**Sheet no :18**

**Written by : Sana Isleim**

**Corrected by : Samar Al-Jaiose**

**\*Pollution:**

**-When can we tell that something is polluted? By two things: 1- Either something happens to the original component (something which is not one of the components of the system comes to it: Foreign component). 2-Changing the regular components.**

**\*By the definition everything is polluted, rarely you can find something contains only its original components (like water. It’s H2O+minerals).**

**\*Pollution happens to: humans, plants, animals, and microorganisms.**

**\*pollution may:**

 **1- Have health impact. 2- Interfere with our enjoyment to the environment (like bad smells from factories).**

**\*Types of environment: 1- Outdoor environment (ambient environment): it is what we are talking about. 2- Indoor environment (two types: 1- house. 2- work).**

**\*\* Each one has its specialists.**

**\*Pollutants: like CO (carbon monoxide). \*If we want to make a standard for people exposure to CO in factories and outdoor would it be different??? YES.**

**\*If we look to the environmental standards compared to occupational standards, we find that we allow higher levels in the occupational place (working field-factory), not because they are taking precautions, but because of “the healthy worker effect” that means many things: 1- People who work are (20-60)years old, so they are supposed to be healthier than the general population so they can tolerate higher levels. 2- The exposure is limited (e.g. 8 hours), while outdoor in the environment we are exposed 24 hours. 3- Also in the general population there are infants, old people, and pregnant ladies, so we can’t allow the same levels for both situations, that’s why we have special standards for environment and other standards for occupational place.**

**\*\*\*How can we come with these standards???**

**\*Toxicity profile: If people are exposed to certain material in their working place for 40 years (20-60 years old), 5 days a week, 8 hours each day they will be alright .**

**\*not all of them, the MAJORITY. There are always some people whatever we do for them there will be a problem.**

**\*I plan for the majority of people not for people with exceptions.**

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**\*Lay outs, we can’t plan for these people.**

**\*Like: 1- people who smoke for a long time and have no diseases. 2- people who develop lung cancer by living with smokers.**

**\*So, its not easy to come up with the standards. Like when we create a new drug from a big company, the drug is usually expensive, one reason for this is what we did to find how safe is this material and to what level people can expose to it without having any problems.**

**\*We need (3-5) years to come up with the toxicity profile.**

**\*What is the difference between criteria and standards???**

**-Criteria: Scientific figure, recommendation based on research.**

**-Standard: Political figure, adopted by the government, thing I can tell people to do.**

**-Sometimes they maybe the same, but majority of time they are different.**

**\*One of the large institutes in the united states that does this job is NIOSH. it spends 80 million dollars each year to do 20 materials.**

**\*Every region has its own standards according to many things.**

**\*The pollution can affect our possessions like buildings, which in turn decreases its cost overtime so we will lose money.**

**\*There is something called degradation.**

**-When we say chemical degradation we mean what is the fate of certain chemical substance.**

**-Biodegradation: process of breaking down the materials by living organisms in the environment.**

**\*So degradation as a concept is wider and the biodegradation is a branch of it. The others are the natural powers like the sunlight, water , temperature, etc, they help in degradation but not in the bio part.**

**\*What if the material is not biodegradable??? It will accumulate in the environment and reach us.**

**-The more the material is not bio degradable, the more the possibility to survive in the environment and reach us.**

**\*DDT (one of the pesticides) was found in the breast milk although the ladies didn’t work in agricultural areas to deal with this kind of pesticides. Later they also found large amounts of DDT in the joints. Then they discovered DDT in the tissues inside the body. So DDT is not biodegradable and it manages to reach our food (drinking milk or eating meat) and this material will accumulate inside the bodies of ladies, some of it will be excreted by the milk and reach the infants. We call this bio accumulation as it accumulates inside the organisms. \*DDT is used in Al-Aghwar to control malaria.**

**\*Bio magnification: as we go up in the pyramid, the concentration of this material becomes higher and higher.**

**-If I through a very small amount of a material on the grass, the worm will eat more than one grass, then a bird or a chicken will come and eat more than one warm, so the concentration of the material that I through on the grass will increase by going up.**

**-The same if I through the material inside the ocean, a small fish will eat that material, then a larger fish will come and eat more than one small fish, so the concentration will be bio magnified.**

**-This what makes small concentrations of certain material in the environment becomes of value when goes upward.**

**\*Bio diversity: having different species in good number in a system.**

**-When we take sample from nature, we expect to see different species in that system.**

**-But if we just see one or two types, this means that the system is polluted. Only these two types could survive, so we can use this as an indication of pollution.**

**\*We need diversity in our environment, we depend on it, so we don’t have to affect it because we will lose some of the creatures and plants and we need them as source of drug, or to keep this environment. So we can’t play with bio diversity.**

**\*The ways by which human beings can interfere with the environment (Eco balance):**

**1- Pollution (daily).**

**2- Simplification: changing a complex eco system into a simple one. Like if we have a forest (complex, have a lot of plants and creatures) and we cut it down to make it a farm (simple, two or three kinds of crops).**

**\*If we leave the forest without care, it won’t be affected because it takes care of itself by itself (complex system).**

**\*While if we leave the farm without taking care of it, it will disappear because it is a simple system unable to stand by itself, and it can’t stand for the natural insults (like whiteflies that kill tomato crops, frosting) \*But in the forest there are natural elements that may counteract the action of the insults (like if we have whiteflies that kill tomato, there are certain types of bees (Dunbar bees ‘not sure’), they feed on whiteflies and kill them. They aren’t found in the farm). That’s why simplification is damaging.**

**\*Africa used to be the paradise of earth, nowadays its mostly deserts. The reason is that the Northern Europeans changed it from forests to farm lands to grow cash crops like cotton and** **sugar cane, and to rear horses and cattles. 3- Abuse of resources: like in phosphate company, after finishing their work with phosphate, they threw the remaining soil haphazardly in the road between Zarqa and Amman.**

**\*There is something called environmental tolerance that we have to calculate. If we have a fishery (place to collect fish), and the scientists measured that this fishery will feed ½ million people. If there are million people, the fishery will disappear.**

**-This is what we are doing, we are abusing the resources to the extent that these resources are unable to reproduce and continue doing what they have to do. Like the forest, if I log it at a speed higher than the rate of its growth, there will be no forest. So abusing resources is a damaging factor, and we are doing it worldwide everywhere.**

**4- Manmade disasters: like war and industrial accidents.**

**-Sometimes in wars the environment becomes a direct victim. The wars hit the environment** **deliberately. Like in America and Vietnam war when America eradicated forests. Iraq during its war with Iran, Iran used depleted uranium and left some regions of Iraq with high levels of radiation (so they have a lot of cancers after that war).**

**-Industrial accidents: like a ship with oil in it in the ocean and a defect happened, the oil goes to water, it will damage the ocean.**

**5-Interfering with growth and reducing factors.**

**- Like what happened in Australia in 1852, a scientist brought a 26 pairs of rabbits, after time they became millions. These rabbits are number one factor damaging for the environment in Australia, they ate all the grass, and pull it out of their roots (so the soil can be taken by the water), and digged under the ground damaging the soil. This 3 kg weighted funny good locking animal became 7-8 kg and a fighter, after they ate everything they start to attack the farms, so people had to build a wall (one of the longest walls build by people) to prevent these rabbits from reaching their farms and eating the grass. In Australia there is no enough natural elements that reduce the number of rabbits, people there don’t usually eat rabbits and there are no foxes to eat rabbits, this help the rabbits to increase in number.**

**-Another example of interfering when a scientist in the united states moved from Boston down to Florida and he used to have water lilies (beautiful plants grow on the top of water) in Boston, so he brought some of them to Florida. Then many of water bodies like lakes and rivers are unable to be used because of those water lilies.**

**-Why this didn’t happen in Boston and happened in Florida??? The difference is the temperature, the temperature in Florida is always sunny and this is what the lilies like (they die during bad winter), so they continue to grow to an extent damaging the environment.**