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## The Urban Metabolism: The Requirement & its Effects on the Environment



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### Abstract

On the basis of its etymology, "metabolism" overall meaning refers to some activities which is done to survive and to protect living. A city is like a living creature: it consumes, it produces and exchanges stuff with its surrounding environment & the farther ones. Oxygen, water, food, the initial materials used for construction, vehicles fuel and such materials are considered as the needed metabolism for the urban communities, which are like living communities. Due to such a metabolism, the wastes include air pollution, urban trash removal and the like, which are among the most significant urban issues and problems. In traditional cities, the living bases of the city are usually situated around the city, whereas due to the development of both transportation industry and the connecting roads, nowadays the cities inter-dependence is not solely limited to supplying food stuff, but it includes a larger domain. Then, what sort of effect could the urban metabolism have on the urban environment, its suburbs and – on a larger scale – in the global level? What strategies could be provided to reduce such destructive effects? To what extent could the environment make up for the destructive effects of the urban metabolism? In this research, it has been tried to provide answers to such issues and strategies for reducing destructive effects of the urban metabolism for time being.

**Keyword:** Urban Metabolism, Urban Trash, Environment, Urban Organism, Urban Ecology

### Introduction

Today, mega cities require to utilize complex mechanism and macro planning to meet all their dwellers' needs. Shortage of housing and civic basic facilities, insufficient transportation

system, destroying the environment ,air pollution, overcrowded population, shortage of health services, water, food and social crisis are the most challenging problem for mega cites.

Buildings, people and all affairs in cities cause the increase in consumption of energy, as well as, increase in producing waste. It is really daunting task for cites in developing countries to provide house ,job and services for their fast growing population even though development and being developed have been basic purpose of urban managers ,but the development should provide all present needs of society without scarifying the ability of next generation in providing their needs and also without harming the environment. This kind of sustainable and constructive development is normal urban metabolism and will cause Important in permanent quality of human life and enjoyment of achievement for all generation. So urban constructive metabolism can cause consistent development in different fields such as ,economy and social. The residents have to provide their needs but this is the way of their providing which makes a metabolism constructive or harming. Undesirable influences of harming metabolism on the environment make it so crucial issue to concern about. The waste out of urban metabolism can be harmful that even will lead to destroy the human environment in long time. The research is tried to study fundamental demands of resident as a motive power for urban metabolism and consider the waste out of metabolism and its influences on environment.

Fundamental demands of city dwellers are divided into different groups such as ,the needs for water, air ,house and energy. Met all kinds of requirements, it has been investigated and has been discussed. How to take the waste away or how to reconsume in sustainable development in a recycling system?

### **The requirement of urban organism**

#### **A-need for air (oxygen)**

In the past ,water and air used to be so available and accessible and it was easy to provide ,but now with the fast growth of population , develop technology and also industry cost high to offer healthy water and air, and per capita of consuming water and air have considerably increased.

It is vital for human being to breathe oxygen in about one cubic meter in every hour and 25 cubic meters for one-day-night.by considering the growth and development of industry ,the per capita of air consumption has increased up to 150 cubic meters for each person , pollution have been considerably increased.

In one hand ,by industrializing of cities ,their requirements for oxygen have been increased, but on the other hand, production of increasing energy by burning fossil fuel, the increase of exhaust

and waste are lead to increase in air pollution, and as a result, the recourses of providing cities ,oxygen, as a essential need for dwellers have been suffered.

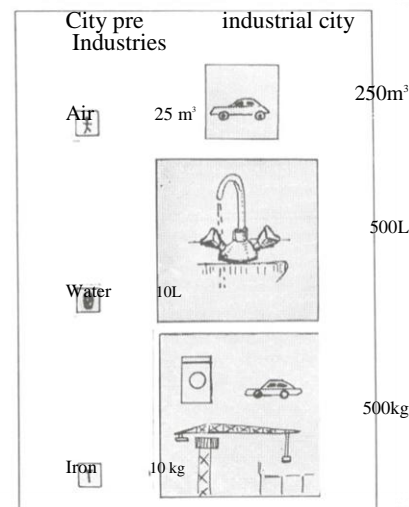


Fig 1(compare between City pre Industries & industrial city)

## B-The requirement of water

In the past, the per capita of using water was about 10 to 15 liter on each day.

Now, With developing of industry, the per capita has increased up to 1000 liter.

One of important resource of environment and necessary needs for human is water.

many affairs of manufactured agriculture, urban homemade are depended on water.

Drinking water is so vital for human and other existence which is provided in a standard quality.

The growth of population, the development of city life and industry, the overconsuming of resources have lead to spend water resources and pollute them.

The main resources of water in cities,

- 1-under ground waters(well-spring- aqueduct)
- 2-atmospheric waters(rain-snow)
- 3-surface run off(rivers, seas, lakes, oceans)

## C-The need for food

The humans need for food is one of the inherent needs or physiological that is an element of surviving. The need for food is perpetual and organism has to try for getting food and eliminating hungriness.

Each person digest about 1 to 3 kg food daily and some parts a half such as vegetable, fruit, fish and meat are put away.

It is evaluated that suitable pure food is made by human, have balance fluctuated between 700 to 1000 kg yearly. In developed countries, for a city of 1 million population, it needs to have a land with an area of one-thousand hectare in order to provide variety needs of residents food, while in developing countries because of having traditional agricultural, it needs to have fifth times land more to supply food.

So in developing countries especially in megacities, it is impossible to provide foods just in their own measurement and with regarding to the development of transportation and agriculture industry, the ecological stations of cities in field of providing food can be located on distance far from cities like, Iran's wheat imports from The U.S.A

### **D-The need for house(the providing of construction materials and initial materials for cities)**

The housing in cities requires extensive construction tools and materials.

In the past, the housing was depended on the suburb of cities, and usually used what its surroundings offer. For example, in forestal areas the most of houses were made by wood, and in mountainous area, houses were made by stones and in barren area, the house were made by adobe.

But now, with improving and developing of technology, especially in railroad, navigation, housing has been possible with approaching to the materials out of frontier of cities.

In the past, percapita consumer of steel : in each year 10 to 15 K.G

Now, percapita consumer of steel : in each year more than 500 K.G

### **E-Consumption energy in cities**

In the past, man power was the main force of craft and traditional cities, warming of houses was possible by burning woods and coal and transferring goods was possible by animal and also providing demanding food was very difficult.

By discovery of steam power, the power used for transportation was changed to be a kind of different power, a part from animal power.

This days Consuming energy of cities is supplied by oil, coal, natural gas and electricity power which caused air pollution.

About 60 to 70 percent of world energy is used in cities and mostly 50 percent of it is used in houses. 25 percent in transportation and 25 percent in industry-agriculture. So appropriate design for cities and using renewable energies like sun, wind, water, sea could have influenced on decreasing energy consumption and also may decrease air pollution

### **The waste out of urban metabolism**

The important part of resources that is necessary for insure the life of society after unclean, is taken away to enjoy a healthy environment. there are different harmful substances according to their weight, and quality. So it needs different ways to clean the environment considering the substances of harmful elements

#### **The Gases**

The major element of air, about 78 percent, is nitrogen, and 21 percent is oxygen and just 1 percent of the rest is a mixture of other gases. The Earth is surrounded by a layer of 60 to 100 diameters.

Any changes in chemical and physical quality of the component parts of air is called air pollution

### **Natural elements of air pollution**

There are some natural factors of polluting the air, such as winds and sand storms (that increase density of substances on air), volcano activities (that throw out methane gas to the air) sulfuric gas which is emitted from mineral spring and waves lashing the shore and fermentation of substances in nature (which is caused the production of carbon dioxide). These factors were existed even before human existence

### **Synthetic elements of air pollution**

There are many basic synthetic elements of air pollution, such as, consumption of fossil fuel by factories and industries, heater services of trade buildings and heavy trucks and cars, etc.....

Consumption of fossil fuel by factories and industry lead to produce carbon dioxide, sulfuric dioxide, nitrogen dioxide and carbon monoxide. Demonstration and decrease in green space of cities by housing cause lots of air pollution. Using a lot of gasoline by cars, especially worn-out cars pollute air, and also other means of transportation such as, air plane, cars, buses, mini buses and etc.... Release harmful gases through air, like lead.

It should be considered that the increase of green house gases by fossil fuel is a kind of important danger.

Air pollution is the main reason of some dangerous diseases, changing in genetics, cattle death, and destruction of agriculture products.

### **Now, how is it possible to meet all requirements of people (city dwellers) without harming the environment ?**

1- whereas the motorized vehicles are one of the most important factor for air pollution, The development of public transportation system can be the best way to decrease air pollution.

2- To make great green space to get CO<sub>2</sub> and to produce oxygen

3 - Improving fuel consumption

4- Using renewable energy such as, sun, wind, water, heating energy of earth.

5- the movement of atmosphere can help to decrease the shortage of air, geographical width, topography and geographical location of cities can be effective to decrease pollution

6- using of air refining filter in factories and industry

### **Liquid**

Liquid is the vast amounts of waste out of cities.

About 85 percent of drinking water is wasted

Although water is the vital reason of life, the polluted water can be enemy for human life, all sewages of houses, cities and agriculture which includes lots of microbes, entozoan, poison and chemical substances, run into rivers and underground waters, as a result, they cause different diseases and death for all existence.

It is necessary to know that one cubic meters of polluted water is able to pollute 400 cubic meters of clean water.

One of the most important solution to prevent the environment of being polluted and to provide agriculture water and biological fertilizer is to refine the urban water

### **Trash and waste**

The reason that It is impossible to control urban and village waste is different polluted substances ,appropriate damp and temperature and suitable shelter for insects and rodents. And also waste is the basic factor of many common diseases between human and animals. It is possible to control pollution by controlling and throwing away the waste,appropriately

### **Ways of damping waste**

- 1-burying trash healthily
- 2-burning trash
- 3-to compost
- 4-to pile the waste
- 5-to repel damp in river or sea
- 6- etc.....

### **The use of un recycling system**

This way lead to pile of waste and decrease of data.

The waste + output=input

Almost, It is used in all ways of repulsion except in compost

### **The use of recycling system**

First, the useful life of product and their yields are increased by this system, moreover ,the products is being chosen in order to recycle their waste.

#### **compost**

compost is the best way to eliminate the waste which is happened in dampness and heat on air condition by different micro organisms.

The use of compost is economical ,however, there are large amounts of waste in metropolitans.

In different countries ,one of the way to change solid waste to gas, is to pyrolysis. In this way, the gas ,is made in generators and steam turbines.

Change to electricity and then it is used. so ,the kitchen waste is the suitable resource to produce biogas that can be used instead of fossil fuels.

### **The conclusion**

Today, As there are lots of changes in environment by urban organism ,it is impossible to create balance except with long-term and high investments ,but city dwellers are sophisticated enough to limit these abnormal changes, and also they are able to manage the waste and metabolism in such a way that can cause the lowest level of pollution and They can make a quick plan to recover the vulnerable environment.

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