RESEARCH PAPER

IMPACT OF URBAN DEVELOPMENT ON AIR QUALITY: A CASE STUDY OF BHILAI

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Abstract: Bhilai is a fast developing city of India , but unfortunately many Indians does not know Bhilai. According to population Bhilai is so near to Banaras city and twice in area. These comparatively small cities required adequate attention to environment issues because it is an industrial city and growing as an educational hub . It is needed that process of urbanization and planning's implementation year to year will help to increase the city air quality . If a city has a good air quality on the same time it will increase quality of life and subjective well being (SWB).

1. INTRODUCTION

Most of the Indian cities had densely populated and has extreme climate which is direct related to air pollution . Dense population creates more air pollution. Air pollution is a serious issue which we should search the solution in urban planning and we can do. According to Global Health Observatory (GHO) data Worldwide, ambient air pollution contributes to 7.6% of all deaths in 2016 .

2. INTERNATIONAL LAW

International law is an area , which created shape in the early 20th century. Environmental law involves the study of treaties , other sources of international laws on the subject, cases and judicial decisions. Treaties means the formal sources of international laws . These are generally negotiated texts in which states have participated .

The Kyoto Protocol was adopted as the first an international treaty that committed its signatories to develop national programs to reduce their emissions such as CO2 , CH4, N2O.The collective efforts has been given a remarkable result in Europe . It reduced emission of sulphur , nitrogen by 40 to 80% since 1990 in Europe .

Share in global emission by jurisdiction , China 26% , USA 13% , India 7% , Russian Federation 5% and European Union 9%.

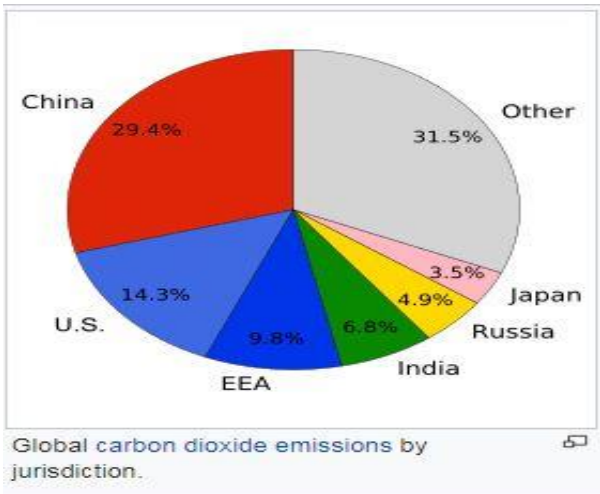

Fig. 1 Share in global emission by jurisdiction ,

Fig . 2 Kyoto Protocol

3 CASE STUDIES

To understand the situation of air pollution and its measures in our world the case study has an important role for developed , undeveloped and developing country .Mostly developed country has less AQI it means they achieved their goal of air pollution .Here we have taken case studies of three countries of different categories.

3.1 Burundi :

Burundi is a small, landlocked country. The country is endowed with valuable natural assets. In particular, abundant rainfall, a dense river network, fertile arable land, productive marshlands, and freshwater lakes generate a range of ecosystem services, as well as directly support the lives and livelihoods of the population. Its economy is dominated by small-scale agriculture, which employs 90 percent of the population, though cultivable land is extremely scarce.

Key Environmental Problems in Burundi Problems Major Causesa Major Consequences Deforestation • Population growth • Clearing for agriculture, residence • Reduced provision of forest products • Loss in biodiversity and other ecosystem services • Soil erosion, severer damages of natural disasters Land degradation • Intensive cropping without adequate management practices •

Fig 3 Location of Burundi .

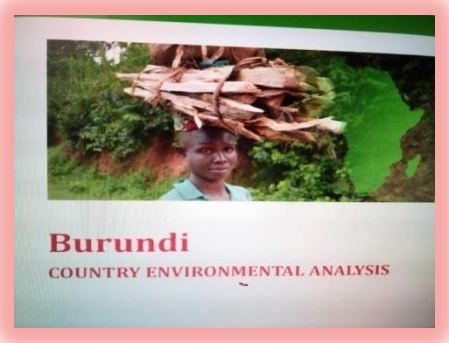

Fig . 4 Under develop country .

Cropping on steep hills without erosion control • Uncertainty of land tenure regime • Agricultural productivity loss • Loss in biodiversity and other ecosystem services • Soil erosion, severer damages of natural disasters Indoor air pollution • Indoor cooking with • "Dirty" fuel • Insufficient ventilation • Compromised public health • Deforestation • Greenhouse gas (GHG) emission Water pollution • Poor sanitation • Insufficient implementation of regulations, especially agricultural processing (for example, palm oil, coffee) • Compromised public health • Compromised health of aquatic wildlife • Scarcity of safe drinking water Natural disaster •

Because of undeveloped country so that It has less development works cause less pollutions .But at present it is going to development works the level of pollution are increasing simultaneously

3.2 : Dhaka (Bangladesh) :

Bangladesh's capital has ranked as Dhaka scored 298 in the US Air Quality Index (AQI) at 9:30am on Monday. The air was classified as "very unhealthy" and most polluted city in the world.

Bangladesh, one of the most densely-populated countries in the world, has been struggling with air pollution for a long time while Dhaka has continued to rank among the most polluted cities .

Bangladesh has fast developing country hence it has maximum pollution level.

DISAPPEARING WETLANDS, RIVERS

Dhaka, ranked as the ninth largest megacity in the world, has seen its population rise by about three times from 6.8 million to 18.2 million over the past quarter of a century, the report cited.

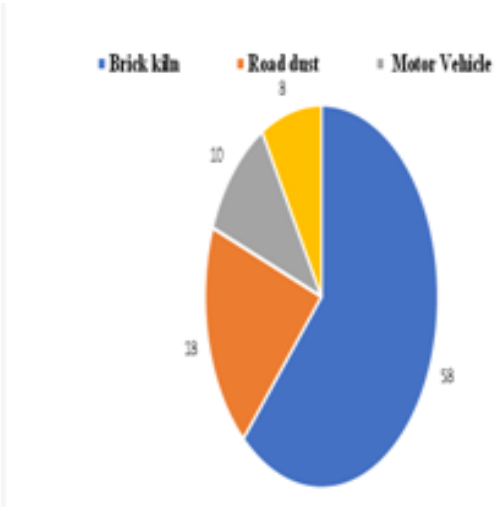

Fig . 5 Source of Particulate matter in Dhaka

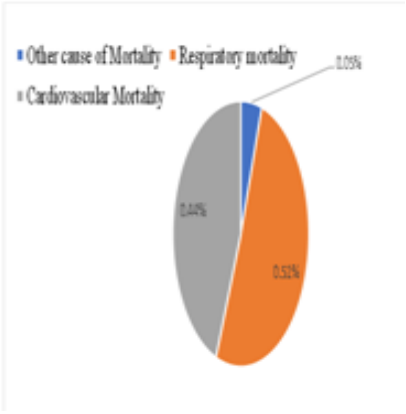

Fig . 6 Mortality due to PM2.5

Continued unplanned urbanization, filling-up of wetlands and rivers, and shrinking of a canal network across the city has exacerbated urban flooding and contributed to various environmental problems.

Flooded roads contribute to traffic congestion and health hazards from the spread of vector-borne diseases.

In Bangladesh they have started of implementation of policies to reduce air pollution like encouraging the adoption of cleaner brick manufacturing technologies as New Zig Zag Kilns, Improved Zig-Zag Kiln, Vertical Shaft Brick Kiln, Mini Tunnel or Horizontal Shaft Brick Kiln, alternative building material and Tunnel Kiln.

3.3 : Berlin (Germany) :
The Germany government aggressively pursued the implementation of renewable energy production .

The low-emission zone covers the centre of Berlin inside the S-Bahn ring ("Großer Hundekopf"). This has an area of approximately 88 km^2. The area is particularly closely built-up. Around one million of the 3.4 million inhabitants of Berlin live here. The low-emission zone is indicated by traffic signs (sign 270.1) at the approach roads.

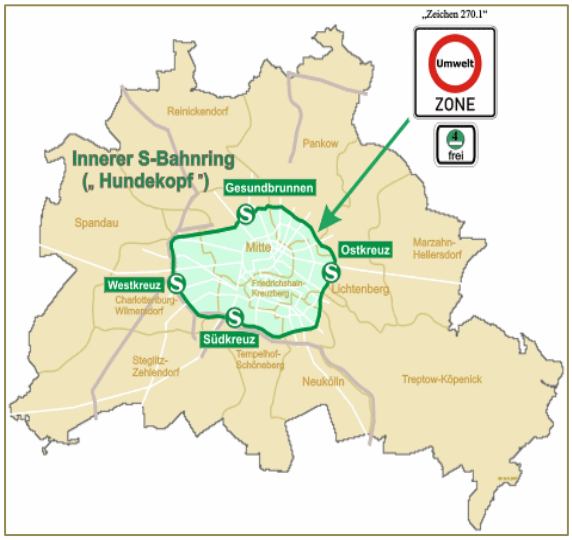

Fig 7 . low-emission zone covers the centre of Berlin. Fig . 8 Bicycle path .

The graphic above shows the signs for the Berlin low-emission zone. As the small additional sign indicates, only vehicles with a green sticker are allowed to drive.

To Reduce Air Pollution, Germany Will Test , Free Public Transportation in Some Cities . The idea is still in the early planning stages, and previous attempts in other parts of the world haven't gone well .

3.4: Local area (Bhilai):

Bhilai, officially called Bhilai Nagar, is a city in the district of Durg, Chhattisgarh, in eastern central India. With an urban population of 1,064,222 Bhilai-Durg is the second largest urban area after Raipur in the Indian state of Chhattisgarh. Bhilai is a major industrial city in India as well as education hub of central India .

Ambient air quality Index (AQI) stations , 4 statios are installed at Bhilai and Durg.

1 – 32 banglow , 2- Boria gate , 3- Industrial area Hathkhoj , 4- Industrial area Borai Rasmada .

Collected the data of Pm10 , Pm2.5 , So2, No2.

Maximum are in Hathkhoj

Bhilai Durg is in the non-attainment city category above 100micro g/m3.

Civic centre station check the BSP plant AQI.

Average AQI of Bhilai Durg has 110 to 95 .

Norms for industry is of 1/3 of the land area shall be of trees.

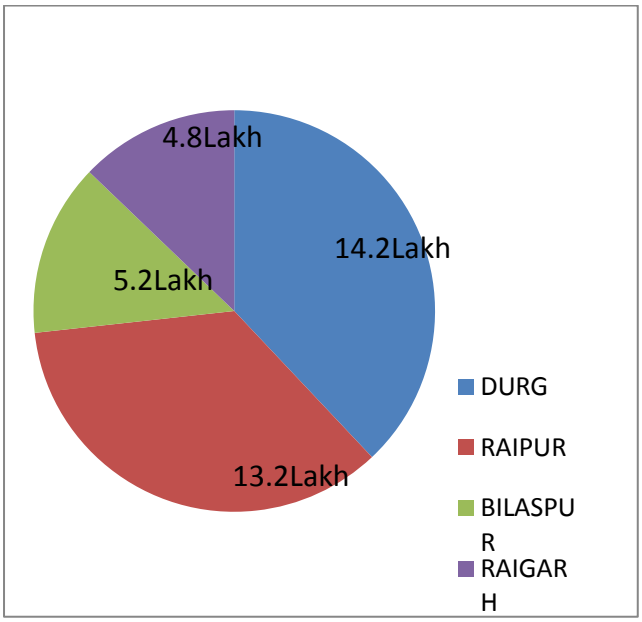

Fig . 9 VEHICLE REGISTERED AT MAIN CITY OF CHATTISGARH

Chattisgarh norms for residential planning :

Road area : 30%

Organized Park Area : 10%

4 : Analysis :

Environmental Problems in Burundi Problems Major Causes Major Consequences Deforestation .Average AQI is 83.It means The starting of development are the starting to increasing AQI

Dhaka Bangladesh minimum AQI is 50 at July and maximum AQI is 310 at January .Population density is very high 23234 / sqkm. Population is direct related to air pollution. Bangladesh is a developing country.

To date, a number of measures have been implemented – from diesel exhaust filters, the modernization of buses and the expansion of public transport services to more cycle paths and zebra crossings. Min. AQI 11 and max AQI 51.

	Berlin (Germany)	**Dhaka(Bangladesh)**	**Gitega(Burundi)**	**India**
category	developed	developing	Under developed	developing

Population(country wise)	83,019,200[18]	162,951,560	10,524,117	1,324,171,354
Population density	232/km²(600.9/sq mi)	1,106/km²(2,864.5/sq mi) (10th	401.6/km²(1,040.1/sq mi	402.4/km²(1,042.2/sq mi) (31st
AQI	29	163 (Dhaka)	83	100 (Bhilai)
GDP per capita	$49,692[19]	$1,888	$310	$2,199
Pollution level	Very low	Very high	high	Very high in national level
Population city wise	3570000	8910000	725000	1060000 {Bhilai}
Population density city wise	3809/sqKm	23234/sqkm	366/sqkm	3100/sqkm (Bhilai)
Area of the city	891sqkm	306sqkm	1979sqkm	341sqkm(Bhilai)

Population of Bhilai : 10.6lakh

Area of Bhilai : 341 sqkm :

Density of population: 3100/ sqkm

3100 person has ; 1 sqkm or 1000000 sqmt one person has required

Then one person has ; 322 smt area.

One person has green space ; 322 x 10% = 32.2 sqmt.

Approx Carbon Sequestration = 32.2 x 774 = 24922kg/year.

The best Sequestration is of 100000kg/year

It means one person required green space = 322 x 40% =128 sqmt area.

It means green space should be in Bhilai = 136 sqkm .

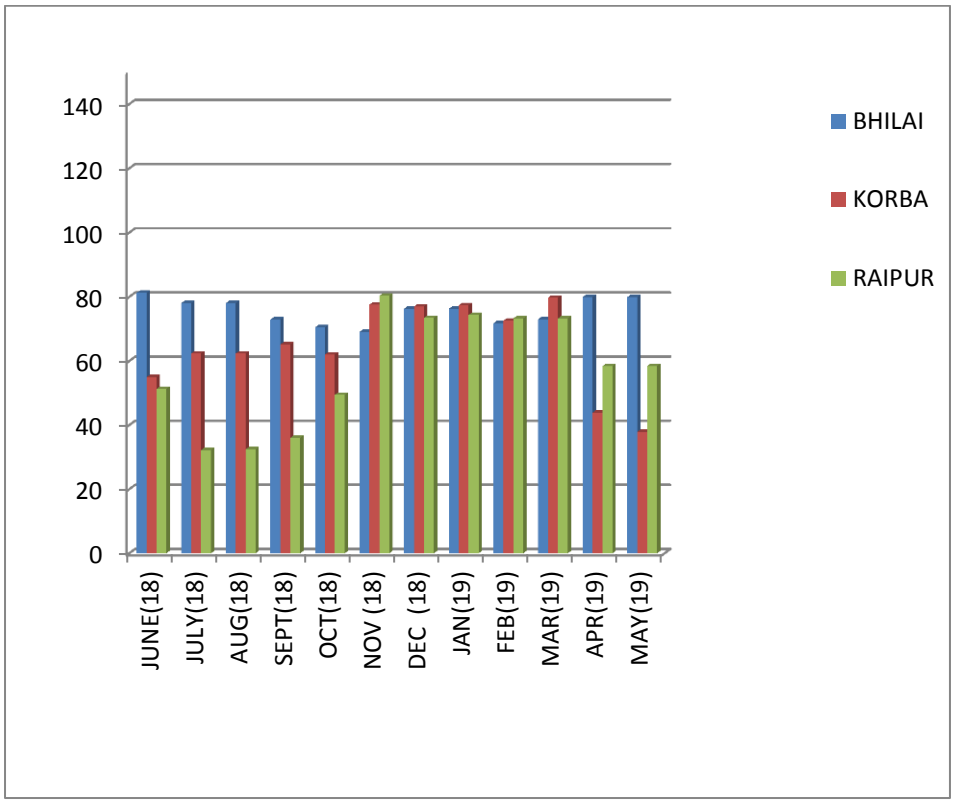

Fig 10 Bhilai and Korba has higher

Average AQI compare to Raipur city. Because of Industrial city.

But Nov. to March Raipur has AQI equal to Bhilai and Korba. It means the dust and traffic pollution increase the AQI.

In case of Bhilai Laghu udyog Nigam and Boraj area has higher AQI .

Bokaro Hostel is very near to Bhilai Steel Plant .

Transport : Reduce private transports and increase public transport. Flyover of triple layer .

Dust : Increase land use of tree and grass land with pavements.

Industries : monitoring and implementation of Industrial norms .

Bhilai has a less density population compare to other cities hence it has A good opportunity to develop in aPlanned manner .

Bhilai is surrounded by cropland area . Hence Land acquisition is a major task . AQI station is very less .We have not the data of other area AQI level at Bhilai . Important land use :Green urban area .Urban forest. Water bodies are missing.

5: Proposals:

For making less traffic conjunction and crowd Flyovers at Nehru nagar and power house shall be merged with commercial complexes. Proposal of air purifier is necessary in the city. Making multilevel parking and restricted petrol diesel vehicle inside the Akashganga and powerhouse market. Development of urban forest. Promote public transport and minimize the private vehicles

Fig 11 Air purifier

Fig 12

Fig . 13 Proposals of Powerhouse

Power house square shall be developed with multilevel parking connecting flyover with two commercial cum residential complex.In this manner ground land will be vacant for urban forestry.

Development of urban forest at the outer fringe of the city .It will be stoped the urban sprawl.

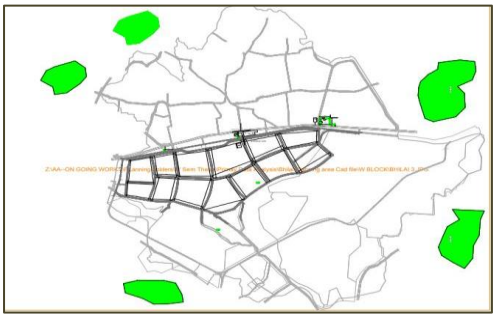

Fig 14 Development of urban forest at the outer fringe of the city.

Implementation of proposals :-

First Step : For the collection of fund we will be approved by UN against of air pollution at the scheme of Kyoto Protocol.

Second step : All shops of the area near about 200 nos .Shall be shifted near by vacant area as the temporary shops.

Third step : Residential block which will be come in under construction area will be acquired by compensation scheme Or rent amount will be payed for the construction period.

Fourth step :After making the towers they will be shifted And some other have taken the compensation .

Fifth step : After shifting the residential area simultaneously .

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NUMBEO . Pollution in Burundi

Numbeo is the world's largest database of user contributed data about cities and countries worldwide. Numbeo provides current and timely information on world living conditions including cost of living, housing indicators, health care, traffic, crime and pollution.

The Institute for Health Metrics and Evaluation (IHME) is an independent global health research center at the University of Washington

Case study of Bangladesh ;

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