarten, provide environmental knowledge in all disciplines, and promote scientific research, technical knowledge and, alternative energy sources in particular and green technologies in general. Also, there is a strong need for all Pakistani academics, research institutes, industries, local and national government entities, ministries, lawmakers, the private sectors, and non-governmental organizations (NGOs) to collaborate and work on the implementation process. It is also the fact that the Environmental Sustainability of any nation cannot be harmed by only the shortage of environmental awareness and knowledge but also bureaucratic delays, capacity and legality issues, political tensions, and pressure of influential organizations hampers the environmental solutions. In Pakistan, most of the executive agencies and EPAs lack strength, capacity building, data collection and monitoring mechanisms, technological progress/up-gradation, and a delayed implementation process. Consequently, at last, it is recognized that sustainable environmental solutions can only be achieved through the integration of the environment with the social, economic, and government sectors at a large-scale. Therefore, for effective management of the environmental pollution problems and implementation mechanism, two environmental models are designed as Environmental Sustainability Model for Sustainable Solutions (ESM-SS) - Model: I and another one is Integration Mechanism Framework of Environmental Sustainability Model (IMF-ESM) represented as Model: II and these both models are self-explanatory and recommended for the execution of the process for sustainable environmental solutions of the environmental problems.

References

Aamir H. 2005. B01-Renewable Energy Technologies and Sustainable Development 2005. Also Prospect of renewable energy sources in Pakistan.

Afzal A. 2019. Time for Carbon Tax. Published in Dawn. Updated December 12th, 2019. https://www.dawn.com/news/1521785.

Alley R, Berntsen T, Bindoff NL, Chen Z, Chidthaisong A, Friedlingstein PM, Hoskins B. 2007. Climate change 2007: The physical science basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Summary for Policy-makers. IPCC Secretariat, Geneva, Switzerland. p 21.

Bar-On YM, Phillips R, Milo R. 2018. The biomass distribution on earth. *Proceedings* of the National Academy of Sciences **115(25),** 6506-6511.

Bierbaum R, Cowie A, Barra R, Ratner B, Sims R, Stocking M, Whaley C. 2018. Integration: To solve complex environmental problems. Scientific and Technical Advisory Panel to the Global Environment Facility. Washington, DC.

Candace MW. 2004. Can Voluntary Compliance and Self-Regulatory Environmental Policies Restrain White Collar Workers from Breaking the Law? An Analysis Using Hirschi's Social Bond Theory. Retrieved April 1, 2004.

Chapa J, Ortega A. 2017. Carbon tax effects on the poor: a SAM-based approach. Environmental Research Letters **12(9),** 094021.

Dawn Editorial. 2015. Carbon Emission Tax. Published in Dawn. Updated November, 2015.

Hens L, Ren J. 2021. A Multidisciplinary Approach to the Theory and Practice of Sustainable Development. Environment, Development and Sustainability.

Erkekoglu P, Kocer-Gumusel B. 2016. Environmental effects of endocrine-disrupting chemicals: A special focus on phthalates and bisphenol A. Environmental Health, 155.

Falvey L. 2004. Reconceiving food security and environmental protection. Asian Journal of Agriculture and Development, 1(1362-2016-107610), 13-28.

Fidh. 2018. Human rights and environmental protection are interdependent. Press Release, Business and Human Right.

Gore AC, Crews D, Doan LL, La Merrill M, Patisaul H, Zota A. 2014. Introduction to endocrine disrupting chemicals (EDCs). A guide for public interest organizations and policy-makers, 21-22.

Hanif M. 2018. 40% of all deaths in Pakistan are caused by water contamination. The New York Times. Updated November 23rd, 2018.

Ilyas SZ. 2007. A review of transport and urban air pollution in Pakistan. Journal of Applied Sciences and Environmental Management **11(2).**

Irfan U. 2019. Why the US bears the most responsibility for climate change, in one chart. Island Countries of the World. (2017). WorldAtlas.com. Archived from the original on 2017-12-07. Retrieved August 8th, 2019.

Kennedy C, Lindsey R. 2015. What's the difference between global warming and climate change?. Science & Information for a Climate- Smart Nation. Climate .gov.

Khazvini F. 2015. Segregation – The First Step to Keeping 60% of our Waste Out of the Landfill. https://wastewise.be/2015/10/segregation-first-step-keeping-60-waste-landfill/

Linnenluecke M, Griffiths A. 2010. Beyond adaptation: resilience for business in light of climate change and weather extremes. Business & Society, **49(3),** 477-511.

Ortolano L. 1984. Environmental planning and decision making.

The News. 2020. Pakistan Forest Institute (PFI). The News Paper, Pakistan.

Pakistan Today. 2018. Pakistan among 12 worst countries in environmental pollution: EPI report. Last Upated: January 24th, 2018.

Pillai V, Burrows R, Brandl D. 2011. North American Conference, March 24–26, 2008, By. The WBF Book Series--ISA 88 and ISA 95 in the Life Science Industries **4,** p 273.

Rehman S. 2018. Pakistan's Rising Air Pollution Crisis. The Diplomat.

https://thediplomat.com/2018/08/pakistans-rising-air-pollutioncrisis/#:~:text=According%20to%20a%20report%20by,are%20attributed%20to%20air%20pollution.

Ritchie H, Roser M. 2017. CO_2 and Greenhouse Gas Emissions. Updated August 2020. https://ourworldindata.org/co2-and-other-greenhouse-gas-emissions#consumption-based-trade-adjusted-co2- emissions.

Saha P, Ahmad S, Abbasi A, Khan M. 2009. Environmental management systems and sustainability: Integrating sustainability in environmental management systems.

Shams T, Khwaja MA. 2019. Assessment of Pakistan National Ambient Air Quality Standards (NAAQS's) with Selected Asian Countries and WHO.

Shaukat S, Siddique IA. 2005. Essential of Mathematical Ecology (Computer program is basic Fortran and C_{++}). Publisher Sir Farquan, Publisher Karachi.

The Express Turbine. 2020. Climate change deaths. Updated January 6th, 2020. https://tribune.com.pk/story/2130975/6-climate-change-deaths

The Economic Times. 2020. Earth is healing: Global air quality improved this year due to COVID lock down. Updated May 14, 2020. https://economictimes.indiatimes.com/magazines/panache/earth-is-healing-global-air-quality-improved-this-year-due-to-coronavirus-lockdowns/articleshow/75729170.cms