Pakistan's ordeal against climate change: the main contributors and the way forward

Fasih Zulfiqar
Institute of Business Administration

PAKISTAN'S ORDEAL AGAINST CLIMATE CHANGE

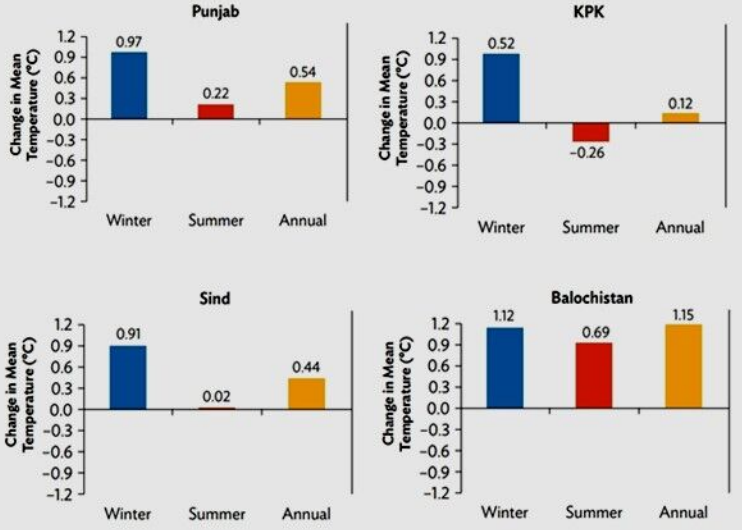
THE MAIN CONTRIBUTORS AND THE WAY FORWARD

ABSTRACT

This poster takes a detour through the challenges facing Pakistan in tackling climate change and the progress hitherto. It analyzes the main culprits of air pollution in Pakistan and where Pakistan stands relative to other developing nations. The poster concludes on a hopeful note, given the recent government initiatives.

The Trend

Figure 1: Mean Temperature Changes from 1960-2007, Regional



KPK = Khyber Pakhtunkhwa.

Source: Q. Z. Chaudhry et al. 2009. *Climate Change Indicators of Pakistan.* Technical Report. No. 22. Islamabad: Pakistan Meteorological Department.

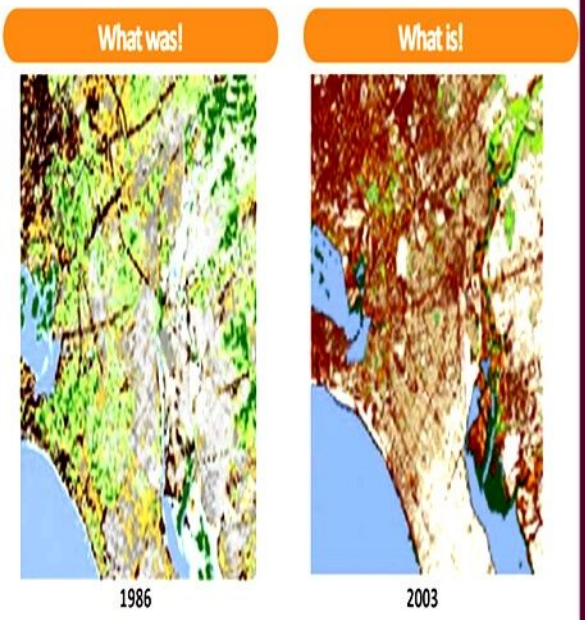
Table 1: Breakup of Pakistan's Current Expenditure

(Rs in Million)

Classification	Budget 2019-20	Revised 2019-20	Budget 2020-21
General Public Service	5,607,041	5,538,073	4,428,643
Defence Affairs and Services	1,152,535	1,227,388	1,289,134
Public Order and Safety Affairs	152,919	153,269	169,927
Economic Affairs	84,167	106,411	71,751
Environment Protection	470	470	431
Housing and Community Amenities	2,292	2,545	35,680
Health Affairs & Services	11,058	12,023	25,494
Recreation, Culture and Religion	9,838	9,301	9,822
Education Affairs and Services	77,262	81,253	83,363
Social Protection	190,595	245,024	230,907
TOTAL:	**7,288,179**	**7,375,757**	**6,345,150**

Source: http://www.finance.gov.pk/budget/Budget_in_Brief_2020_21.pdf

Vanishing Green Spaces



Source: Ecological disturbances due to high cutback in the green infrastructure of Karachi: Analyses of public perception about associated health problems, 2010
Salman Qureshi a,b,, Syed Jamil Hasan Kazmi b, Jürgen H. Breuste a

IMPORTANT FACTS

- Sea level along the Karachi coast has risen around 10cm in the last century. Expected to rise by 60cm by 2100 and will most likely affect low-lying coastal areas of Karachi toward Keti Bander. 40% of industry is situated on or near the coast.
- By the end of this century, the annual mean temperature in Pakistan is expected to rise by 3°C to 5°C for a central global emissions scenario, while higher global emissions may yield a rise of 4°C to 6°C.
- Annual mean temperatures increased in all provinces and in all seasons from 1960 to 2007, and this is before the recent deluge of heatwaves. Balochistan saw the highest temperature rise.
- Environmental protection **got the lowest budget allocation** in current expenditure in all 3 fiscal years.

1: https://www.researchgate.net/publication/266838504_

2: https://reliefweb.int/report/pakistan/climate-change-profile-pakistan

Main Factors: SPM, Vehicle Industry, and the Ramifications

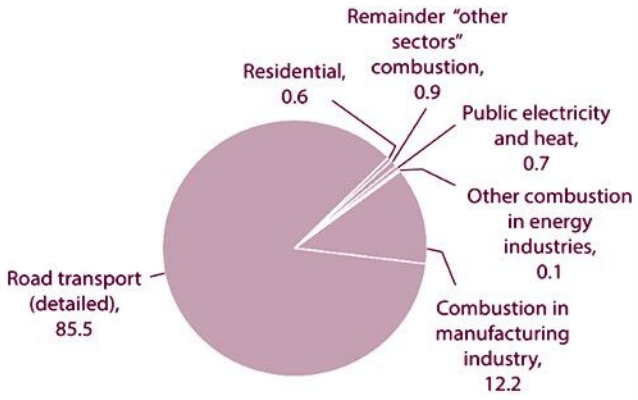
Table 2: Annual Average Suspended Particulate Matter (PM 2.5) from 2010 to 2011

Sr. No.	City	Level (ug/m3)
1	Islamabad	91.13
2	Lahore	116.51
3	Karachi	41.49
4	Peshawar	70.86
5	Quetta	40.86

Source: Environment Protection Agency (EPA)

SPM is the main problem of air quality in Pakistan. As the table shows, Pakistan had an average of 72.17 ug/m3 SPM in its 5 major cities!. The pie chart shows transport was responsible for more than 3/4 of this. Vehicles are the obvious culprit, yet there isn´t much initiative to bring electric cars in Pakistan.

Pie Chart 1: Sources of PM Emissions from Fossil Fuel Combustion in Pakistan, 2008



Source: Cleaning Pakistan's Air, World Bank pdf

Motorcycles and rickshaws, are most inefficient in burning fuel thanks to their 2-stroke engines are responsible for emission SPM that cause respiratory diseases. The 2-stroke vehicles industry has increased by **142.6 percent in 2010-11** compared with the year 2000-01.

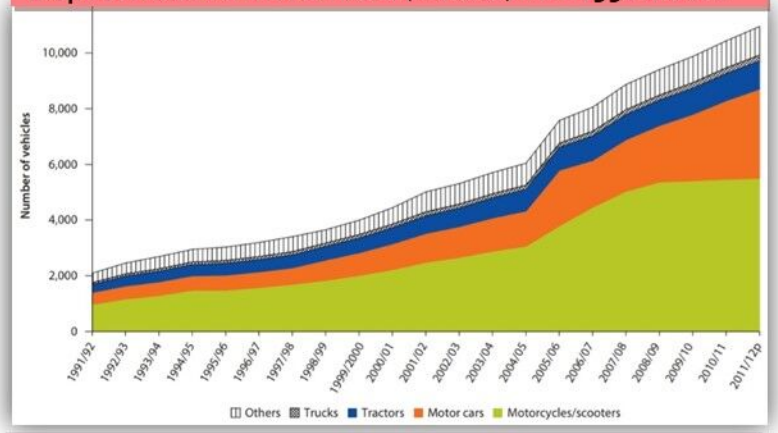
Pakistan had the highest number of NGV in 2010, encompassing 21.6% of the

Table 3: Natural Gas Vehicles in 2010

Country	NGV Population	% all NGVs in World
Pakistan	2,500,000	21.6%
Iran	1,954,925	15.4%
Argentina	1,901,116	15.0%
Brazil	1,664,847	13.1%
India	1,080,000	8.5%
Italy	730,000	5.8%
China	450,000	3.6%
Colombia	340,000	2.7%
Thailand	218,459	1.7%
Ukraine	200,000	1.6%

www.iangv.org/tools-resources/statistics. html

Graph 2: Motor vehicles on Road (in 1000s) from 1991 to 2011

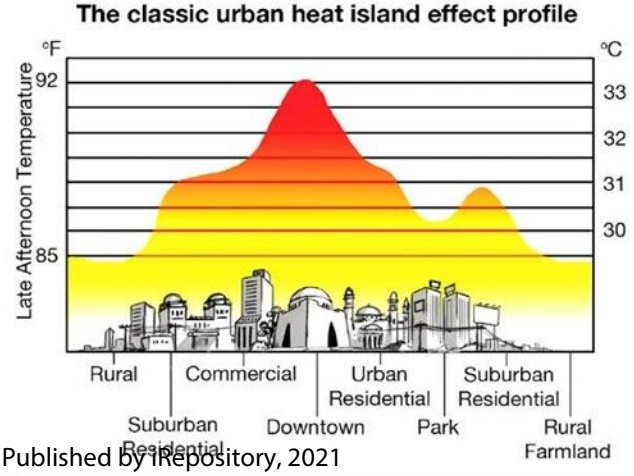


This growth in motor vehicles was primarily driven by the astronomical increase in motorcycles, most inefficient.

The Urban Heat Island Effect

Empirical evidence for Pakistan

The classic urban heat island effect profile



Describes the warmth of the surfaces and atmosphere that urban areas often experience in comparison to the rural areas that surround them. Compared to rural areas, cities tend to have **higher air and surface temperatures, usually 1-3%**, due to the urban heat-island effect.

With around **37 percent** of its population living in cities, Pakistan is the **most urbanized country in South Asia.** Environmental problems such as pollution, waste management, congestion and the destruction of fragile ecosystems are certainly an issue, but more so is the urban heat island effect which affects all urban life.

Coal, Mining, the Dilemma and Overall GHG Sources

Pakistan's Increasing Coal Consumption

Coal is the single biggest contributor to anthropogenic climate change: responsible for 46% of carbon dioxide emissions worldwide and 72% of total greenhouse gas (GHG) emissions from the electricity sector.

Worse, the government does not seem to realize this: as the infographics show, not only consumption is increasing but coal capacity of Pakistan is to be doubled by the end of June 2021.

The Mining sector will come under immense scrutiny from policy makers and society for it is alone responsible for 4-7% of GHS in the world.

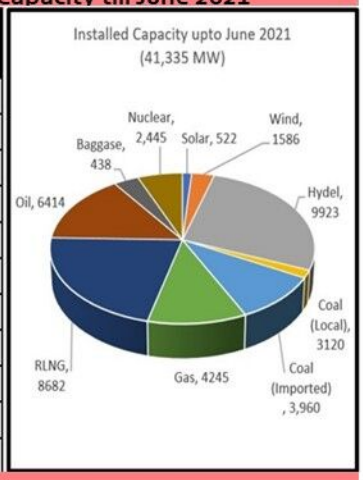
Mining is deleterious for the environment because;

- Soil erosion and contamination.
- Burning of fuel and the corollary emissions.
- Loss of biodiversity and hence unsustainable.
- Groundwater and Waste water

Finally, it is simply unsustainable because minerals are a non-renewable resource.

Planned Additional Capacity till June 2021

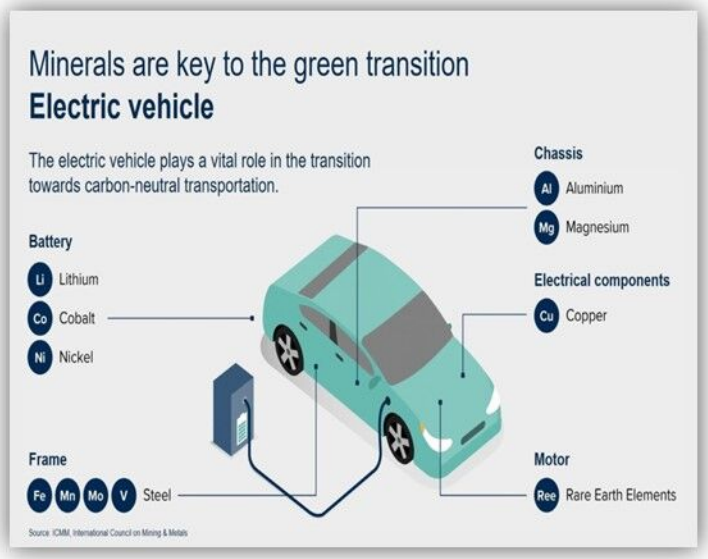
Source/ Fuel	Added Capacity	As on June 2021 (MW)
Solar	22	522
Wind	351	1,586
Hydel	76	9,923
Coal (Local)	2,310	3,120
Coal (Imported)	-	3,960
Gas	-	4,245
RLNG	-	8,682
Oil	-	6,414
Bagasse	74	438
Nuclear	1,100	2,445
Total Capacity	**3,933**	**41,335**



Source: https://www.pc.gov.pk/uploads/annualplan/

Mining: A Double-edged Sword

A Potential Savior



Minerals aren't only required in EVs and batteries, but mining is also an integral part of many poor Pakistanis and enables them to earn a living.

There is also **green mining**; using of technologies and policies to make mining sustainable. This is completely untapped in Pakistan. Below is one possible policy.

EVs require a plethora of minerals. All electric batteries need lithium, cobalt, and nickel, so the need for mining is polyvalent, for batteries are used almost everywhere.

Effectively and equitably manage the quantity and quality of water resources for all users and the ecosystems they depend on

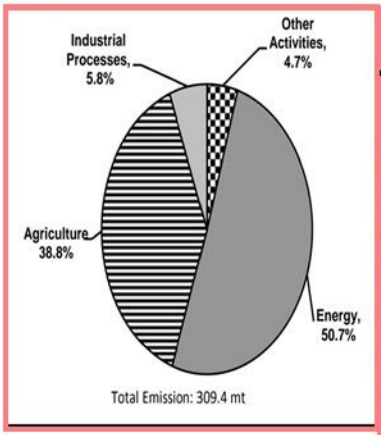
Governments must regulate the extraction of valuable water resources at the watershed level and manage water use, water discharges and water quality.

Mining operations use large amounts of water to:

- Process ore
- Supply camp operations
- Suppress dust
- Transport slurry

Pragmatic Solutions: Education, Employment Incentives, Green Energy, and EVs

Caveat lector, these policies won't be a panacea; many dominoes have to fall simultaneously to fix climate change.



http://www.finance.gov.pk/survey/chapter_11/16-Environment.pdf

Green Energy

The Shift Away from Coal

India and China have both shown it is possible to invest big in green energy and win. Given the ample sunlight Pakistan gets, it is truly shameful to see such a dearth of solar panels. All wasted potential. Indubitably, this is a long process, but better now than later.

Provide job Incentives

The government can increase the size of its climate cabinet while offering more positions in environment in public jobs. This signal of increased demand for climate experts will incentivize students to take Climate courses. Only a few students will be selected in the cabinet, but now many more people would be epistemologically aware of climate issues and are hence more likely to disseminate this knowledge. All this increased awareness should lead people to use less motorcycles and harmful fuels and perhaps switch to electric vehicles; it may even encourage them to walk instead of drive, which will also alleviate our health outlook.

Educate People, Courses (Nudge)

Pakistan should push harder on education, for as literacy increases people learn more about issues like climate change. But education isn't enough if that education doesn't entail any courses on ecological issues. Most institutions don't have separate courses on climate change, and where these courses are available they are hardly ever opted for. Students don't see any material benefit in these courses.

The government should incentivize students. As a libertarian, I don't want to make courses mandatory for everyone. But the government can make mandatory for public sector workers, for as someone who represents the government you have an additional civic duty to protect the nation's environment.

AGRICULTURE & POLITICS

Agriculture is also a major contributor to GHS, but I didn't target it here because this industry has a plethora of lobby groups, unlike the vehicle industry. These groups are resistant to changing their traditional ways of farming, no matter how ecologically unfriendly they are. These antiquated ways are a part of their culture. An economist worth his salt considers political and cultural barriers. The assumption of ceteris paribus works only in theory. but not in practice.

EVs, Markets, and Foreign Investment

Building electric charging ports is the biggest obstacle, infrastructurally. Even if billions are put into it, the bigger issue is of maintenance. How to protect them from vandalism and degradation? This requires consistent effort. And whenever consistent effort is required, it is best to delegate to private firms. But private firms don't provide public goods. For this reason, the government needs to provide subsidies as an incentive to firms to maintain charging booths.

The government also needs to appeal to rich foreign nations and supranational organizations for investment into these green endeavors of Pakistan, since the social benefit of this extends to the entire world, making the ROI extremely high.