UNIT 9 : ENVIRONMENTAL STRESSORS

UNIT STRUCTURE

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9.1 LEARNING OBJECTIVES

After going through this unit, you will be able to-

- describe the meaning of environmental stressors
- explain the different categories of environmental stressors
- evaluate the impact of environmental stressors like noise,air and water.

9.2 INTRODUCTION

An environmental stressor is something in our environment that can easily be perceived as annoying, distracting, uncomfortable or unpleasant. Environmental stressors comprise pollution, weather extremes, noise, heat, water, air pollution and so on. Often many of these are ignored. However, they sneak into our lives and collectively have long-term negative effects on our health and environment and become the major reasons for the stress. These environmental stressors are not only disturbing the environmental balance but also the peacefulness of the individual. They destabilize our physical, emotional, psychological and spiritual health and have long term

critical effects. This unit will discuss the various environmental stressors which are responsible for making a highly disturbed natural environment.

9.3 MEANING OF ENVIRONMENTAL STRESSORS

Stress is one of the issues which are being discussed these days.Though the concept of stress is difficult to define researchers of environmental psychology are trying to adopt more relational and interactive definitions of stress. Stress is defined by Hans Selve as the non-specific response of the organism to any demand mode upon it. From an environmental point of view. 'Stress is a state that occurs when people are faced with demands from the environment that require them to change in some way'(Veitch and Akkelin, 1995). When there is an imbalance between environmental strain and reaction potentiality of the individuals then it can lead to stress.

Stress occurs when environmental stimuli exceeds one's coping capacities. Hence stress is basically a relational term suggesting an inequality between environmental opportunity and individual's goals, and competence to copy with that imbalance (Baum, Singer & Baum, 1982). Stress can be termed as something that occurs to people and the people's report to the things that are happening. During excess stress situations the people may show depressed symptoms. Once again, this may be for physiological reasons. One of the stress hormones released by the adrenal cortex is cortisol. The main function of cortisol is to control swelling when an injury occurs. However, it also appears to have the effect of reducing the density of serotonin receptors in some parts of the brain. Since abnormal serotonin activity is thought to be associated with depression. Stress is a dynamic, recursive relationship between environmental demands, individual and social resources to cope with those demands, and the individual's appraisal of that relationship.

Environmental stressors are the conditions which disturbs the act of the person in his attempt to sustain normal living. Environmental stressors are those factors which interfere with performance through certain coarse-grained actions. The internal or external environment forces lead to imbalance

disturbing physical and psychological health. Environmental stressors don't usually involve people, but relate to the conditions of the physical environment.

Environmental stressors may be grouped into different categories: Cataclysmic events, Stressful events, Daily hassle and Ambient stressors.

The sudden catastrophes that demand adaptive response of individuals affected by the event are called cataclysmic events. The cataclysmic events affect the entire community. The examples are earthquakes, volcanoes, floods and so on. Stressful life events are the major incidents in one's life and that typically require adaptive response either personal or social, such as marriage, birth, death, divorce or changes in economic conditions like change in jobs, transfer, and retirement and so on.

There are typical day to day events of normal life that sometimes cause frustration, tension or irritation. These are referred to as micro stressors. The daily hassle includes environmental events (like crowded buses, traffic jams), work issues (target deadlines, arguments with co-workers), and interpersonal problems (disturbance with family members, neighbours and friends). These daily hassles are part of life to most of us they are common but with short duration. Though, these minor situations are focused on individual, however in the long run the cumulative effect of these hassles may have a high impact on the individuals.

On the other hand, ambient stressors are environmental pressures like wind, pollution, overcrowding noise, which are often minor but can affect people over a long period and affect everyone in the area. They are more continuous, relatively firm and rigid conditions of the physical environments. The stressors are mostly indirect and operate in the form of background conditions. The extent of changes in psychology of the people depends mainly on the power of the stressor. The emotional responses caused by stressor become highly pessimistic and more severe, causing worsening of behaviour in the society such as augmented fierceness leading to unselfish acts. This can also lead to shortage in cognitive functioning and can distress the ability of the individual in performing multiplicity of errands.

This may also lead to decline in problem-solving aptitude. It makes the person to depend on regular activities originating to rigid, ritualistic means, indicates until it affects the healthy of the individuals.



CHECK YOUR PROGRESS

Q 1: What do you mean by environmental stressors?

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Q 2: Define the term stress.

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Q 3: What is meant by micro-stressors?

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9.4 TYPES OF ENVIRONMENTAL STRESSORS

Environmental Stressors may be divided into two types on the basis of causative factors :

A. Natural Stressors and

B. Man-Induced Stressors.

- **Natural stressors**

These are caused by natural factors which are further divided into three sub categories-

i. **Terrestrial or endogenous factors or stressors:** These occur on the earth's land surface, e.g., earthquakes, volcanic eruption, etc. but caused by deeply hidden factors within earth which are not observable but their effects are observable and experienced.These extreme events are caused by endogenetic thermal conditions of the interior of the earth. It is the result of disequilibrium in any part of the earth crust.

These hazards and disasters have resulted in great

damages to human constructions -buildings, roads, rails, factories, dams, heavy loss to human property. On the other hand there is great disaster for human lives and other organisms. The quality of environment is deteriorated and great damage to human structures, towns and cities, dams and human settlement as a whole.These extreme events can not be prevented or checked, because these are beyond human control and management.

ii. **Atmospheric or Exogenetic Hazards and Disasters:** These are caused by atmospheric processes, e.g., tropical cyclones, typhoons, forest-fires, hurricanes. These are normally related to weather and climate extreme conditions. These natural hazards are caused by atmospheric processes or forces which generate from with the atmosphere so these are known as 'exogenetic natural hazards'. The causative factors are not observable, but are recorded by meteorologists to forecast about the weather conditions. These are further classified into two categories:

a. Abnormal or infrequent events - 1. Cyclones, 2. Lightening, 3. Hailstormes and 4. Fire.

b. Cumulative atmospheric hazards and disaster -1. Floods, 2. Droughts, 3. Cold waves and 4. Heat waves.

Tropical Cyclones our country is an example of abnormal exogenetic hazards. It comes from over the Bay of Bengal, become hazardous to the east coastal lands of India which effects West Bengal, Orissa, Andhra Pradesh and Tamil Nadu states of our country. In the November, 1977 cyclonic storm struck Andhra coast when the biggest surge of 6 meters height was recorded and moved with a speed of 175 km per hour. It has damaged human lives and other organisms and made the coastal land barren and wasteland by the deposition of salt on the soils by the storm. The strongest cyclone of November 1977. The destruction by the tropical cyclones include loss of human lives, other organisms and human

constructions, agricultural crops, vegetation, wild life and power supply and communication system and so on.

The floods and droughts are the examples of cumulative atmospheric hazards. The floods means coming out of huge volumes of water from the river banks and spread over the extensive land area for several days in continuation. This may be caused by natural factors, i.e., heavy rain lives and property also the natural environments. The large scale deforestation is the most important factor which causes the river floods in upper catchment-area of rivers.

iii. Extra Planetary Stressors: Earth scientists are of the opinion that several cases of collision between the earth and other planets - asteroid, meteorite and comet have taken place in the past history. The disaster caused by the collisions between earth and other extra planetary bodies of space are called 'extra-planetary hazards'. The shift in the earth's axis of rotation may be the cause of collision which produces enormous dust, hurricanes, change in sea level, climate change and volcanic eruptions, etc

The astrologists can predict above the occurrence of collisions, but nothing can be done to prevent from these hazards which may cause the damage to human lives and environment as whole at global level.

- **Man-Induced Stressors**

The man-induced environmental stressors are caused through a variety of human activities both deliberate and spontaneous character. These can be classified into three categories:

i. *Physical stressors:* Physical Stressors are those factors causing damage or threat to the environment as a result of human activity such as landslides and soil erosion.

ii. *Chemical Stressors:* Toxic chemicals, poisonous gases nuclear explosion, tankers leakage into the ocean, leakage of gases and crude oil etc are some of the chemical stressors.

iii. *Social Stressors* : Population explosions and downfall in moral

and religious values, use of chemical and organismic weapons during wars, construction of multi-storied buildings, disorganisation in the society etc. are some of the social stressors which adversely affect the human society and as a result the total environment.



CHECK YOUR PROGRESS

Q 4: Mention the types of environmental stressors.

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Q 5: What is 'extra-planetary hazards'?

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Q 6: Mention some chemical stressors.

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9.5 EFFECTS OF ENVIRONMENTAL STRESSORS

9.5.1. Noise Pollution

Modernization has led to a new means of pollution, called noise pollution. Nonstop noise is polluting the environment especially in densely populated cities and towns. This is due to mechanized transport, novel amusements and entertainments. The unpleasant and unwanted sound is called noise. The noise as a pollutant having a deleterious effect on peace of mind and beauty of the environment is increasing every day.

Effect of Noise

(a) Speech Interference: Interference with speech communication is perhaps the best understood of the non-auditory effects of noise. Speech interference is also the most

important non-auditory effect since the ability to communicate by speech is vital in industrial and other situations. Basically, the speech interference caused by noise is a masking process. In general, our hearing threshold is raised by background noise. One should remember, however, that some continuous noises may produce less interference with speech. Since such noises are continuous, some people raise their voices accordingly. Similarly, discontinuous or impulsive noises often produce less speech interference than expected. The reason is that speech that is partly masked by such noises may be complemented by interpolation or gestures. In certain noisy conditions, the wearing of personal hearing protection devices (earplugs, earmuffs or hearing protective helmets) is necessary.

(b) ***Effects on Efficiency:*** According to WHO, noise can act as a distracting stimulus, depending on how meaningful the stimulus might be. Noise may also affect the psychological state of the individual exposed to it. Meaningful noise, especially if it is elusive, may be more distracting then meaningless noise. Similarly, a change in noise levels (up or down) from those to which people are accustomed may cause adverse effects.

(c) ***Physiological Effects:*** The most apparent physiological non-auditory effects of noise concern disturbance of sleep and stress reaction. Noise can also awaken sleeping people, starting from levels of ambient noise as low as 35db, with difference insensitivity related to age and sex. It has been shown by a number of experiments that ambient noise above a certain level may produce variations in heart rate, blood pressure, respiration, dilation of pupils, and changes in the liquids, glucose and uric acid pattern in the blood.

(d) ***Mental Health and Behavioural Effects:*** Noise may not affect the mental health of the person directly, but indirectly it

may increase the growth of latent neurosis. It has often been asserted that noise reduces work output and working efficiency, and affects morale. Noise impairs hearing due to damage of sensitive parts in the auditory system and this is exposed to any loud and sudden noise, it may lead to severe damage to the ear drum. Any lengthened exposure to noise of definite frequency pattern may lead to persistent harm to the inner ear. Noise also leads to nervousness, stress effect and fear. These severe reactions when joined with changes in hormone content of blood, may lead to increased rate of heart beat, shrinkage of blood vessels, digestive contractions and dilation of pupil of eye and so on,

Noise and physical vibration from handheld tools may cause severe effects often described as white fingers, dead hands or pneumatic drill disease. Pain, blue coloration and numbness of fingers results from moderate vibrations and in severely high vibrations cause damage to bones and joints in the hands with swelling and stiffness. Even the ultrasonic sound may have the effect on the digestive, respiratory, cardio vascular systems and semicircular canals of the internal ear. Noise causes heart output to decrease and creates fluctuations in arterial blood pressure and vascoconstriction of peripheral blood vessels.

9.5.2. Air Pollution

Air is a natural resource and it is a fundamental element of human life. It is the basis for all forms of terrestrial and biological species. It is also one of the important sources for economic development like agricultural and industrial production, energy generation, heating, cooling and so on.

The pollution in cities is rising due to fuel burning techniques and poor fuel quality. Traffic also contributes in a large part to the air pollution. It has been estimated that more than half of the total air

pollution is shared by running of motor vehicles in the Indian cities. Inferior quality of fuel material, outdated engines and overloading of motor vehicles are the major causes. Road traffic in particular is much more damaging to the environment than railway traffic.

The air pollution caused by industries is due to incorrect selection of sites and emission of waste gases into the air without taking adequate technical precautions. In India due to the presence of paper, sugar, food processing, textile, steel, pesticides, leather and energy producing industries many areas are affected by air pollution.

- **Effects of Air Pollution**

  The pollutants aggravate the infections of the upper respiratory system and this causes sneezing and coughs. These pollutants overload or reduce the functioning of the natural resistance of the people. The diseases such as cancer, asthma, chronic bronchitis and emphysema are caused due to prolonged smoking or contact to air pollutants. Many vulnerable people like elderly citizens, infants, pregnant women and people with heart disease, asthma or other respiratory diseases are more affected by air pollution.

  Maximum contact to carbon monoxide is mainly because of cigarette smoking. Contact to even 0.001 per cent of carbon monoxide in air for several hours can lead to collapse, coma and to demise. Carbon monoxide can remain in blood for longer duration and decreases blood's oxygen transport capacity. It also affects the insight and thoughts, sluggish reflexes and produced pain, sleepiness, giddiness and vomiting. In heavy traffics carbon monoxide causes headaches, tiredness and distorted vision and in large doses it may even lead to death.

  Respiratory tissues are worsened by sulphur dioxides and prolonged exposure to them can cause a state like bronchitis. Sulphur containing acids will be formed when it reacts with water, oxygen and other materials in the air. They

are extremely caustic to the lungs. The pollutant such as nitrogen oxides, can cause irritation in the lungs, worsen asthma or persistent bronchitis and also raise the vulnerability to respiratory infections, like influenza or common colds. The elements in the air exacerbate the respiratory tract, causing to bronchitis and asthma. Exposure to these particles for a long duration can cause damage to lung tissue, chronic respiratory disease and cancer.

Mutations and reproductive problems are caused by volatile organic compounds (e.g., benzene and formaldehyde) and toxic particulates 9e.g., lead and cadmium). Severe cough, pain in chest, breathlessness and irritation of the eye, nose and the throat are also caused due to the frequent breathing of ozone, a component of photochemical smog.

Effects on Plants: The leaves of plants will be destroyed if pollutants in the atmosphere percolate into the leaf through pores. When the leaves are exposed to the pollutants for a longer duration they split the waxy coating. The waxy coating in fact protects the leaf by preventing undue loss of water and from diseases, vermin, famine and frost. Due to higher concentrations of sulphur dioxide in the atmosphere, the flower buds will become hard and fall from the plants without flowering.

9.5.3. Water Pollution

The life on earth will not feasible without water. This makes water an incredible valuable resource. It has been forecasted that in future many countries may fight for water. Even after decades, people have to share the same amount of water they have today. The economic growth of several countries will be determined in the future on the basis of their access to fresh water. The water that is found in the rivulets, rivers, ponds, wetlands and manmade reservoirs is termed as surface water. The groundwater includes

the water that penetrates into the ground and blocks the pores of soil and rock.

- **Causes of Water Pollution**

  Water can be contaminated through numerous disease-causing agents (pathogens), which comprise bacteria, viruses, protozoa and parasitic worms. They come into contact with water from household sewage and organic human and animal waste. Contamination of water by huge quantity of human waste can cause gastrointestinal diseases due to increase in the number of bacteria. Oxygen depleting wastes are organic wastes that can be decayed by aerobic (oxygen-needing) bacteria. In order to reduce the wastes, bacteria use up the oxygen present in the water and it in turn reduces the quality. This leads to stinking smell and an objectionable taste, which can harm the health of the people. Pollutants also include inorganic nutrients of the plants. They cause disproportionate growth of algae and other aquatic plants as they are water-soluble nitrates and phosphates. This may obstruct the utilization of the water through blockage of water-intake pipes, altering the taste and odour of the water, and an increase in organic matter. Due to the decomposition of organic matter, there will be decline in oxygen levels leading to death of fish and marine species.The chemicals in fertilizers and pesticides used in the agriculture fields pollute the soil and water. These insect repellent come into contact with water sources and introduced into the aquatic food chain. The Phytoplanktons and aquatic plants take them up. The herbivorous fish eat these plants; they are consecutively consumed by the carnivorous fish, which are then eaten by the water birds. The harmful substances in the food chain do not pass out of, accumulate and produce deleterious effects. The other water pollutants are water-soluble acidic inorganic chemicals, salts and compounds of toxic metals

such as mercury and lead. Presence of large quantities of these chemicals in water makes it harmful to drink, damage flora and fauna and other aquatic life, diminish the crop yields, and corrode the equipment.

The organic chemicals like oil, gasoline, plastics, pesticides, cleaning solvents, detergents and other chemicals also cause water pollution. These substances damage the health of the people and the animals living in water. These substances penetrate into the water straight from industries, due to in appropriate usage of chemicals in industries and through the wrong and illegitimate throwing away of chemical wastes. The residue of floating matter in water due to soil erosion is causing water pollution. The soil particles floating in water obstruct the diffusion of sunlight. When the water in streams and rivers diminishes, the suspended particles settle down at the bottom as sediments. They obstruct and block the ponds, contaminate non-natural reservoirs, the feeding places and destroy off springs of fish and so on.

Power plants release hot water and huge volumes of water are used by industries to cool the plant. It leads to an increase in temperature of the neighbouring water resources resulting in thermal pollution. There will be declined in the solubility of oxygen due to warm water and it also changes the reproductive patterns of different aquatic organisms. Another source of pollution is due to leakage of underground tanks. The oil leakage transport tankers at sea are also causing considerable environmental pollution.



9.6 LET US SUM UP

- Environmental stressors are the conditions which disturbs the act of the person in his attempt to sustain normal living. Environmental stressors interfere with performance through certain coarse-grained actions. The internal or external environment forces lead to imbalance disturbing physical and psychological health. Environmental stressors don't usually involve people, but relate to the conditions of the physical environment.
- Environmental stressors may be grouped into different categories: Cataclysmic events. Stressful events, Daily hassle and Ambient stressors.
- The environmental stressors are divided into two types on the basis of causative factors: Natural Stressors and Man-Induced Stressors.
- Modernization has led to a new means of pollution, called noise pollution. Nonstop noise is polluting the environment especially in densely populated cities and towns. This is due to mechanized transport, novel amusements and entertainments.
- Air is a natural resource and it is a fundamental element of human life. It is the basis for all forms of terrestrial and biological species. It is also one of the important sources for economic development like agricultural and industrial production, energy generation, heating, cooling and so on.
- Water can be contaminated through numerous disease-causing agents (pathogens), which comprise bacteria, viruses, protozoa and parasitic worms. They come into contact with water from household sewage and organic human and animal waste. Contamination of water by huge quantity of human waste can cause gastrointestinal diseases due to increase in the number of bacteria.



9.7 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: Environmental stressors are the conditions which disturbs the act of the person in his attempt to sustain normal living. Environmental stressors interfere with performance through certain coarse-grained actions. The internal or external environment forces lead to imbalance disturbing physical and psychological health.

Ans to Q No 2: Stress is defined by Hans Selye as the non-specific response of the organism to any demand mode upon it.

Ans to Q No 3: There are typical day to day events of normal life that sometimes cause frustration, tension or irritation. These are referred to as micro-stressors.

Ans to Q No 4: Environmental stressors are two types- natural stressors and man-induced stressors.

Ans to Q No 5: The disaster caused by the collisions between earth and other extra planetary bodies of space are called 'extra-planetary hazards,'

Ans to Q No 6: Toxic chemicals, poisonous gases, nuclear expolsion, tankers leakage into oceans, leakage of gases and crude oil etc. are some of the chemical stressors.



9.8 MODEL QUESTIONS

A) Very Short Questions (Answer each questions in about 50 words)

Q 1: Write the meaning of environmental stressor.

Q 2: Environmental stressors are induced by nature not by man.
(Write true or False).

Q 3: Environmental degradation takes place due to .....
(Fill up the blanks).

Q 4: Write some of the man made hazards.

B) Short Questions (Answer each questions in about 150 words)

Q 1: Write about the terrestrial stressors.

Q 2: Describe briefly about man-induced stressors.

Q 3: Write about the effects of air pollution on plants.

Q 4: Write about the effects of water pollution on acquatic life.

C) Long Questions (Answer each questions in about 300-500 words)

Q 1: Discuss about the different types of environmental stressors.

Q 2: Discuss the effects of different environmental stressors on physical and mental health of people.

Q 3: Discuss the impact of noise pollution on human life.

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