



A study of correlation between Environmental Degradation and Human Development Index in the WANA region

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Abstract:

Energy is the prerequisite for not just development but also human development in any country. However, it's non-sustainable usage pose a havoc on environment. Unthought of overexploitation of non renewable energy sources for a longer time have created alarming scenarios with respect to the overall environment in which we are living. It has today emerged as the of the most dominant threat of present times globally. *Against this backdrop, this paper investigates the relationship between renewable and non-renewable energy consumption, economic growth, sustainability and human development index (HDI) in West Asia and North Africa region . Further, in order to understand the role of sustainability today, the broader purpose of this paper is to study the quantitative linkages between human development index , a sustainability measure of standard of living, that is, per capita GDP) and overall environmental performance . In order to investigate as to whether development is correlated with environmental degradation, this paper has employed the data from Human Development Report and analyses it to find the linkages between relevant variables.*

Key Words: Human Development, sustainability, development, environment.

Introduction

In the past decade various efforts in order to combat the degradation of environment while treading on the path of growth and development has been quite challenging both for developed as well as emerging economies. Balancing sustainable environment practices with development is what most of the economies are trying. However, this relationship between growth and environment as very closely connected through a connection between energy consumption and growth.

To measure economic growth. GDP is the most important tool. While the developing economies usually aim for growth, the developed ones seek post- growth advancements and sustainable development . As growth is not synonymous with development or well- being, thus, sustainable development captures the complexities and helps to understand the challenges faced by our society. To get a hold on the renewable and non-renewable energy consumption are the major drivers to achieve economic prosperity which is also sustainable.

A great emphasis is being given to economic growth, however, the targets of sustainable development are being grossly compromised. It is true that demand and consumption patterns of energy increases the economic

activities in any country, but, during this entire process, large chunks of toxic substances are also released into the environment. Many economies seem to ignore the human development aspect while dealing with the environmental issue.

The need of the hour is that the High-HDI countries and regions collectively spend more funds and along with that, also concentrate on environmental sustainability along with reducing the dependence on fossil fuels and promoting much cleaner sources of energy. On the other hand,, poor countries with quite low HDI that generally depend on very traditional energy sources and spend less on modern technologies to reduce CO₂ emissions from fossil fuels should also start looking for more alternative sources of energy.

The environment, health and economy of low HDI nations are far below than of the high ones. Thus, the paper attempts to throw ample light on the correlation between the HDI rank of a country and environmental degradation.

Review of related literature:

It's an established fact that there is high degree of correlation between the amount of energy consumed, environmental degradation and development of a country. Fossil fuels contribute significantly to rising CO₂ emissions. . Many studies have analyzed the complex ties of economic activities with CO₂ emissions and energy consumption. Energy consumption is also a source for intensifying the temperature of earth by overuse of fossil fuels that emit toxic gasses.

Hassan et al. investigated the major drivers that impacts CO₂ emissions on the basis of data from 1980–2011. The findings indicated a negative between economic growth and CO₂ emissions in the short run in Pakistan, where a lot of energy is from the non – renewable sources. Naqvi and Rehman then focus on the association between major variables like CO₂ emissions, energy overuse , , GDP, and population growth in Pakistan. The results show a positive relationship among these variables.

Rafindadi tried to explore the link between economic growth and CO₂ emissions in Nigeria. Concluding that financial growth increases energy demand but on the other hand decreases CO₂ emissions. Tiwari argued that CO₂emissions is a byproduct of economic activities and energy consumption in India. Having studied the link between energy consumption and CO₂emissions, Apergis and Payne discovered a correlation that CO₂ emissions share with energy consumption in central America. Chien-Liang showed how renewables had a negative effect on CO₂ emissions and also put pressure to use more renewables to decrease CO₂ emissions. Serap and Vildan's study revolves round 33 OECD countries to explore the relationship between carbon emission and HDI suggesting that HDI is not affected by carbon emissions. But also made it clear that the relationship between carbon emissions and human development varies from country to country.

Objectives

1. To identify the importance of a modified human development index.
2. To examine the extent to which environmental degradation impacts human development.
3. To check the sensitivity of human development to pollution, CO₂ emissions and material footprint.
4. To suggest relevant policy measures to be incorporated in measuring real development.

Methodology

The two most prominent variables impacting environment and sustainable development are carbon dioxide emissions and pollution. Pollution and CO₂ and the data for these variables is available for almost all countries. The HDI was therefore released by UNDP to take into account five factors related to sustainable development: life expectancy, education, GDP per capita and CO₂ emissions as well as material footprint. The corrected HDI can lead to a rather different ranking of countries linked to the traditional classification of HDI

The question that arises is whether the consideration of variables related to environmental degradation leads to a significant change in the ranking or not. So it's quite pertinent to include these two measures of pollution that is emissions and concentration to take into account these two aspects of pollution.

This paper proposes an additional part of the HDI between 0 and 1 (most and least polluted countries) using the following index. This pollution index will take the value 1 if country is ranked first both in terms of low emission levels and low concentration of pollution. It takes the value 0 if a country is ranked last for both components.

The final step is to study the planetary pressure adjusted HDI and analyze it. Whereas the HDI consists of three components (life expectancy, education and GDP), the inclusion of a fourth component will provide the following adjusted HDI.

$$\text{HDI (Modified)} = [(0.75 * \text{HDI}) + (0.25 * I \text{ pollution})]$$

Background of the study

There are many dimensions to check sustainable development like greenhouse gas emissions, GDP per capita, transport fuel consumption, productivity of resource, risk of poverty rate after social security transfers, official development assistance etc. Some important ones are as below:

1. UNDP Indicators: HDI , GDI, HPI, Indicator of Women Participation.
2. Environmental Performance Index and Environmental sustainability Index
3. Social Health Index
4. Measurement of Economic Well-being (Nordhaus and Tobin, 1973)
5. Index of Economic Well-being
6. The Index of Sustainable Economic Welfare
7. Sustainable Well-being Index (Friends of the Earth)
8. Progress Indicator.
9. Genuine Progress Indicator
10. Sustainable Development Indicator (INSEE)
11. Better Life Index (OECD)

The global sustainable development indicators include:

1. Adjusted net savings (WorldBank)
2. GDP per capita
3. Green GDP
4. The ecological footprint, "carbon" footprint or CO2 budget

And an integrated environmental and economic accounting that is the interaction between economy and environment called the System of Integrated Environmental and Economic Accounting (SEEA) and Natural capital accounting.

But the point is that no report has come out in favour of using just one indicator of sustainable development. So if we wish to come out in favour of replacing it and challenge the supremacy that GDP enjoys as a measure of development, it should not be replaced with another hegemonic tool. There needs to be different tools each taking care of an important element for specific policy makers.

Also because of lack of data for many indicators for WANA region, application of sustainability indices in these countries becomes difficult.

Statement of the problem:

The West Asia and North Africa region is a drastically diverse region in all terms whether it be socio-economic or political conditions. The whole region is currently witnessing the triple threats of climate change, food and water scarcity as well as economic crisis. On top of these issues, the region is under continuous turmoil, conflict, political instability, exacerbating poverty, inequality, and refugee crisis.

Some other features that are a matter of concern is that extent of water scarcity issue makes it the driest as well as the most water-stressed region in the world. Data suggests that 18 out of 22 Arab states Currently stands below the renewable water resources annual scarcity threshold and 13 below the absolute water scarcity threshold. 60% of its population lives currently in areas of very high water stress, while the global average is only 35%. Also, 70% of its GDP is too generated in such areas, compared to just 22% globally.

Against this backdrop, climate change will have severe impact especially on this region. The impact has already started, as temperatures are rising faster than the global average. Extreme extended periods of heat is changing both rural and urban areas, exposing cities to a rising heat effect. All this is negatively impacting productivity of agricultural areas and placing strains on scarce water resources. Researchers predict that such scenarios will worsen in the coming future. In addition to all this, the region's population is also estimated to double by 2050, putting the region's resources under a lot of planetary pressure and carbon footprint.

Climate change can also generate conflicts like wars related to water resources when droughts occur frequently. This scenario has even started as Egypt seems to be engrossed in quite long dispute with Nile Basin countries over transboundary water management of the river, as Ethiopia continues with the Grand Ethiopian Renaissance Dam project. Also Iraq is facing existential threats to its own water security as neighbouring countries such as Turkey and Iran are developing the Euphrates and Tigris rivers.

. They can further have it's spiral effect on other water dependent sectors like on prices, malnutrition, disease outbreak and food security.

These ongoing scenarios needs improving knowhows, technologies and their application; integration of climate concerns into development policies formulation and also building local capacity for improved preparedness.

The West Asia and North Africa (WANA) region thus remains one of the most vulnerable regions of the world that is and can be most affected by the dynamics of climate change.. Also, the region is a major contributor to the problem, as the largest global source for energy resources like oil and gas, one of the top emitters of fossil fuels, and a significant contributor of plastic waste in oceans. Alongwith these, poor air quality and rising pollution levels have increased health risks, while climate risks related to rising sea levels directly affect a number of regional coastlines, especially in the Mediterranean coast.

The response thus far to environmental changes is the result of the little attention paid to the dangers of climate change happening, a general lack of development in civilian-state relations to shared solutions, and a failure to govern. The prioritisation of needs has reduced climate action and response to a government soundbite. The

private sector remains silent and inactive, nor that civil society is ignorant about the risks. Also, private sector investment is made up to benefit elites who can afford climate-responsive adaptations to daily life, and civil society has been unable to elevate its voice in the face of continued state repression and authoritarian regimes .

According to recent 2021 GEO Regional Report for West Asia the regional environmental challenges that are continuing in the region includes :

- Worsening water quality and overexploitation of groundwater resources;
- Shared water resources ,a major regional concern due to lack of regional cooperation;
- Unsustainable consumption patterns threaten water, energy and food security;
- Biodiversity loss, desertification and ecosystem degradation
- Air pollution
- Waste management
- Energy efficiency and energy mix continue to be a priority
- The environment, threatened by and a cause for lack of peace and security and increasing levels of conflicts.

Findings:

Thus, in light of the above made observations, the data was extracted from the Human Development Report 2020. It was for the first time that UNDP released the planetary pressure adjusted human development index to see the impact of carbon dioxide emissions and material footprint on human development.

The findings revealed some stark realities and how much our development as humans depend on the environmental factors. Especially for West Asia and North Africa region which due to natural ad geographical factors is highly dependent on environmental issues and it's degradation.

The below table no 1 depicts the actual HDI and planetary adjusted HDI. Alongwith this it also shows the percentage difference between the scores and how ranking of a country will be impacted by taking into account planetary pressure adjusted HDI.

Table 1.

Country	HDI (Actual)	PHDI (Planetary pressure adjusted HDI)	Difference from HDI Value (%)	Difference from actual HDI rank
Saudi Arabia	0.854	0.707	17.2	-33
Iran	0.783	0.698	10.9	-12
Oman	0.813	0.704	13.4	-15
Qatar	0.848	0.581	31.5	-84
UAE	0.89	0.609	31.6	-87
Kuwait	0.806	0.587	32.1	-74
Iraq	0.674	0.642	4.7	3
Turkey	0.82	0.746	9	10
Israel	0.919	0.781	15.0	2
Yemen	0.47	0.467	0.6	0

Syria	0.567	0.554	2.3	1
Jordan	0.729	0.7	4	19
Lebanon	0.744	0.688	7.5	-2
Egypt	0.707	0.684	3.3	15
Morocco	0.686	0.668	2.6	11
Algeria	0.748	0.721	3.6	29
Tunisia	0.74	0.71	4.1	19
Libya	0.724	0.673	7	3
Djibouti	0.524	0.518	1.1	2
Sudan	0.51	0.5	2	0
Ethiopia	0.485	0.483	0.4	0
Bahrain	0.852	0.691	18.9	-42

Source: Extracted from UNDP Human Development Report 2020

The table above shows that the countries that feature very good in actual human development index fare badly when planetary pressure is taken into account. From the mentioned countries, the major players like Saudi Arabia, Qatar, UAE, Kuwait, Bahrain lose significantly in terms of their ranks in PHDI from actual HDI ranks. This also reflects that although they seem to develop but lag behind in terms of sustainable development. When major players of West Asia and North Africa are compared to the less developed players then they seem to lose very few ranks. So these countries are neither doing well in human development index nor in PHDI's.

Table 2.

	SDG 9.4		SDG 8.4, 12.2	
Country	Carbon dioxide emissions per capita (production)	Carbon dioxide emissions (production) index	Material footprint per capita	Material footprint index
	(Tonnes)	Value	(Tonnes)	(Value)
Israel	7.7	0.89	23.9	0.843
UAE	21.3	0.694	49.6	0.675
Saudi Arabia	18.4	0.736	12.4	0.919
Bahrain	19.8	0.717	14.4	0.906
Qatar	38	0.456	13.2	0.913
Turkey	5.2	0.926	16.2	0.894
Oman	13.9	0.801	10.4	0.932
Kuwait	23.7	0.661	46.5	0.696
Iran	8.8	0.874	14.1	0.908
Lebanon	3.5	0.949	15.4	0.899
Jordan	2.4	0.965	6.7	0.956
Libya	8.1	0.884	3.9	0.974
Egypt	2.4	0.965	4.8	0.968
Morocco	1.8	0.974	3.9	0.975
Iraq	5.3	0.924	2.8	0.982
Syria	1.7	0.976	3.4	0.978
Djibouti	0.7	0.99	2.3	0.985
Yemen	0.4	0.995	1.1	0.993

Source: Extracted from UNDP Human Development Report 2020

The above mentioned table describes the carbon dioxide emissions and material footprint index of WANA region. In terms of Co2 emissions per capita the countries that perform worst are UAE , Saudi Arabia, Bahrain, Qatar and Kuwait . Again in material footprint per capita UAE features to have maximum material footprint and then comes Kuwait, Israel, Turkey, Qatar and Bahrain.

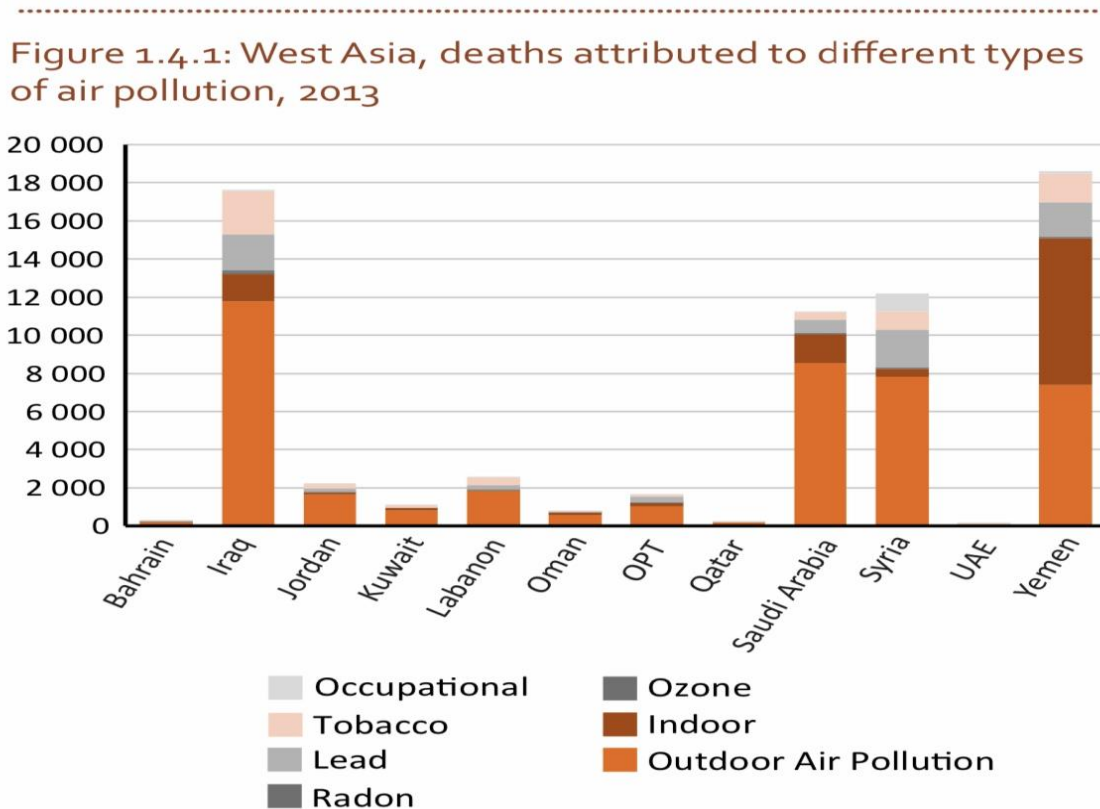
While for rest of the countries of the region the co2 emissions and material footprint is till not in the red zone.

Table 3.

Table 1.4.1: West Asia, burden of disease of environmental risk factors, 2004 and 2013 (estimated)

Country	Environment attributable DALYs per 100 000 people	Environment attributable deaths per 100 000 people	Environment attributable DALYs	Environment attributable deaths	Environment attributable DALYs	Environment attributable deaths
	2004	2004	2004	2004	2013	2013
Bahrain	1 639	58	11 665	411	21 946	773
Iraq	11 687	316	3 221 343	87 234	4 104 013	111 137
Jordan	2 511	83	135 559	4 456	175 549	5 771
Kuwait	1 415	33	37 028	852	47 163	1 085
Lebanon	3 001	132	120 871	5 298	133 373	5 846
Oman	1 899	55	48 813	1 416	66 876	1 940
OPT	**					
Qatar	1 361	32	10 851	252	35 878	833
Saudi Arabia	3 027	91	698 105	20 962	818 117	24 566
Syrian Arab Republic	2 293	72	424 435	13 275	510 675	15 972
UAE	1 438	33	56 561	1 313	125 563	2 915
Yemen	9 309	247	1 901 457	50 533	2 209 630	58 723
Total			6 666 688	186 002	8 248 783	229 561

The above table clearly depicts that environment attributable deaths are on an increase in the region. If we compare the environment degradation related deaths in 2004 to them in 2013 there is a remarkable increase from 186002 to 229561. This clearly shows that human development which rests majorly on health indicator as well cannot improve unless environmental performance is taken into account.

Table 4.

Source: IHME 2013

In the above figure 4, the graphs show the deaths due to different types of air pollution in the region under study. Here Iraq, Lebanon, Saudi Arabia, Syria and Yemen seem to perform the worst. This again shows that the conflicts that erupt in a region and influx of refugee population and displacement of population also impacts environment to a huge extent and due to these issues this region has seen an increase in environmental degradation in the past few decades remarkably.

Concluding views

It can be concluded thus, that the inclusion of environment performance in the HDI leads to quite serious deterioration in the ranking of the whole region, with a strong downgrade for the country that seems to do quite well in the human development parameter. Other countries of the region are not doing good too but are not performing too badly, but results are mainly linked to low emissions due to their low economic development.

Thus, these results demonstrate the high sensitivity of the HDI to environmental factors. The exercise carried out above partly raises the question concerning the ranking made by the United Nations Development Program. It clearly appears that some countries are heavily overrated without taking into account their poor environmental performance (USA, Japan, and Finland). Even Australia and Canada are among the countries upgraded. The countries in Northern Europe, seem to be relatively underrated may be due to better performance in terms of air pollution. Among WANA countries, Morocco and Tunisia appear underrated while Egypt, Syria, Algeria and Jordan seem significantly overrated.

Finally, it is appropriate to propose an econometric model to identify the determinants of this indicator (beyond its components). It can be concluded that GDP of a nation, which is a universally accepted indicator of economic welfare, would not reflect the whole picture during times of financial turmoil and crisis. Rather, an alternative indicator that takes into account the not just the economic, but also social and environmental well-being should

be the new instrument to promote governance based on sustainable development, where the long term is as important as the short term and the future of the humanity becomes a priority.

WANA needs domestic and regional action on climate. Governments must look for this challenge and adopt holistic responses, to rebuild civilian trust, tackle state corruption, and redistribute wealth more effectively. They must also engage with their neighbours on a fair, equitable basis to resolve disputes specifically on transboundary water management. In the absence of such, governments must at the very least allow other actors whether they be international partners, their private sector or the civil society, all of them should be given the space and opportunity to respond as they can.

Thus the major concluding points and recommendations to be taken for further policy making are:

- Inequality and the climate crisis are interwoven—from emissions and impacts to policies and resilience. Countries with higher human development generally emit more carbon per person and have higher ecological footprints overall.
- Climate change will hurt human development in many ways beyond crop failures and natural disasters.
- Climate change will hit the tropics harder first, and many developing countries are in the tropics. At the same time, developing countries and poor and vulnerable communities have fewer capacities to adapt to climate change and severe weather events than do their richer counterparts.
- The negative impacts of climate change extend to health and education. Between 2030 and 2050 climate change is expected to cause some 250,000 additional deaths a year from malnutrition, malaria, diarrhea and heat stress.
- If disasters tend to hit disadvantaged people harder, climate change could make vicious cycles of low outcomes and low opportunities more persistent.
- Millions of Indians in low-lying coastal areas are exposed to a rise in sea levels.
- Environmental degradation is a major issue that is linked to access to water, food and energy. For instance, absence of agreement on shared water resources, as well as pollution of water bodies, complicates water management in the region, resulting in food security issues, human health risks and socio-economic instability. Similarly, the region's high reliance on fossil fuels leads to detrimental impacts on the economy, the environment and public health.
- Following the adoption of the SDGs, new environmental and health objectives and instruments will be created, and resources deployed to support monitoring and reporting on the implementation of these goals, particularly Goal No.3 that deals with healthy lives and well-being. With this understanding, it is essential to adopt and implement an integrated ecological public health approach, which recognises the complex interactions between biological, behavioural, environmental and social factors. Monitoring activities conducted in support of achieving the SDGs and their related targets offer an important opportunity to build national capacity for the identification and tracking of key environmental and health risks in the West Asia region.

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Note:

Human Development Index (HDI): A composite index measuring average achievement in three basic dimensions of human development—a long and healthy life, knowledge and a decent standard of living. See Technical note 1 at http://hdr.undp.org/sites/default/files/hdr2020_technical_notes.pdf for details on how the HDI is calculated.

Planetary pressures-adjusted HDI (PHDI): HDI value adjusted by the level of carbon dioxide emissions and material footprint per capita to account for excessive human pressures on the planet. It should be seen as an incentive for transformation.

Difference from HDI rank: Difference in ranks on the PHDI and the HDI, calculated only for countries for which a PHDI value is calculated.

Adjustment factor for planetary pressures: Arithmetic average of the carbon dioxide emissions index and the material footprint index, both defined below. A high value implies less pressure on the planet.

Carbon dioxide emissions per capita (production): Carbon dioxide emissions produced as a consequence of human activities (use of coal, oil and gas for combustion and industrial processes, gas flaring and cement manufacture) divided by midyear population. Values are territorial emissions, meaning that emissions are attributed to the country in which they physically occur.

Carbon dioxide emissions (production) index: Carbon dioxide emissions per capita (production-based) expressed as an index using a minimum value of 0 and a maximum value of 69.85 tonnes per person. A high value implies less pressure on the planet.

Material footprint per capita: Material footprint is the attribution of global material extraction to domestic final demand of a country. The total material footprint is the sum of the material footprint for biomass, fossil fuels, metal ores and nonmetal ores. Material footprint is calculated as raw material equivalent of imports plus domestic extraction minus raw material equivalents of exports. Material footprint per capita describes the average material use for final demand.

Material footprint index: Material footprint per capita expressed as an index using a minimum value of 0 and a maximum value of 152.58 tonnes per person. A high value implies less pressure on the planet.

